CAUSAL RELATIONSHIP BETWEEN LABOUR PRODUCTIVITY AND EXPORT OF GARMENT FIRMS IN YANGON*

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Abstract

The garment and apparel industry is one of the prioritized sectors in Myanmar and increasing its productivity is vital to Myanmar's economy. In order to ensure the growth of labour productivity and promote its export to the global apparel market, this study explores the causal relationship between labour productivity and exports of Myanmar garment firms. The major purpose of this study is to analyze the direction of causation between labour productivity and export of garment manufacturing firms, and to examine whether the relationship between labour productivity and export are long-run or short-run. The analysis is based on the Granger Causality Test by using the time-series data for 64 consecutive months during the period from January-2017 to April-2022. The results of causality test indicates that the relationship between labour productivity and export is concerned only short-run with the unidirectional causal relationship form labour productivity to export of garment firms which is occurred by three months lags. Therefore, based on this result, it can be concluded that an increase in labour productivity about three months ago can enhance current period's exports for Myanmar's garment industry.

Key words: Labour Productivity, Export, Garments, Causality.

Introduction

The garment industry has recognized to be a driver of economic and occupational growth in many Asian economies. Myanmar's garment and textile industry is one of the fastest growing industries in Southeast Asia since 1990s. Although agriculture is the backbone of Myanmar's economy as a land rich country with abundant natural resources. In addition, the most popular handicraft in Myanmar is traditional textile weaving and it is still possible to produce excellent clothes. Nowadays, garment and textile markets become wider and wider with increasing population and the global garment industry forms an important component of world trade flows. Particularly, some developing countries like Myanmar, where garment accounts for a large proportion of nation's total exports.

Myanmar's garment manufacturing industry is dominated by exported-oriented firms, which operating under the CMP (Cut - Make - Pack) system, where most of the raw materials have been imported. Myanmar experienced a remarkable development of its garment industry after 1990s. Since that time, garment sector has become a key contributor to GDP of Myanmar's economy along with agricultural products, fishery and natural gas. Accordingly, garment production is one of the largest manufacturing activities in Myanmar in terms of the number of firms involved, number of employees, and increasing number of exports. Therefore, in the case of Industry Sector, processing and manufacturing contributes the highest share of GDP, in which CMP garment and textile industry create a major portion of Myanmar's manufacturing sector and which covered about 75% of total manufactured products (ADB, 2019).

In the past few years, Myanmar's garment sector was the second largest export item after the natural gas. In recent years, the garment industry contributes the largest share of export among principal export commodities of Myanmar. According to the Central Statistical Organization's Statistical Year Book (2020), the contribution of export by garment industry has

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increased significantly, which was sharply increased from US$ 272 thousand million in 2005-06 to US$ 4,830 thousand million in 2018-19. Therefore, it was increased over ten-times during the period of 2005-06 to 2018-19 (CSO, 2020).

Now a day, garment export has taken the leading role of Myanmar's commodity export. In order to promote the export of garments to the global market, it needs to ensure the growth of labour productivity. Thus, the direction of causation between export and labour productivity has become the important implication for the way of industrial policy that can lead to stimulate the labour productivity growth. Therefore, this study requires to analyze the linkages between labour productivity and garment export of Myanmar.

Objectives of the Study

In order to observe the relationship between labour productivity growth and export growth, this study explores the two objectives:

- To examine the direction of causation between labour productivity and export of garment manufacturing firms , and
- To analyze whether there is a long-run or short-run relationship between labour productivity and export of garment manufacturing firms.

Literature Review

This part of study reviews the literature concerns with the labour productivity, export and their linkages.

Productivity Growth and Long-run Export Growth

Economic growth can occur when an economy's production at full employment level increases. It can push an outward shift of production possibility fronter (PPF). Many literatures found out the results that indicate the growth of productive capacity depends on the rate of growth of labour productivity and technological progress.

In the modern world, the role of exports in economic growth is obviously importance. Recent economic development models would also suggest an important positive role of exports in economic development due to an attenuation of the foreign resource gap (Robertson, 2012). Again, according to Porter (2003), productivity is the best measure of export competitiveness, and, there are some circumstances that would lead to a productivity growth.

Garment exports contributed significantly in obtaining foreign exchange for developing countries. Thus, various researchers explored the determinants of export growth and its impact on labour productivity of garment firms for many countries. When the countries liberalized in international trade, there is great competition among garment and textile industries. On the other hand, competition both in local and international market is hindered by manpower underdevelopment, and high cost of production.

However, there is no single factor to determine nations' competitiveness for export growth. There are also four major different ways to determine export competitiveness of garment exporting firms. The first is the relative export price, which are one country's export prices in relation to other countries, expressed as an index. The second is a country's terms of trade, which is an index of a country's export ratio to import prices. In addition, the third one is the labour productivity, which is usually expressed as GDP per worker, or GDP per hour of employment. Then, the last is the unit labour costs, which are the cost of labour per unit of output. (Khanna, 1993)

But labour costs are not the only comparative advantages for garment exporting countries but also to compete the global market of garment and textile industry. Quality products, labour skills and process of technology are also important factors that buyer firms need to care about for garment industry (Handfield, 1994).

Many industry level literatures described that low-cost labor is no longer the significant comparative advantage for garment industry in Asian countries, such as, China, Taiwan, South Korea and Japan, etc. These countries have experienced losing export competitiveness, due to increasing labor costs and it created negative impact on their textiles and garment export performance (Jin, 2004).

Sayre and Morris (2015) criticized the idea of reducing factor costs cannot be further suitable to promote productivity of any manufacturing firms. Then, Sayre and Morris (2015) also argued again that when an increase in the quality of the labour force, an increase in the amount of capital stock and natural resources, or as improvement in technology, which will increase the productivity and shifts the production possibilities curve to the right. It also equally increases the quality of exports in the long-run.

Therefore, manufacturing firms should contribute to improve efficiency in productive factors, such as provide workplace training for employees and other welfare facilities, that lead to an improvement in human capital. In some cases, firms have to utilize improved technology or emphasize on advanced technology and R&D. Furthermore, some firms try to modify their managerial practices for efficient utilization of their own resources like human resource, financial capital and natural resources (Sayre and Morris, 2015).

However, with the lack of physical capital and technology, developing countries should be depending on an improvement in human capital and upgrading the managerial practices to be an efficient utilization of owned resources to increase productivity and export growth in the long-run (Sayre and Morris, 2015).

Causality Approach: Relation between Labour Productivity and Exports

The most important factor affecting exports of an industry is evolution of labour productivity. It can be an important variable in productivity measurements. The international trade theory has suggested a potential source of productivity gains where an outward-oriented trade regime for production across exporting goods. Krugman (1985) stated that international trade theory saw the growth of exports as stimulating production across the economy through technological spillovers and other externalities. Thus, the rate of export growth can cause productivity gains in economy.

Moreover, Romer (1986) presented that new growth theories are characterized by the endogenization of technology. A justification of causality from productivity to exports that can be found in New Trade theories. It is argued that productivity leads to greater exports by motivating the technological factors to get more exports. In other words, international technological differences are important factors of international competitiveness and trade performance of developed countries (Romer, 1986).

Although the new trade theory reflects the link between productivity gains and exports, the effect of export on a greater productivity is primarily ambiguous and doubtful in model of imperfect competition and increasing return to scale. Exports are expected to increase technical efficiency to greater degree in smaller economies and those with fewer new firms can be entering the markets. Furthermore, productivity improvements are more likely to result from an increase in exports if incentives are created to invest in R&D (Dhiman & Sharma, 2019).

However, examining of causality for productivity and exports in industrialized countries shows that countries are successful in their export performance seem also to be successful in their productivity performance, and vice versa. A number of studies have found a positive relationship between exports and productivity growth (Dhiman & Sharma, 2019). At the macro-level, Marin (1992) found that there is unidirectional causality from exports of manufacturing goods to labour productivity undeveloped countries, such as Germany, Japan, the UK and, US. On the other hand, at the micro-level, firms with higher productivity are more expected to sell in the export market, especially in developing countries (Marin, 1992).

In practices, the relationship between exports and productivity is an interesting prospect. Exports may rise from the realization of economies of scale due to productivity gains, then, the rise in exports may further create cost reductions which may result in further productivity gains. Alternatively, export expansion leads to improved skills and technology. This increased efficiency creates a comparative advantage for a given country, which facilitates exports growth (Hatemi & Irandoust, 2001).

Methods of the Study

This study has used both primary and secondary data. The primary data are collected through interviewing firm owners with structured questionnaire. The data collection period is February to August, 2022. The secondary data is mainly collected from Myanmar Garment Manufacturers Association (MGMA), Directorate of Investment and Company Administration (DICA), and Statistical Year Book, as well as the international sources like WTO and UN Comtrade Database. In this study, the Granger Causality test is used to examine the direction of causation and analyze the relationship between two main variables: labour productivity and export, whether their relationship is long run or short run.

In the preparing the process of Granger causality test, Augmented Dickey-Fuller (ADF) unit root test is conducted in order to examine whether the variables are stationary or not, and then, Vector Autoregressive (VAR) model is applied for lag length selection. Subsequently, Vector Error Correction Model (VECM) and Johansen Co-integration test had used for long-run relationship between variables. Finally, Granger causality test is accomplished to examine the direction of causation between the selected variables in the short-run and long-run. This analysis can be based on time-series data (i.e., monthly data), in which labour productivity and export data are collected for 64 consecutive months (January, 2017 to April, 2022) through the survey data from sample garment manufacturing firms.

Data Analysis and Results

In an econometric analysis for some economic variables, it needs to know whether changes in one variable would have an impact on changes other variables, sometimes. When a study needs to find out this phenomenon more accurately, it should use a Granger Causality Test (Wooldridge, 2019).

In order to analyze the relationship between the labour productivity and export of the sample garment exporting firm, this study operates Granger Causality Test by using time-series data (i.e., monthly export, monthly production, and monthly numbers of workers) for 64 consecutive months during the period from January-2017 to April-2022. In order to analyze the relationship between labour productivity and export of sample garment firms, this study includes the following steps.

(i) Results of Unit Root Test (Testing for Stationary)

In order to examining the causality between the variables of labour productivity and export of garment firms, this study needs to perform the unit root test to analyze the variables are

stationary or non-stationary. In this case, the Augmented Dickey-Fuller (ADF) test is applied in this study. The test is undertaken for labour productivity per month (total output is divided by total labour inputs) and monthly export (total number of clothes exported per month). The results of ADF tests are presented in Table 1, as below.

Table 1: Results of Augmented Dickey-Fuller Test

Variables	With Trend		With Drift		Results
	t-statistics	p-value	t-statistics	p-value	
ADF of Labour Productivity	-5.420***	0.000	-2.166**	0.0172	Stationary
ADF of Export	-4.859**	0.004	-2.816**	0.0033	Stationary

Source: Own Survey Data (2022)
*** Significant at 1% level
** Significant at 5% level

In order to analyze the ADF unit root test for stationary, this study propose the hypothesis as follow:

H_0: The series has a unit root (i.e., There is non-stationary between two variables)

H_1: The series has not a unit root (i.e., There is stationary)

According to the table, the results of unit root test for both export and labour productivity described that it has a negative coefficient with significant p-value at 5% level. In this analysis, the negative coefficient means that the model is valid and the absolute value of Test Statistics for both Export and Labour Productivity are higher than its critical values at 5% level, which occurred both in terms of regress with trend and drift.

Therefore, the results of ADF test indicated that this study can reject the null hypothesis because the test statistics is significantly large and negative. Thus, the series is stationary, which means that the series have not a unit root. Since all variables are stationary, the rest parts of the causal analysis can be continued to test.

(ii) Optimal Lag Length Selection

In this section, the Vector Auto Regression (VAR) lag order selection method is utilized to determine the optimal lag length as presented in Table 2.

According to results of an analysis, the above table presents the optimal lag length by VAR model which determines the number of lagged for the cointegration test of this study. The optimal lag-length can be determined by using the test statistics of LR, FPE, AIC, SBIC and HQIC tests, where the selection criterion is based on the lowest value of those tests. According to AIC test, it is indicated to choose “three lags” which can be suitable for this model to determine both variables; export and labour productivity of garment exporting firms in this study, because Lag-3 of AIC has lowest value with significant p-value at 5% level.

Table 2: Determine the Optimal Lag Length by VAR

Lag	Log L	LR	FPE	AIC	HQIC	SBIC	p-value
0	-1079.95		1.6e+13	36.0651	36.0924	36.1349	
1	-961.493	236.92	3.5e+11	32.2498	32.3317	32.4592***	0.000
2	-956.579	9.8295	3.4e+11	31.2193	32.3558	32.5683	0.043
3	-948.043	17.071**	2.9e+11**	32.0681**	32.2593**	32.5568	0.002
4	-944.199	7.6881	2.9e+11	32.0733	32.3191	32.7016	0.104

Source: Own Survey Data (2022)
Denote: ** Significant at 5% level
*** Significant at 1% level

(iii) Johansen Cointegration Test

The Johansen Cointegration test can be estimated whether there is a long-run relationship or not between the variables. Before performing this test, the variables have to been stationary. According to the ADF unit root test, variables are stationary, and, thus, the result allows to operate the cointegration test. The results of the Johansen Cointegration test are shown in Table3.

Table 3: Results of Johansen Test for Cointegration

Maximum Rank	Eigenvalue	Trace Statistic	5% Critical Value
0	-	35.2674	15.41
1	0.43492	1.0205**	3.76
2	0.01686	-	-
Maximum Rank	**Eigenvalue**	**Max Statistic**	**5% Critical Value**
0	-	34.2470	14.07
1	0.43492	1.0205**	3.76
2	0.01686	-	-

Source: Own Survey Data (2022)
** Denotes rejection of the hypothesis at the 0.05 level

In this test, the Null Hypothesis (H_0) stated that there is no cointegration between two variables, and the Alternative Hypothesis (H_1) stated that there is a cointegration between two variables. In the analysis of Johansen Cointegration test, the rule of interpretation is based on the value of trace statistics and max statistics (maximum-eigenvalue statistics) with its critical value at 5% confidence level.

According to the results of Johansen test in table, the test starts from the maximum rank zero, the trace statistics at Maximum-Rank=0 of 35.2674 exceeds its 5% critical value of 15.41,

which means that the trace statistics can reject the null hypothesis and accept the alternative hypothesis. Although the results of trace statistics accept the alternative hypothesis of H_1: there is cointegration among the two variables, the zero-maximum rank in Johansen test presents that there is zero cointegrating equation (i.e., no cointegration) among the variables in this study.

Further, the trace statistics at Maximum-Rank=1 of 1.0205 is also less than its critical value of 3.76. Therefore, the null hypothesis cannot be rejected and accept the null hypothesis. It means that the two variables of this study are not cointegrated, which described that they are not moving together in the long-run. Thus, this study should be used the unrestricted VAR model instead of VECM because the two variables (i.e., labour productivity and export) are not cointegrating in the long-run and they have only short-run relationship among the variables in this study.

Similarly, the maximum-eigenvalue statistics (i.e., max-statistics) of Johansen Cointegration test also presents the similar results of trace statistics for the variables of this study.

(iv) Estimation of Short-Run Relationship by VAR Model

The analysis of causality test indicated that this study should run unrestricted VAR Model instead of VECM because the variables of this study are not cointegrated by applying the results of Johansen test. It means that the variables such as labour productivity and export of sample garment firms are not related over the log-run and their relationships are significantly occurred only in the short-run. Therefore, the short-run relationship between labour productivity and exports of garment firms are presented in the Table 4.

Table 4: Results of VAR Model for Short-Run Relationship

Variables	Coefficient	p-value
Labour Productivity		
Export L1.	-4.92e-09	0.865
L2.	-1.51e-08	0.637
L3.	1.26e-08	0.658
_Cons	.2407372**	0.033
Export		
Labour Productivity L1.	1317430	0.931
L2.	3783616	0.805
L3.	-8352481**	0.002
_Cons	6220249**	0.018

Source: Own Survey Data (2022)

***denotes highly significant at 1% level.

** denotes highly significant at 5% level.

The data for VAR analysis involves two variables: the labour productivity and exports of garments firms for sixty consecutive months between 2017 to 2022. According to the results of analysis by the VAR Model, all the lag values of export do not have significant effect on labour productivity because its p-values are not significant even at the 10% level. It means that there is no short-run causality from export to labour productivity of garment firms in this study (i.e., export does not cause labour productivity). However, the constant p-value (p=0.033) is significant at 5% level, which means that both of the variables can be jointly determined on labour productivity of garment firms in the short-run.

On the other hand, the export would be considered as the dependent variable, where the p-value of labour productivity (L_3) p=0.002 is significant at 1% level. It can be described that the export of garment firms is significantly influenced by its labour productivity during the three months periods of time to export. Therefore, the time lag between labour productivity to export is considered as 3 moths for garment industry of Myanmar. In this study, a significant lag 3 value means that the relationship between variables (causation from labour productivity to export) are 3 months apart or firm's lead time to export is 3 months from its labour productivity growth. Therefore, it can be described that there is a causal relationship from labour productivity of garment firms to export, which is occurred in three months lags.

(v) Results of Granger Causality Test

In this section, Granger Causality Wald test is operated to analyze the short-run causation of variables for this study. The results of Granger Causality Test of paired variables of labour productivity of garment firms and its export are presented in the following Table 5.

Table 5: Results of Granger Causality Wald Test

Granger Cause	No. of Obs	Chi-sq	df	Prob > Chi-sq
Export ⟶ Labour Productivity	61	2.9467	3	0.400
Labour Productivity ⟶ Export**	61	9.3706	3	0.025

Source: Own Survey Data (2022)
**denotes highly significant at 5% level.

Table 5 presents the results from Granger Causality of short-run relationship between the variables. According the results of causality test, only the labour productivity of garment firms has "Granger Cause" to the exports of garment firms at 5% significant level. However, garment export does not "Granger Cause" the labour productivity of garment firms in this study. Therefore, there is unidirectional effect from labour productivity to export in the short-run for this study. It means that, Labour Productivity has causal effect on Export at 5% level, however export of firms has no causal effect on Labour Productivity of garment firms.

Then, in order to check whether the VAR Model is fit or not fit for the variables of this study, it operates the VAR Diagnostic Test, such as LM Test for Residual Autocorrelation Test is performed. The results of LM test are presented in Table 6.

According to the results of LM Test, the p-value of lags (L_1 and L_2) are not significant. It means that it cannot reject the null hypothesis and it has to accept the null hypothesis of there is no autocorrelation at lag order. Therefore, the model does not have any autocorrelation, which means that the model is desirable and fit for the variables of this study.

Table 6: Diagnostic Test of VAR

Diagnostic Test	Lag	Chi-sq	Prob.
LM Test for Residual Autocorrelation	L_1	5.7933	0.21512
	L_2	4.8999	0.29772

Source: Own Survey Data (2022)
H_0: no auto correlation at lag order

Therefore, this study can be concluded that only 3 lag value of Labour Productivity variable has causality fit on Export at 5% level. Thus, there is unidirectional causal relationship

from Labour Productivity to Export for 3-month lag. This relationship occurs only in the short run and it may change over the long-run for this study. It can be described that increased labour productivity can cause the garment export growth that is prominent for three-month lag, which can be valid for only short-run.

Findings and Conclusion

The findings of Granger Causality Test presents the causation and relationship between the major two variables of this study like labour productivity and export. Under the analysis of the causality test, the Augmented Dickey-Fuller (ADF) unit root test found the series of variables are stationary. Then, according to the results of Vector Auto Regressive (VAR) model, the lag selection found to choose three months lags is occurred for relationship between labour productivity and export of garment manufacturing firms in this study. Then, Johansen Cointegration Test presented that labour productivity and export of garment firms are not cointegrating in the long-run which means that their relationships are occurred only in the short-run.

Therefore, the causation from the labour productivity to export is concerned only for short-run, which can be analyzed by restricted VAR Model. The results of VAR Model found that labour productivity of garment firms can cause the export of garment firms is significantly with three months lag. Finally, the Granger Causality Test found the unidirectional causal relationship form labour productivity to export of sample garment firms which is significant at 5% level in this study. Therefore, this study can be concluded that an increase in labour productivity in three months ago is related to the enhancement of current period's exports for Myanmar's garment industry. In this study, this kind of relationship occurs only in the short run and it may change over the long-run.

Based on the findings, the conclusion can be drawn is that the Myanmar Garment Industry needs to increase its labour productivity in order to achieve long run export growth. As an implication of this study, increasing labour productivity is only possible when the hypothesized variables of this study are strengthened, and through this, exports of Myanmar Garment Industry may be increased in the long-run.

Therefore, under the CMP nature of garment industry, increased labour productivity of garment firms can help to attract the buyers' order from global garment value chain process, which in turn can help to increase the garment exports of Myanmar. When the productive factors are strengthened or firms can efficiently use of their productive factors, Myanmar can access the long-run export growth of its garments in the global apparel market.

In addition, Myanmar garment industry should be promoting the "local brand garments" in order to access the global apparel market and increased export. Accordingly, the government and related stakeholders of garment industry of Myanmar should encourage the export promoting strategies for local textile and garment products, intensively.

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