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Original article

The Determinants of Income Inequality in Bangka Belitung Province

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Abstract

Purpose: *this research study focused on analyzing the conditions of income distribution and the determinants of the low Gini coefficient, namely the sectors that have the highest contribution, including the industrial, agricultural and trade sectors and labor productivity in the industrial sector in Kepulauan Bangka Belitung Province.*

Methods: *the income distribution phenomenon in Kepulauan Bangka Belitung Province during the 2007–2018 period became the basis for analyzing the determining variables of income distribution including the industrial sector, the agricultural sector, the trade sector and the industrial labor productivity. The income distribution indicator was measured from the Gini coefficient value using the Panel Data Regression approach to determine the effect of these variables on the Gini coefficient in all regencies / cities in the Kepulauan Bangka Belitung Province.*

Results: *the results showed that the agricultural sector, industrial sector and trade sector had a negative and significant effect on the Gini coefficient. Meanwhile, labor productivity in the Industrial Sector had a significant positive effect on the Gini coefficient. The results showed that the determinant of income distribution was the agricultural sector. Further findings prove that the agricultural, industrial and trade sectors improved the income distribution.*

Conclusions and Relevance: *this study implied for the efforts to increase the agricultural market orientation towards high productivity which was inversely contrast to the output of workers in the industrial sector proven to reduce income distribution. Therefore, the structural transformation towards industrialization and market-oriented efforts from the agricultural sector were necessary.*

Keywords: *income distribution, Gini coefficient, agricultural sector, industrial sector, trade sector, labor productivity, regression analysis*

Conflict of Interes. *The authors declare that there is no Conflict of Interest.*

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Оригинальная статья

Факторы неравенства доходов в провинции Бангка Белитунг (Индонезия)

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Аннотация

Целью *исследования является анализ условий распределения доходов и факторов низкого коэффициента Джини в областях, которые вносят наибольший вклад в экономику провинции Кепулауан Бангка Белитунг (Индонезия), включая промышленный, сельскохозяйственный и торговый секторы, а также производительность труда в промышленном секторе.*

Методы или методология проведения работы. *Феномен распределения доходов в провинции Кепулауан Бангка Белитунг в период 2007–2018 гг. стал основой для анализа определяющих переменных распределения доходов, включая промышленный, сельскохозяйственный и торговый секторы, а также производительность труда в промышленности. Индикатор распределения доходов измерялся по значению коэффициента Джини с использованием метода регрессии панельных данных для определения влияния этих переменных на коэффициент Джини во всех округах (городах) провинции Кепулауан Бангка Белитунг Индонезии.*

Результаты работы *показали, что сельскохозяйственный сектор, промышленный сектор и сектор торговли оказали отрицательное и значительное влияние на коэффициент Джини. Между тем, производительность труда в промышленном секторе оказала существенное положительное влияние на коэффициент Джини. Определяющим фактором распределения доходов был сельскохозяйственный сектор. Дальнейшие результаты подтверждают, что в сельскохозяйственном, промышленном и торговом секторах распределение доходов улучшилось.*

Выводы. *Представленное исследование подразумевало усилия по повышению ориентации сельскохозяйственного рынка на высокую производительность труда, что было противоположно тому, что производительность труда рабочих в промышленном секторе, как было доказано, снижает распределение доходов. Следовательно, необходима структурная трансформация в направлении индустриализации, а также рыночные усилия сельскохозяйственного сектора.*

Ключевые слова: *распределение доходов, коэффициент Джини, сельскохозяйственный сектор, промышленный сектор, торговый сектор, производительность труда, регрессионный анализ*

Конфликт интересов. *Авторы заявляют об отсутствии конфликта интересов.*

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Introduction

Income distribution in Indonesia was categorized from the value of Gini ratio classified into two classifications namely high distribution or low inequality (0.00- <0.35) and moderate distribution or inequality (0.35-<0.50). The classification of inequality was spatially mapped into low, medium and high categories which were then divided into red zone representing high classification, yellow zone representing medium classification and blue zone representing low classification. Provinces in Indonesia generally had moderate inequality because they belonged to the yellow zone with 0.34 Gini ratio average. The spatial classification of inequality in all provinces in 2018 was displayed in Figure 1.

Figure 1 showed that Bangka Belitung was the only area of Indonesia in the blue zone. Therefore, Bangka Belitung was categorized in high distribution compared to other provinces. Its 0.272 Gini ratio was lower than the whole country in general. According to BPS (Statistics Indonesia) for Bangka Belitung (2019), the income distribution of this province was affected by (1) the average expenditure of the 40 percent of lower class group increased by 3.05 percent while the increase was 2.17 percent for the 20 percent of upper class group and (2) a decrease in spending distribution for the 20 percent upper class group and the 40 percent middle class group was 0.21 points and 0.03 points respectively. In addition, there was an increase of 0.25 points for the lower class group. Therefore, an increasing percentage of regional income earned by the 40 percent lower class group and the decrease in regional income received by the upper middle class created income distribution growth. The rise in spending reflecting the increase in income of the lower class group came from the infrastructure establishment, conducive trade and services businesses development and government's social protection schemes (BPS Bangka Belitung, 2019). The income distribution in Kepulauan Bangka Belitung came from the role of the three leading sectors, including agriculture, industry and trade. On top of that, continous structural transformation created economical change to the composition of demand, trade, production and other factors necessary to increase social earnings and welfare through the increased per capita income (Chenery 1960, 1964; Chenery et. al. 1986; Chenery dan Syrquin 1975; Chenery dan Taylor 1968; Chenery dan Watanabe 1958).

There were several studies discussing changes in economic structure and income distribusi. Baymul & Sen (2020) conducted study to see the impact of changes in economic structure on income inequality, and the results of the study showed that the change of economic structure to industrialization had a positive impact on income equality. Furthermore, Simaimi & Darren (2019) found that the change in income distribution was more elastic in the agricultural sector than in the industrial sector although the growth of the two sectors would increase income distribution. However, Bouincha & Karim (2018) discovered that productivity in the agricultural sector would reduce income distribution in developing countries.

Source: The result of data processed using Microsoft Office 2019 Software.

Fig. 1. Gini Ratio Distribution in Indonesia in 2018

Источник: результат обработки данных авторами с помощью обеспечения Microsoft Office 2019.

Рис. 1. Распределение коэффициента Джини в Индонезии в 2018 г.

portunity and income would be unavoidable (Martorano and Sanfilippo 2015).

Alternatively, the transition from agricultural economic structure to industrial economic structure in state development, which had been modeled by Lewis (1954) and Kuznets (1955), should lead to a general increase in the income share of the modern sector, and the inequality would grow to the point where the majority of the workforce was employed with high productivity. According to Lindert & Williamson (2001), the process of economic reform is a shift of the agricultural market from domestic market to export, and not the shift from agriculture to manufacturing and services which caused an increased inequality as stated by Kuznets. In addition, Wan et al. (2017) focused on the growth-inequality relationship, which was not formalized. It is also different from convergence or catch-up literature, including Caselli et al. (2012).

Literature Review

Baymul & Sen (2020) tested the economic transformation or structural changes of the kuznet hypothesis, and the findings suggested that changes in economic structure towards the service sector led to income inequality. On the other hand, if the pattern of economic structure changed towards industrialization, the income equality would increase. Simaimi & Darren (2019) found that the structural changes from the agricultural sector to the industrial sector provided a greater elasticity of income distribution. Nevertheless, without permanent structural changes in the agricultural sector, the impact of income distribution elevated because the growth of the agricultural sector would encourage a more elastic income distribution than the growth of the industrial sector.

Several studies specifically discussed the process of changing the economic structure towards industrialization which caused various issues, including income inequality. Haraguchi et al. (2017) described that the decline in manufacturing added value and the manufacturing job share in many developing countries were the results of the shift of manufacturing activities to a country with a relatively small population rather that the changes in the sector development potential.

These conditions created inequality in wage and employment opportunities. The shift in economic struture towards industrialization encouraged the modern manufacturing sector to adopt the use of capital intensive expanding technology utilization and skilled labor employment. Consequently, the inequality of job op-

The model postulated that structural changes triggered by technology (e.g., the emergence of information and communication technology and e-commerce), culture (e.g., increased demand for health food), institutional (e.g., reform and openness), or policy (e.g., privatization movement) caused shock relocation of resources across sectors and locations, leading to an imbalance in demand and supply factors and thus causing changes in income distribution (Wan et al., 2017; Yue et al., 2011).

In line with Lindert & Williamson model (2001), Van Leeuwen & Földvári (2016) stated that the combination between the shift from agriculture to manufacturing and services and increased labor productivity in agriculture would encourage income equality. Yue et al. (2011) conducted study about the economic reform in industrialization, specifically in monopoly and competitive industries. The study discovered that the subsector contributed 8.2% of the total income gap among workers. The study only differed in education levels that led to the inequality.

This economic transformation would not have a direct impact on the income distribution. According to Zhou & Song (2016), government policies such as regional development, rural development, social welfare system for low-income people, taxation, education and

bureaucratic structure were needed. In addition, the resource-oriented manufacturing industry should also be addressed. Akita et al. (2011), spatial distribution of resource-oriented manufacturing industries (e.g. wood processing industry, plantation-based and mineral resource-based) had high transportation costs which therefore tended to be placed where raw material inputs were available. This created uneven spatial distribution related to the distribution of income per capita.

The change in the agricultural economic structure to the industrial economic structure in economic development was modeled by Lewis (1954) and Kuznets (1955) whose objective was to increase the income from the modern sector would cause inequality rise because the majority of the workforce worked high productivity jobs.

The change in economic structure to industrialization in Bangka Belitung was based on the high equality phenomenon. A model of economic transformation was applied to accept or reject the hypothesis that lindert & williamson (2001) critisized. To test this, a conceptual framework was established as follows (Figure 2):

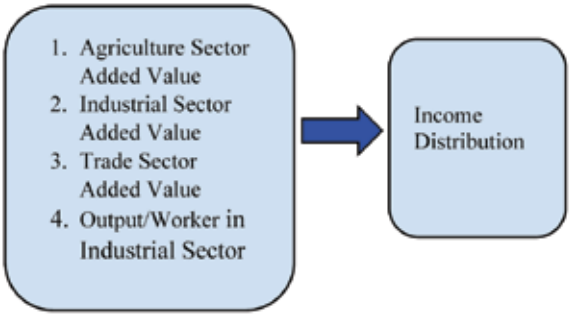

Fig. 2. Conceptual Framework
Рис. 2. Концептуальная основа

Research Goals Formulation

This study analyzed the condition of income distribution and highest contributed sectors determining the low Gini Coefficient including industrial sector, agricultural sector, trade sector and worker productivity in industrial sector in Kepulauan Bangka Belitung.

Main Research Material Description

This research examined the condition of income distribution and the determining variables including the added value in industrial sector, agricultural sector and trade sector, and the output/worker in industrial sector in all cities and regencies in Kepulauan Bangka Belitung in 2007–2018. This study used a combination of time-series data and cross-section data sourced from BPS (Statistics Indonesia). The data obtained then were analyzed with descriptive analysis and quantitative analysis. Descriptive analysis would look at the income distribution, added value in agricultural sector, industrial sector and trade sector, and output/workers in the industrial sector. Descriptive analysis was conducted by interpreting tables and graphs to see the trends that occured in the data. Quantitative analysis was used to test the Kuznet Hypothesis (1955) and Lewis Model (1954) by looking at the determinants of the income distribution during the structural changes process. This included the added value in agriculture, industry, trade and output/workers in the cities an regencies in Kepulauan Bangka Belitung. The writer used the Regression Data Panel with the following equation models.

$$Y_{it} = \beta_0 + \beta_1 Agr_{it} + \beta_2 Ind_{it} + \beta_3 Trd_{it} + \\ + \beta_4 PrInd_{it} + e_{it}$$

Explanation:

Y = Income distribution per capita in 2007–2018;

α = Interception;

β_1–β_4 = The regression coefficient for each independent variable;

Agr = Added Value of the Agricultural Sector;

Ind = Added Value of the Industrial Sector;

Trd = Added Value of the Trade Sector;

PrInd = Output/worker in Industrial Sector;

t = 2007–2018 (Period, Year);

e_{iT} = Error term.

Results and Discussion

The selection of model was based on several tests, namely Chow test, Hausman test and Lagrange multiplier test. The following are the results of model testing presented in Table 1.

The selection of regression method was necessarily conducted before the estimation. It was firstly tested using Chow Test which was comparing the Pooled Least Square (PLS) to Fixed Effect Model (FEM). Based on Chow test results, the probability value on the model of income distribution was 0.037. It indicated that the best selected model on income distribution model was Fixed Effect Model with probability value of the chi-square less than real level of 5%. The next test was carried out to choose the best model between the Fixed Effect Model and the Random Effect Model by doing the Hausman Test. Based on the results of the Hausman test, the value of the probability of Chi-Square on the model of income distribution accounted

Table 1

Model Testing Result

Таблица 1

Результат тестирования модели

No	Tests	Statistics	Probability
1	Chow Test	13,398	0,037
2	Hausman Test	0,0000	1,0000
3	LM Test	15,920	0,0001

Source: Data Processed, 2020.

Источник: обработанные данные, 2020 г.

for 1,000 indicating that the best model was Random Effect Model. There were some differences from each testing result thus the Lanrange Multiplier test was carried out using Breusch-Pagan test. It showed that "both" probability value was smaller than real level of 5% {0.0001<0.05), therefore the model selected was Random Effect Model (REM). The output of estimated model was depicted in Table 2.

The estimation results of income distribution determinants in Bangka Belitung Province using the Gini Ratio indicated that the Random Effect model was the best model. This model was chosen because statistically and by determining the best model through the Hausman test and the LM test, the Random Effect Model was chosen as the best model. In this model all variables were declared significant, namely: the agricultural sector, the industrial sector, the trade sector, and the output / workers in the industrial sector.

Before conducting further stages of analysis, there were statistical tests including: F test, t test, and coefficient of determination. The results of the F statistical test showed that the F statistical probability value was smaller than the real level of 5% (0.003 <0.05), thus the variables of the agricultural sector, industrial sector, trade sector, and output / workers in the industrial sector were simultaneously significant to the Gini Ratio. Meanwhile, to partially analyze the effect.

Table 2

Panel Data Regression Estimation Results

Таблица 2

Результаты оценки регрессии панельных данных

DEPENDENT VARIABLE: Y?				
VARIABLE	Coefficient	Std. Error	t-Statistic	Prob.
C	0.654673	0.103770	6.308883	0.0000
LNIND?	-0.006486	0.002485	-2.609877	0.0110
LNAGR?	-0.029576	0.009061	-3.264191	0.0017
LNTRD?	-0.019833	0.007660	-2.589070	0.0116
LNPRIND?	0.000620	0.000286	2.166541	0.0335
RANDOM EFFECTS (CROSS)				
BANGKA	0.009532			
BELITUNG	0.009342			
BANGKA BARAT	0.000579			
BANGKA TENGAH	-0.004153			
BANGKA SELATAN	0.001040			
BANGKA TIMUR	-0.015565			
PANGKAL PINANG	-0.000775			
WEIGHTED STATISTICS				
R-SQUARED	0.192603	Mean dependent var		0.162992
ADJUSTED R-SQUARED	0.148362	S.D. dependent var		0.035147
S.E. OF REGRESSION	0.031042	Sum squared resid		0.070343
F-STATISTIC	4.353503	Durbin-Watson stat		1.303890
PROB(F-STATISTIC)	0.003261			
UNWEIGHTED STATISTICS				
R-SQUARED	0.174222	Mean dependent var		0.275474
SUM SQUARED RESID	0.077962	Durbin-Watson stat		1.176462

Source: Data Processed, 2020.

Источник: обработанные данные, 2020.

The probability value of the industrial sector variable was smaller than the real level of 5% (0.0110 <0.05) now that the industrial sector partially had significant impact on the Gini coefficient whereas the probability of industrial sector variables was smaller than the real level of 5% (0.017 <0.05) so that partially the industrial sector had a significant impact on the Gini ratio. The trade sector variable had probability value smaller than the real level of 5% (0.0116 <0.05). Consequently, the trade sector partially had significant effect on the Gini ratio. Furthermore, the output / worker variable in the industrial industrial sector was smaller than the real level of 5% (0.033 <0.05) thus the output / worker in the industrial sector partially had a significant effect on the Gini ratio. The further test conducted was determination coefficient test to find out how the variety of variables namely the agricultural sector, industrial

sector, trade sector, and output / workers in the industrial sector contribute to determining the variation of the Gini ratio variable with the R2 results of 0.192 or 19.2%. Meanwhile, the remaining 80.8 percent was influenced by other variables. For further discussion, the influence of each variable of the industrial sector, agricultural sector, sector trade, and output / workers in the industrial sector would be analyzed by the following equation model:

$$Y = 0.654673 + -0.006486\ LNIND + \\ + -0.029576\ LNAGR + -0.019833\ LNTRD + \\ + 0.000620\ LNPRIND$$

The estimation results showed that the coefficient value of the industrial sector variable was negative indicating the industrial sector had a negative and statistically insignificant effect. These results illustrated that any increase in the output of the industrial sector in the Bangka Belitung islands would increase the income distribution. This condition proved that theoretically it could be explained in the model of economic transformation from the traditional sector to industrialization. The economic transformation from traditional to modern was a change in the economy related to the composition of demand, trade, production and other factors needed continuously to increase income and social welfare through increasing per capita income (Chenery 1960). This was in line with the economic situation in the industrial sector which experienced an increase in output every year. Furthermore, this positive trend had significant impact on declining the Gini ratio or structural transformation to traditional to modern, the growth of industrialization impacted on the better income distribution.

In contrast, Gollin et. al. (2002) found that the structural change model, especially in the industrialization process, created the inequality of income distribution to the country. The research concluded that the output of the agricultural sector increased equity more than industrialization which had negative impact on income distribution. It could be assumed that the industrialization process provided bigger gap in terms of the wage gap and the labor gap because the process of transforming the agricultural sector into industry caused a large number of unskilled workers unemployed.

In addition, Baymul & Sen's (2020) discovered that the industrialization process had positive impact on income distribution. On the other hand, Simaimi & Darren's (2019) research showing that structural changes from the agricultural sector to the industrial sector provided lower income distribution elasticity. However, if there were no permanent structural changes in the agricultural sector, the impact on income distribution was higher since the agricultural sector growth would encourage income distribution more elastically than the growth in the industrial sector.

Alternatively, the transition from an agricultural economic structure to an industrialized economy in country development, which was modeled by Lewis (1954) and Kuznets (1955), should lead to a general increase in the share of income of the modern sector, with unequal increase to the point where the majority of the generation was employed in a modern, high-productivity sector. According to Lindert & Williamson (2001), the process of economic transformation was a shift in the orientation of agricultural markets from within the country to export, and not (as argued by Kuznets) a shift from agriculture to manufacturing and services that caused an increase in inequality. Additionally, Wan et al., (2017) was in contrast to Kuznets' (1955) hypothesis which focused on the growth-inequality relationship, which was not formalized. This situation was also different from the convergence or catch-up literature, including Caselli et al. (2012).

The model stated that structural change was driven by technology (for example, the emergence of information and communication technology and e-commerce), culture (for example, the increase demand of health food), institutions (e.g., reform and transparency), or policies (e.g., the privatization movement) caused a shock reallocation of resources across sectors and locations leading to an imbalance in supply and demand factors. Thus it caused changes in income distribution (Wan et al., 2017; Yue et al., 2011).

The study of van Leeuwen & Földvári (2016) was in line with Lindert & Williamson's (2001) model which found that the changes from agriculture to manufacturing and services must be accelerated with the increase of labor productivity in agriculture expected to promote income distribution. Moreover, Yue et al. (2011) opined that the economic reforms in industrialization had two sides, namely monopoly and competitive industries. It was found that these subsectors accounted for 8.2% of the total income gap among workers, and the differences in education level solely led to inequality.

The economic transformation did not have a direct impact on income distribution, according to Zhou & Song (2016), it required government policies, including regional development, rural development, and social welfare systems for low-income people, taxation and education and bureaucratic structuring. In addition to policy responses, the cause of unequal income in the industrial sector was the resource-oriented manufacturing industry. Akita et al. (2011) stated that spatial distribution of resource-oriented manufacturing industries (eg wood processing, plantation-based and mineral resource-based industries) required high transportation and accommodation costs for raw material inputs since the output must be placed in where input raw materials were available. It created a relatively uneven spatial distribution to the income distribution per population.

The coefficient value on the output of the agricultural sector showed negative direction indicating that any increase in agricultural output would give decrease impacts on the value of the Gini ratio. This relationship could empirically be explained by the role of the agricultural sector in increasing income distribution or reducing inequality. Theoretically, the role of the agricultural sector in reducing inequality was explained in the role of the agricultural sector in the transformation of development. Kuznet (1961) explained that (1) the contribution of agricultural sector products as providers of industrial raw materials; (2) The contribution of the household market in the agricultural sector was as the main target of industrial sector consumptions, whether as direct consumption or used as input in agricultural production activities; (3). Contribution of foreign exchange, the agricultural sector played a role in contributing foreign exchange to the results of its exported production activities.

This condition was in contrast to the transformation of economic development formulated by Lewis and Kuznet (1954) and Kuznets (1955), it was believed that economic development transformation should lead to a general increase in income distribution of the modern sector, while inequality influenced an increase to the point where the majority of the workforce was employed in the modern sector with high productivity. It was in line with the findings of Lindert & Williamson (2001) showing that process of economic development transformation was the change of agricultural markets orientation from within the country to export, and not (as suggested by Kuznets) a shift from agriculture to manufacturing and services causing increased inequality. Furthermore, Wan et al. (2017) was in contrast to Kuznets' (1955) hypothesis which focused on the inequality growth relationship, which was not formalized.

The role of the trade sector had significant negative effect on the value of the Gini ratio. It was implied that an increase in the output of the trade sector played a major role in increasing income in the province of Bangka Belitung islands. It was evident that the output of the trade sector during the period of 2007 – 2018 had the highest value compared to other sectors. This phenomenon was quite interesting because the trade sector played an important role in the economy of the province. In addition, the Gini iratio value was periodically constant at 0.34, the lowest in national scale. Further evidence was based on the literature results of several studies supporting the research result. Pal, Chakraborty and Ghose (2019) found that the growth of the trade sector would directly reduce income inequality. Similarly, study (Khan and Nawaz 2019) found that the output of the trade sector had a significant effect on the Gini ratio. This was in line with the inverted U curve theory. In such case, it was accordance with the trade theory which discussed the effects of trade components in developing countries such as exports and imports which would determine the level of the gini ratio.

There were some interesting findings on worker productivity in the industrial sector showing a phenomenon that was in contrary to Lewis and Kuznet's development models. It implied that labor productivity in the industrial sector had positive impact on the increase Gini ratio value meaning that labor productivity in the industrial sector expanded the inequality of income distribution. Specifically, there were several studies that were in accordance with the research that discussed the economic transformation towards industrialization causing several economic issues, one of which was income inequality and wage inequality. Based on the findings of Haraguchi et al. (2017), the situation was caused by a decrease in the added value of manufacturing and the share of manufacturing employment in many developing countries, not due to changes in the development potential of the sector because of a shift in manufacturing activities to a country with a relatively small population. Thus it was resulted in a concentration of manufacturing activities centered only on certain areas. In addition, the conditions of industrialization had an impact on inequality of wages and job opportunities, the shift in the economic structure towards industry encouraged a change in the manufacturing sector from traditional to modern which adopted capital-intensive use. Consequently, the use of technology and skilled labor was needed. if this change occurred then it would encourage inequality in both income and wages (Martorano and Sanfilippo 2015).

Conclusion and Relevance

This research focused on analyzing the determinants of income equalization across districts/cities in Bangka Belitung Province in 2007–2018 using the regression analysis tool data panel. The results showed that the determinant of income equalization in Bangka Belitung Province was the agricultural sector. The influence proved that the industrial sector, agriculture sector and trade sector had a negative influence on the Gini coefficient. Thus, the increase in the three sectors would have a significant increase in revenue. On the other hand, the increase in industrial sector output had a positive and significant impact on Gini coefficient. This condition indicated that the increase in industrial sector output was proven to decrease inequality. The related implications proved that the role of the agricultural sector in increasing income equalization in Bangka Belitung Province was statistically proven. Therefore increasing the agricultural market orientation towards higher productivity was necessary. In contrast, the output of workers in the industrial sector that was proven to lower the revenue charts. Thus, the structural reforms towards industrialization should be reevaluated and focus solely on the market orientation of the agricultural sector.

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