
Environmental Analysis of the Effect of Population Growth Rate on Supply Chain Performance and Economic Growth of Indonesia

Muhammad Haseeb ¹, Gholamreza Zandi ^{2*}, Nira Hariyatie Hartani ³,
Munwar Hussain Pahi ⁴, Shahid Nadeem ⁵

¹ Taylor's Business School (TBS), Taylors University, MALAYSIA

² University Kuala Lumpur Business School, MALAYSIA

³ School of Government (SoG), Universiti Utara Malaysia (UUM), Sintok Kedah, MALAYSIA

⁴ Indus University, Karachi, PAKISTAN

⁵ School of International Studies, Universiti Utara Malaysia (UUM), MALAYSIA

* Corresponding author: zandi@unikl.edu.my

Abstract

Many people worry that population growth will eventually cause an environmental catastrophe. However, the problem is bigger and more complex than. The need to include environmental criteria in the analysis of supply chains is increasingly recognized as a result both of limitations that are posed by legislation and regulations as well as of various motivations that a company may have. Extensive literature is available on supply chain performance (SCP). Most of the studies examined the relationship between SCP and firm performance in both developed as well as developing countries. However, researchers did not consider the effect of SCP on economic growth, particularly in Indonesian prospective. Therefore, the objective of this study is to examine the role of supply chain performance in the economic growth of Indonesia. To address the objective, data were collected from Indonesian economists. E mail survey was used, and questionnaires were distributed to collect the data. A total number of seven hypotheses were tested with the help of the structural equation modelling technique. The finding shows that inflation has an influence on SCP. Increases in population growth decrease the SCP. Moreover, investment growth rate and population growth rate also have an effect on SCP which has a contribution to the economic growth of Indonesia. Thus, the Indonesian government must boost supply chain to enhance economic growth.

Keywords: environmental analysis, supply chain performance, rate of inflation, investment growth rate, population growth rate, economic growth rate

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INTRODUCTION

The world population is growing by approximately 74 million people per year and population growth is not evenly distributed across the globe. In 2015 the world population is more than 7.3 billion people. That's more than seven billion three hundred million bodies that need to be fed, clothed, kept warm and ideally, nurtured and educated. More than 7.3 billion individuals who, while busy consuming resources, are also producing vast quantities of waste, and our numbers continue to grow. The United Nations estimates that the world population will reach 9.2 billion by 2050. Many people worry that unchecked population growth will eventually cause an environmental catastrophe. This is an understandable fear, and a quick look at the

circumstantial evidence certainly shows that as our population has increased, the health of our environment has decreased. The impact of so many people on the planet has resulted in some scientists coining a new term to describe our time—the Anthropocene epoch. Unlike previous geological epochs, where various geological and climate processes defined the time periods, the proposed Anthropocene period is named for the dominant influence humans and their activities are having on the environment. In essence, humans are a new global geophysical force.

The need to include environmental criteria in the analysis of supply chains is increasingly recognized as a result both of limitations that are posed by legislation and regulations as well as of various motivations that a

company may have. A decision model is proposed in this paper based on environmental performance indicators, which may support decision making in the case of supply chains in the presence of environmental considerations. In the recent decade, the supply chain is becoming the crucial element in economic growth. As a good supply chain mechanism has considerable contribution among various nation's economy. Because it has an exceptional contribution to various country's gross-domestic product. Increases in the performance of manufacturing companies and services companies (Choi and Chu 2001, Mitra and Datta 2014) increases the overall growth in the economy. Because the increases in firms performance have a direct relationship with economic growth (Škare and Hasić 2016, Wagner 2010, Bilman and Yetik 2017).

Extensive literature is available on SCP. Most of the studies examined the relationship between SCP practices and firm performance in both developed as well as developing countries (S. Li, Ragu-Nathan, Ragu-Nathan, & Rao, 2006; Tan, Kannan, & Handfield, 1998), however, most the previous studies did not examine the effect of SCP on the economic growth. This relationship between SCP and economic growth is important because the supply chain has a key role in the economy.

Therefore, this study examined the role of supply chain performance in the economic growth of Indonesia. Indonesia is under the list of emerging economies. Therefore, it requires better strategies to become under the list of developed economies. Various previous studies carried out research on Indonesian economic growth and supply chain management (Yoo and Kim 2006, Zuo et al. 2009), however, missing the collective effect of supply chain and economic growth.

Thus, this study investigated the relationship between economic growth and supply chain performance in Indonesian prospective. Additionally, supply chain performance generally effected due to various other economic factors such as rate of inflation, investment growth rate and population growth rate. According to Bey (2012), the rate of inflation, investment growth rate and population growth rate has a significant influence on economic growth. Fluctuations in these three elements have the ability to influence the supply chain and economic growth of every country (Ali and Haseeb 2019, Haseeb et al. 2017, Suryanto et al. 2018, Shital et al. 2018).

Inflation is usually the quantitative measure of the degree at which the normal price level of various

particular goods as well as services in an economy goes upward over a specific period of time. Often articulated as a percentage, inflation designates a reduction in the buying power of a nation's currency. It has a negative effect on the supply chain of goods and services. Because increases in inflation decrease the purchasing power of people which ultimately decreases in the supply of goods and services. On the other hand, investment is treated as the expansion or development of businesses. As increases in investment among various business increase the supply chain activities which ultimately increases the overall supply chain performance (Khan et al. 2018). Increases in SCP definitely have a positive indication of better economic growth. Moreover, increase or decreases in population also effect on the supply of goods. As both population and demand for goods have a relationship with each other (Coale 1960, Lührmann 2005). Increases in the population increase the demand for goods and services which increases the supply chain activities as well as performance.

Therefore, the objective of this study is to examine the role of SCP in the economic growth of Indonesia. The relationship between supply chain performance, inflation, investment, population, and economic growth is shown in **Fig. 1**. To achieve this objective, the study has following sub-objectives;

1. To study the role of inflation rate in SCP.
2. To study the role of the investment growth rate in SCP.
3. To study the role of population growth rate in SCP.
4. To study the role of SCP in economic growth through the supply chain.
5. To study the mediating role of SCP.

HYPOTHESES DEVELOPMENT

There is a huge survey of the literature, which includes theoretical and experimental parts of the connection between economic growth and inflation. To achieve the end goal and stay away from replication we chose to exhibit a concise literature survey which is committed to the examination of inflation impact on economic growth. Now a day, the new class of models with respect to inflation-economic growth linkage demonstrates that connection between them is non-linear and, in this manner, there is a threshold level here. In this relationship between inflation and

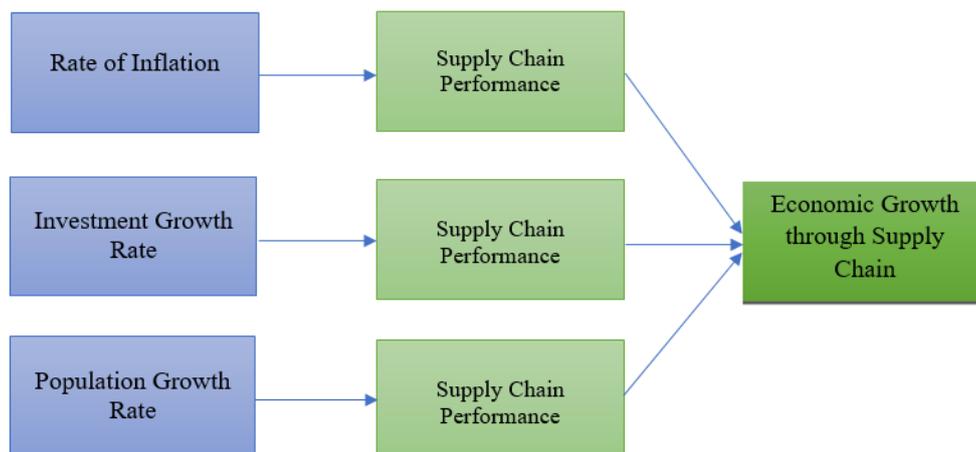


Fig. 1. The theoretical framework of the study showing the relationship between SCP, inflation, investment, population, and economic growth

economic growth, the supply chain has the most important role. Inflation has an impact on the supply chain which ultimately has an impact on the economic growth of the country. As it is revealed by Sarker, Jamal, and Wang (2000), both supply chain and inflation have a relationship with each other.

Besides, some different investigations have demonstrated that the connection between inflation and growth is critical just for specific levels of inflation. For example, Bruno and Easterly (1998) inspect the factors of economic growth utilizing yearly CPI inflation of 26 nations which noticed inflation crises in the period between 1961 and 1992. The observational discoveries of the investigation show the presence of a limited level of the inflation rate of 40%. They find an uncertain link between inflation as well as economic growth beneath this limit level when nations with more inflation crises. The investigation proposes that there exists a brief negative association among inflation as well as economic growth. The strength of the exact results is analysed by monitoring for different factors, for example, shocks related to political issues (Maqbool et al. 2018) wars and terms of exchange. They additionally find that nations that have crossed the limit into more inflation have a negative impact on economic growth. The economy is the most important element of every nation (Basheer et al. 2019) and increases in inflation decrease the supply chain activities, which decreases economic growth

The supply chain has a significant role in every nation's well-beings and economic growth (Abdul and Khan 2018, Delgado and Mills 2017, Khan et al. 2018). Increases in supply chain mechanism increase the economic growth. As the supply chain is the most important part in various activities related to exports

(Henson and Mitullah 2004, Ling-Yee and Ogunmokun 2001) and export has an important participation in economic growth (Balassa 1978, Ram 1985). However, inflation has a negative effect on the supply chain. The negative effect on supply chain decreases the supply chain effectiveness and ultimately decreases the economic growth.

Hypothesis 1: Rate of inflation has a negative effect on SCP.

Moreover, the investment growth rate also has a role in the supply chain and economic growth of the country. In general, to invest is to assign money in the anticipation of some profit in the future – for instance, investment in various goods, in real estate by the service industry, in different factories for manufacturing products, in product expansion, and in R & D. These investment activities growth has significant influence on supply chain and economic growth. According to various studies, increases in investment increases economic growth (Borensztein et al. 1998, Carkovic and Levine 2005, Wright 2008). It is evident from the literature that to expedite economic growth, investment is most important.

Increases in investment also have an influence on the supply chain. More the investment in the country more will be the supply chain performance. Most of the previous studies revealed that investment increases the business (Haines Jr et al. 2003, Harris and Li 2005). Improvement in business in any community increases the supply chain performance which ultimately increases the economic growth. As it is revealed that increases in businesses promote economic growth (Cooley and Prescott 1995). Therefore, there is a significant link between the investment growth rate,

supply chain performance and economic growth of the country.

Hypothesis 2: Investment growth rate has a positive effect on SCP.

Nevertheless, population growth rate has a considerable effect on economic growth through supply chain performance. According to Bey (2012), the population growth rate is responsible for the economic growth of every country. A study carried out by Peterson (2017) on the relationship of population growth and economic growth drawing on historical data to chart the relations of population growth, growth in per capita, and complete economic growth by considering the past 200 years and found that both economic growth and population growth has a strong relationship with each other's. He also argued that most of the previous studies have controversial results in respect to the connection between economic growth and population growth rate.

A third element, namely; supply chain performance also has an important role between economic growth and population growth rate. Increases in population growth rate have an influence on supply chain performance which has a significant impact on economic growth. Low populace growth in high-income nations is probably going to make social and economic issues while high populace growth in low-income nations may moderate their advancement. The universal movement could alter these awkward natures, however, is contradicted by many factors. Drawing on economic examinations of imbalance, it creates the impression that brings down population growth rate and restricted movement may add to expanded national and worldwide economic disparity (Bey 2012). However, all the factors influence the supply chain performance.

Fluctuation in supply chain activities has an effect on economic growth rate. As literature provides the evidence that supply chain/logistic and economic growth has a significant association through the gross-domestic product (Dölek and Günes 2016, Boyi et al. 2017, Li et al. 2018, Ozturk and Ozturk 2018, Ozturk and Ozturk 2018, Pérez-Luna et al. 2018, Rahman et al. 2017, Sharipbekova and Raimbekov 2018, Tshupo et al. 2017). A study carried out by Hayaloğlu (2015) found that logistic contributes towards economic growth. Increases in logistic activities increase the supply chain and ultimately increases economic growth. Most of the countries are now focusing on supply chain management activities to enhance economic growth.

Increases in supply chain activities increase the contribution in the gross domestic product. Thus, from the above discussion, it is concluded that population growth rate has the ability to influence supply chain performance. Increases or decreases in population can influence the supply chain and finally supply chain performance can modify the economic growth.

Hypothesis 3: Population growth rate has a significant effect on SCP.

Hypothesis 4: SCP has a significant effect on economic growth.

Additionally, from the literature, it is investigated that inflation, investment growth rate and population growth rate have a significant relationship with SCP. Moreover, SCP has a significant relationship with economic growth of the country. Therefore, by following the instructions of Baron and Kenny (1986), supply chain performance can be used as a mediating variable. Thus, from the mediation prospective of supply chain performance, following hypotheses are proposed;

Hypothesis 5: SCP mediates the relationship between the rate of inflation and economic growth.

Hypothesis 6: SCP mediates the relationship between the investment growth rate and economic growth.

Hypothesis 7: SCP mediates the relationship between population growth rate and economic growth.

RESEARCH METHODOLOGY

Three sorts of methodologies have been directed in the area of advanced education which are quantitative, qualitative and mixed method research techniques. In the mixed methodology, quantitative as well as qualitative methods are utilized mutually (Creswell and Garrett 2008). In the sociology research, the determination of method is most significant. The methodologies section should in line with the nature of the research study being attempted as opposed to making choice dependent on biases (Sogunro 2001). Along these lines, at the time of determination of the methodology for the research, numerous variables are considered yet the most critical thing to be considered is the choice of technique which gives the best responses to the various research questions.

Therefore, by following the above guidelines and examine the nature of the study, the quantitative research design was selected. To address the objective,

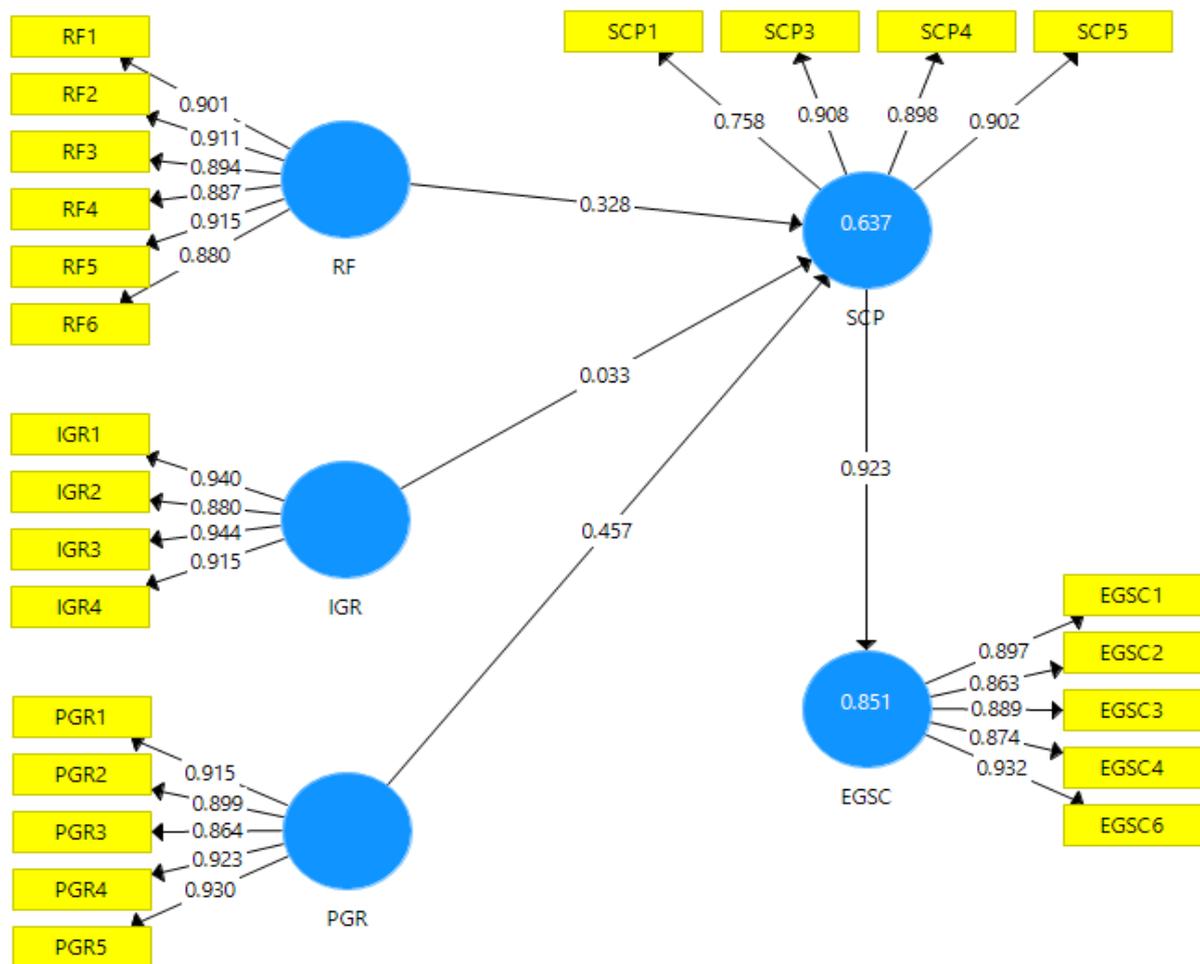


Fig. 2. Factor Analysis

data were collected from Indonesian economists. E mail survey was preferred, and questionnaires were distributed to collect the data. Total 200 questionnaires used to collect the data. All the questions in the questionnaires were close ended and based on the 5 options from strongly disagree to strongly agree. E mail addresses of economists were gathered from the various sources provided by the government of Indonesia. Three reminders were sent to all the economists who did not respond to the survey. Additionally, all the measures were adapted from previous studies and measurement scale was developed to collect the data. From 200 questionnaires, only 69 valid responses were received. Therefore, PLS was used to analyse the data, because PLS is appropriate while analysing the data with a small sample (Reinartz et al. 2009).

ANALYSIS AND RESULTS

Hameed, Basheer, Iqbal, Anwar, and Ahmad (2018) provide the various steps of PLS-SEM techniques by following the recommendations of Henseler, Ringle, and Sinkovics (2009). According to these steps, PLS-

SEM is based on two major parts. Generally, these steps are divided into various measurements such as reliability, validity and hypotheses testing. According to the instructions, reliability and convergent validity is based on factor loading, composite reliability (CR) and average variance extracted (AVE). **Fig. 2** showing the factor loading which is above 0.7 as recommended by different prominent studies.

From **Tables 1** and **2**, it is clear that all the values are under satisfactory level. Factor loading is above 0.7 for all items, composite reliability is above 0.7 and AVE is also above 0.5. Additionally, the discriminant validity is shown in **Tables 3** and **4**. In **Table 3** it is achieved with the help of AVE square root and in **Table 4**, it is achieved with the help of HTMT ratio.

Table 1. Factor Loading Results

	EGSC	IGR	PGR	RF	SCP
EGSC1	0.897				
EGSC2	0.863				
EGSC3	0.889				
EGSC4	0.874				
EGSC6	0.932				
IGR1		0.940			
IGR2		0.880			
IGR3		0.944			
IGR4		0.915			
PGR1			0.915		
PGR2			0.899		
PGR3			0.864		
PGR4			0.923		
PGR5			0.930		
RF1				0.901	
RF2				0.911	
RF3				0.894	
RF4				0.887	
RF5				0.915	
RF6				0.880	
SCP1					0.758
SCP3					0.908
SCP4					0.898
SCP5					0.902

Table 2. AVE and CR

	α	rho_A	CR	(AVE)
EGSC	0.935	0.937	0.951	0.795
IGR	0.940	0.945	0.957	0.847
PGR	0.946	0.948	0.958	0.822
RF	0.952	0.953	0.962	0.807
SCP	0.889	0.890	0.925	0.755

Table 3. Square Root of AVE

	EGSC	IGR	PGR	RF	SCP
EGSC	0.892				
IGR	0.685	0.920			
PGR	0.630	0.532	0.907		
RF	0.696	0.705	0.807	0.898	
SCP	0.523	0.756	0.785	0.673	0.869

Table 4. HTMT Ratio

	EGSC	IGR	PGR	RF	SCP
EGSC					
IGR	0.726				
PGR	0.773	0.788			
RF	0.735	0.757	0.655		
SCP	0.601	0.626	0.756	0.840	

From **Tables 1-4**, it is evident that the measurement model is achieved its satisfactory level to proceed for the further analysis. Further analysis of hypotheses testing was performed with the help of PLS bootstrapping technique. PLS bootstrapping is shown in **Fig. 3**.

Table 5 shows the PLS bootstrapping results. From the results, it is clear that all the hypotheses have t-value above 1.96 which supported the hypotheses. Hence, the results supported Hypothesis 1, 2, 3 and 4. Additionally, the mediation effect is shown in **Table 6**. It is found

that all the in-direct hypotheses with the mediation effect of supply chain performance are significant which accept Hypothesis 5 and 7. However, the in-direct effect between investment growth rate and economic growth was not significant which rejected Hypothesis 6.

DISCUSSION AND CONCLUSION

The purpose of this study is to examine the role of SCP in the economic growth of Indonesia. To address the objective, data were collected from Indonesian economists with the help of an email survey. To attain

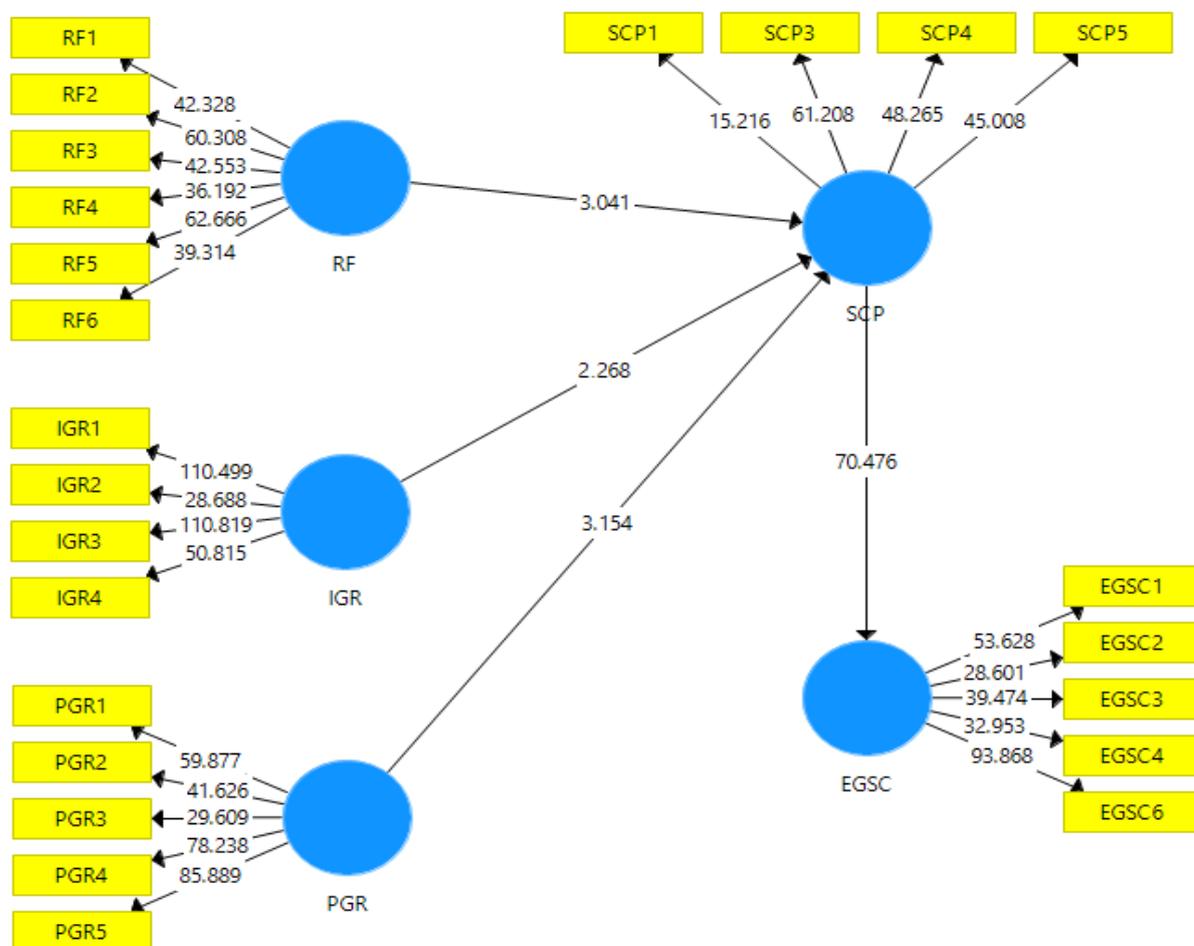


Fig. 3. Structural Model Assessment

Table 5. Direct effect

	(O)	(M)	(STDEV)	T Statistics	P Values
IGR -> SCP	0.033	0.032	0.015	2.268	0.031
PGR -> SCP	0.457	0.455	0.145	3.154	0.002
RF -> SCP	-0.328	-0.316	0.108	3.041	0.002
SCP -> EGSC	0.923	0.923	0.013	70.476	0.000

Table 6. Mediation Effect

	(O)	(M)	(STDEV)	T Statistics	P Values
IGR -> SCP -> EGSC	0.030	0.041	0.113	0.269	0.788
PGR -> SCP -> EGSC	0.422	0.420	0.135	3.135	0.002
RF -> SCP -> EGSC	0.303	0.292	0.100	3.036	0.003

the main objective, five sub objectives were developed which are given below and each objective is discussed one by one in light of results provided by the current study.

1. To study the role of inflation rate in SCP.
2. To study the role of the investment growth rate in SCP.
3. To study the role of population growth rate in SCP.

4. To study the role of supply chain performance in economic growth through the supply chain.
5. To study the mediating role of SCP.

Against the first objective, the inflation has a significant effect on SCP with t-value 3.041 and beta value -0.328. Negative beta value shows an indirect relationship. Increases in inflation decrease the supply chain performance. Against the second objective, it is found that investment growth rate has a significant positive relationship with supply chain with t-value

2.268 and beta value 0.033. Increases in the rate of investment increase the supply chain practices. Against the third objectives, the same results were found. The population growth rate has significant and positive effect supply chain with t-value 3.154 and beta value 0.457. The fourth objective was also achieved with the significant positive relationship between SCP and economic growth. Finally, the fifth objective related to mediation is shown in **Figs. 4** and **5**.

From **Fig. 4**, it is evident that the mediation effect of SCP between population growth rate and economic growth is significant. SCP increases the positive effect of population growth rate on economic growth.

Moreover, **Fig. 5** shows the indirect effect of SCP between the rate of inflation and economic growth which shows a significant mediation effect. However, the mediation effect of SCP between the investment growth rate and economic growth is insignificant.

Therefore, the Indonesian government must enhance the SCP to increase economic growth. The Indonesian government should control inflation rate which will affect positively on economic growth and increase the supply chain practices. Thus, the study is beneficial for practitioners to take help while making strategies.

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