Agricultural Labor Productivity Growth in Southern Red River Delta's Coastal Provinces in Vietnam

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Abstract

Agricultural labor productivity growth plays a decisive role for the competitiveness of the industries and the whole economy, contributing to the sustainable sectoral development. Using the method of Shift Share Analysis (SSA) to calculate labor productivity growth in agriculture in Southern Red River Delta's Coastal Provinces provide critical points: (i) Increasing trend in labor productivity growth (ii) Contribution to the increase in intra-industry labor productivity is higher than the contribution of structural transformation to the increase of overall labor productivity (iii) Increase in labor productivity is mainly due to the effect of the "static" impact from industries with low labor productivity to sectors with high labor productivity (iv) Thai Binh is still the local area with the highest growth along with the most outstanding contribution of structural transformation to labor productivity growth. Accordingly, this paper suggests that it is necessary to review local agricultural planning in order to attract investment in agriculture, have breakthrough policies to attract investment in sectoral development, strengthen agricultural production links based on the product value chain and improve labor qualifications for farmers to facilitate the application of scientific and technological advancement in agricultural production.

Keywords: Shift-share analysis, Labor productivity, Agricultural structural transformation

1.1. Introduction

Labor productivity is understood as the ratio of output to labor. Labor productivity can promote economic growth. A highly productive economy means that it can produce more goods or services with the same amount of inputs. For workers, increasing labor productivity leads to higher wages and better working conditions. In the long run, increasing labor productivity is very important for job creation. Therefore, increasing labor productivity is essential for the economy in general and for the industries in particular.

The coastal area of the Southern Red River delta includes three provinces: Thai Binh, Nam Dinh and Ninh Binh. According to 2017 data, this area has a total natural area of 4,641.7 km2, accounting for 21.83% of the total Red River Delta area. The population size is 4,606.7 thousand people, accounting for 21.59% of the total, of which the rural population accounts for 57.8%. This is an area with a relatively high population density, with 1,007 people/km2, higher than the population density of the Red River delta (1,004 people/km2) and 3.56 times higher than the average value of the entire economy (GSO 2017).

These provinces have outstanding features for agricultural development including the 200 km length of coastline; the land area is relatively flat and has a large proportion of alluvial soil and gray soil (greater than 60%); a large proportion of the population is working in agriculture (approximately 30%) and a high degree of intensive farming; Convenient transportation and near large consumption markets like Hanoi, Hai Phong and Quang Ninh. In addition, for the last few years, these provinces which are located in the Red River Delta region with the mission of "a pioneering region of the whole country to implement strategic breakthroughs, economic restructuring, successful renewal of economic growth model, and become a leading driver of the country for economic development" (Vietnamese Government 2012) have many policies in promoting the transformation of the industries and increasing agricultural labor productivity such as the Project of agricultural transformation towards increasing the added value and sustainable development of each locality; Promoting investment in agriculture and rural areas in the Red River delta.

With advantages in agricultural development and much effort in implementing structural transformation, the agricultural sector of the Southern coastal provinces has achieved many great successe including food production in 2017 accounted for 35.31% of the total output of Red River Delta and 4.7% of the country; rice productivity reached 60.2 quintals per ha higher than the national average output (56 quintals/ha); aquaculture production accounted for 42.21% of the Red River Delta and 5.51% of the country's output, the number of large model fields accounted for 52.48% of the Red River Delta region and 16.35% of the whole country;... The development of agriculture has contributed to increasing farmer incomes and reducing rural poverty (GSO, 2017). However, the agriculture of these provinces has not yet clearly shown its role as a high quality rice region; raising cattle, poultry and aquatic products on a large scale; It has not yet become a region specializing in developing supporting industry for processing agricultural products and preserving agricultural products after harvest and especially not having good conditions for a sustainable agriculture. One of the constraints of the agricultural sector development in these provinces is low labor productivity. Therefore, improving the labor productivity of the industry is critical to enhancing the competitiveness of this sector towards sustainability. This paper will focus on analyzing the agricultural labor productivity growth situation in the coastal provinces

of the South Red River Delta in the given period of 2011-2017. Further, it proposes solutions for promoting future agricultural labor productivity growth.

Literature Review

The transformation of economic sectors has a highly interactive relationship with the increase in productivity, and is clearly shown in previous literature. Labor productivity growth occurs if there is a movement of resources from one sector to another to create more productive products (Schumpeter, 1939). Meanwhile, Kuznets (1966) argued that it was the difference in growth rates of the sub-sectors that created the internal stransforming process. When referring to the two-sector model, Lewis (1954) argued that a developed industrial sector would attract surplus labor from agriculture. Thus, when transferring surplus agricultural labor to the industrial sector occurs, the marginal labor productivity of the agricultural sector also tends to increase. Todaro (1994) agrees with the view that agricultural labor productivity will increase by changing the structure of agricultural production from traditional production to diversifying production. Increased labor productivity will increase the income and life of farmers. The shift from low-productivity areas to high productive areas will accelerate the development of the low-income economy. This is most evident in middle-income countries such as India and Indonesia (OECD, 2013).

The SSA (Shift-Share Analysis) method proposed by Fabricant (1942) was used to analyze the average labor on the USA industrial product unit from 1899 to 1939. SSA method has been used by many researchers when analyzing the changes in labor productivity due to the transforming process that is created in specific industries such as agriculture, industry, service or the whole economy. According to Syrquin (1988), labor productivity growth is determined by two factors: the intra-industry effect and the effect of transformation. Bart van Art (1995) developed the model of Syrquin (1988) by decomposing the impact of structural transformation into two components: (i) The impact of transformation due to labor transfered from low productivity industries into a highly productive industry (static-shift effect); (ii) The impact of the shift from a sector with low labor productivity growth rate to a higher productivity-growing industry (dynamic-shift effect). He made a conclusion when analyzing labor productivity growth in the 1950-1990 period based on the data of eight Western European economies in comparison with United States as follows: (i) Intra-sector labor productivity growth is the driving force for productivity growth; (ii) Improvement of labor productivity due to transforming is mainly due to the contribution of static shift. When analyzing labor productivity growth in Asia, Bart Van Art and Timer (2003) also used SSA method and concluded that: (i) Intra-sector productivity growth is driving force of growth in Japan, South Korea, Taiwan and India (ii) Sectoral transformation is the driving force for productivity growth in Thailand, Malaysia and Indonesia.

Using SSA method to analyze labor productivity growth of China allows offering a conclusion: (i) Productivity growth is mostly the result of intra-sector productivity growth. (ii) Labor productivity growth of the service sector is the key driver in the overall productivity growth of the economy. (iii) The motivation for labor productivity growth in industry is contributed by manufacturing, food and beverage industry (Molnar and Chalaux 2015).

In Vietnam, Dinh Van An and Nguyen Thi Tue Anh (2007) used the SSA method to estimate the contribution of the sector and the structural transformation to the growth of labor productivity of Vietnam from 1991 to 2006. The authors stated that structural transformation has a positive impact on

the growth of labor productivity in the period of 1991-2006. Nguyen Thi Tue Anh (2016) used SSA method to calculate the impact of sectoral shift on labor productivity growth in 2008-2014 period and asserted that the contribution of sectoral shift to labor productivity growth compared to the previous period has remained unchanged at 48.4%.

2. Research methodology

2.1. Data collection

The study uses secondary data collected from reports of Vietnamese agencies and organizations, including: (i) the data from the Statistical Yearbook of the General Statistics Office of Vietnam such as: value added, labor of the sectors ... (ii) The data from the results of the evaluation report provided by Department of Agriculture and Rural Development of selected provinces.

2.2. Analysis Method

The research team will use the method introduced by Bart van Art (1995) as a theoretical basis for productivity growth in combination with new developments of Syrquin's 1988 model to analyze agricultural labor productivity growth in the coastal provinces of South Red River Delta of Vietnam.

The formula as follows:

$$gP_A = \frac{\sum_{i=1}^{n}(P_i^T - P_i^0) * S_i^0}{\sum_{i=1}^{n} P_i^0} + \frac{\sum_{i=1}^{n} P_i^0 * (S_i^T - S_i^0)}{\sum_{i=1}^{n} P_i^0} + \frac{\sum_{i=1}^{n}(P_i^T - P_i^0) * (S_i^T - S_i^0)}{\sum_{i=1}^{n} P_i^0}$$

In which:

gPA: Growth rate of sectoral productivity

P and Pi: Level of productivity of agriculture and sub-sectors i

Y and Yi: Value added of agriculture and sub-sectors i

L and Li: total labor of agriculture and sub-sectors i

Si: The share of labor in sub-sector i in total number of agricultural labor

n: the number of sub-sectors in agriculture

Firstly, the intra-sector productivity growth rate (formula 1)

Second, the impact of 'static' structural transformation is due to the movement of workers from the low-productivity sector to the high-productivity sector (formula 2). This impact shows that labor productivity has not changed but the labor structure has changed between the two periods.

Thirdly, the impact of 'dynamic' structural transformation is due to the movement from a sector with a low labor productivity growth to a sector with a high growth of labor productivity (formula 3). This impact results from a combination of changes in labor structure and labor productivity among

sectors. If this effect is positive, it means that workers are transferred to a sector that has a higher level of labor productivity and vice versa.

3. Research Results and Discussion

3.1. Agricultural Labor Productivity of Coastal Provinces in the South of the Red River Delta in Vietnam during 2010-2017

Average labor productivity in agriculture in the three selected provinces during 2010-2017 tended to increase from 15.61 million VND per capita in 2010 to 28.4 million VND per capita in 2017. On average, labor productivity increased by an average of 8.9% per annum. The average labor productivity experienced an increasing trend after 2013, indicating that the agricultural sector has developed rapidly after the 2013 Sector Restructuring Project.

The result from the comparison among selected provinces shows that Thai Binh has the highest labor productivity (VND 43.4 million per capita per annum), 1.53 times higher than the average labor productivity of the 3 provinces and 2.39 times higher than the labor productivity in Nam Dinh (the province with the lowest labor productivity). Nam Dinh also has the lowest average labor productivity growth rate of 5.4% in the Red River Delta. Compared with the Red River Delta region and the whole country, the labor productivity of Thai Binh is higher than the average of both the Red River Delta region (VND 30.04 million) and the whole country (VND 39.97 million), and both Nam Dinh and Ninh Binh have a lower level of labor productivity than the regional and national average value of labor productivity. This shows that Thai Binh agricultural transformation is more economically efficient than Nam Dinh and Ninh Binh.

Table 1: Labor Productivity in Selected Provinces in 2010-2017

Unit: million VND

Year	2010	2011	2012	2013	2014	2015	2016	2017
Thai Binh	19.63	26.60	24.80	24.86	28.10	32.55	35.88	43.40
Nam Dinh	10.87	13.90	13.96	14.32	15.60	16.65	17.65	18.14
Ninh Binh	16.33	20.55	20.17	20.51	16.73	17.68	20.65	23.65
The average value of three provinces	15.61	20.35	19.64	19.90	20.14	22.29	24.73	28.40
Red River Delta	14.36	19.40	19.43	19.89	22.26	25.09	28.48	30.04
National average value	16.8	22.9	26.2	27	29.2	31.1	34.4	39.79

Source: General Statistics Office (2017)

Comparison with labor productivity of other sectors within the province shows that (i) Agricultural labor productivity is the lowest (ii) Labor productivity growth rate in agriculture is lower than other sectors. Specifically, in Thai Binh, in 2010 labor productivity of the agricultural sector

reached VND 19.63 million, while labor productivity of industry and services was 1.19 times and 2.11 times higher than that of agriculture, respectively. By 2017, the agricultural labor productivity increased to VND 43.4 million while the labor productivity of industry and services also increased 1.21 times (industry) higher than agricultural labor productivity and 2.92 times for services sector. Thus, the low labor productivity in agriculture plus limited growth rate is one of the causes for the gap between labor productivity in this sector and the average labor productivity in the province. This is also the factor that hinders the increase of labor productivity in the whole province.

3.2. Using SSA Method for the Analysis of Labor Productivity Growth of Agriculture

The results of the analysis of labor productivity growth in SSA method showed that:

First, pure agriculture is the sector that has the strongest impact on overall labor productivity growth of the entire agricultural sector. Specifically, in the period of 2011-2017, for the case of Thai Binh, the average growth rate of the whole industry was 5.036% in which the contribution of pure agriculture was 3.798%, accounting for 75.39% of the whole labor productivity growth. Similarly, the results for Nam Dinh and Ninh Binh are 0.626% and 52.06%, 1.537% and 56.41%, respectively.

Secondly, the "static-shift' effect that bears a negative sign in the period of 2011-2017 shows that in all three selected provinces, there has been a shift of labor from a low-labor productivity sector to a higher labor productivity sector (seafood, e.g). In other words, labor productivity did not change but the labor structure changed between the two periods (see table 2)

Third, the "dynamic-shift" effect is negative for the fisheries and agriculture sectors. Thus, in the three provinces, there has not been a labor movement from a sector with a low labor productivity growth rate to a sector with a high labor productivity growth rate. In other words, a labor structure shift to fishery sub-sector increased faster than the industry's value added. The main reason is that during this period, the government's credit supporting policy has promoted the shift of aquaculture production from small-scale farming to a concentrated farming model in the linkage, focusing on application of standards of VietGap, Global GAP, ASC standards, the trend of movement is fairly strong towards increasing the farming area among the businesses and reducing the farming area in the households. Along with the support of the State for the making of large-capacity ships, team-led exploitation introduced in selected provinces has saved costs and enabled the offshoring exploitation. Therefore, to increase labor productivity, it is necessary to promote more labor-productivity industries (fisheries, e.g) (see table 2)

Table 2: Contribution of Sectors to the Increase of Labor Productivity in Selected Provinces during 2010-2017

Unit:%

Province	Average value	Labor productivity growth rate	Agriculture			Fisheries			Forestry		
			Intra-sector	Static-shift effect	Dynamic-shift effect	Intra-sector	Static-shift effect	Dynamic-shift effect	Intra-sector	Static-shift effect	Dynamic-shift effect
Thai Binh	2011-2013	2.091	0.241	0.086	0.000	1.981	-0.204	-0.005	0.011	-0.014	-0.005
	2014-2017	7.245	6.467	-0.287	-0.024	-0.462	1.547	0.000	0.001	0.003	0.000
	2011-2017	5.036	3.798	-0.127	-0.013	0.585	0.797	-0.002	0.006	-0.004	-0.002
Nam Dinh	2011-2013	2.612	1.826	-0.237	-0.006	0.024	1.004	-0.005	0.078	-0.055	-0.018
	2014-2017	0.164	-0.275	-0.164	-0.013	-0.016	0.611	0.032	-0.010	-0.001	0.000
	2011-2017	1.213	0.626	-0.195	-0.010	0.001	0.780	0.016	0.028	-0.024	-0.008
Ninh Binh	2011-2013	-1.315	-1.865	-0.258	0.008	1.440	1.440	-0.132	-0.404	-0.084	-1.460
	2014-2017	5.768	4.089	-0.240	-0.006	0.980	0.980	-0.074	-0.151	0.084	0.106
	2011-2017	2.733	1.537	-0.248	0.000	1.177	1.177	-0.099	-0.259	0.012	-0.565

Source: Calculated from General Statistics Office (2017

Table 3: Contribution of Sectoral Shift to Labor Productivity Growth

Unit: %

Year	Thai Binh			Nam Dinh			Ninh Binh		
	Total	% share of intra-sector	% share of sectoral shift	Total	% share of intra-sector	% share of sectoral shift	Total	% share of intra-sector	% share of sectoral shift
2011	100	118.4	-18.4	100	73.1	26.9	100	41.7	58.3
2012	100	88.1	11.9	100	80.7	19.3	100	-25.8	125.8
2013	100	78.6	21.4	100	71.9	28.1	100	119.2	-19.2
2014	100	63.5	36.5	100	84.1	15.9	100	71.1	28.9
2015	100	88.9	11.1	100	92.7	7.3	100	79.6	20.4
2016	100	107.2	-7.2	100	98.5	1.5	100	121.3	-21.3
2017	100	96.4	3.6	100	84.8	15.2	100	97.7	2.3
Average of 2011-2013	100	106.8	-6.8	100	73.8	26.2	100	63.0	37.0
Average of 2014-2017	100	82.9	17.1	100	-183.6	283.6	100	85.3	14.7
Average of 2011-2017	100	87.1	12.9	100	53.9	46.1	100	89.8	10.2

Source: Calculated from General Statistics Office (2017)

Fourthly, the data also show the remarkable role of the contribution of intra-sector increasing labor productivity compared to the contribution of structural transformation in the overall labor productivity in agriculture in the period of 2011-2017 (accounting for 87.1%). Although the contribution of economic restructuring plays a fairly minimal role compared to the increase in intra-sector labor productivity, there is an increasing trend, especially in Thai Binh and Nam Dinh. Specifically, Thai Binh has a contribution of sectoral shift to labor productivity growth from -6.8% in the period of 2011-2013 to 17.1% in the period of 2014-2017, 26.2% to 283.6% for Nam Dinh. Particularly for Ninh Binh province, the contribution rate decreased from 37.0% to 14.7% (see table 3)

With the above results, in 2017, the labor productivity due to sectoral shift of Thai Binh accounted for 83.4% (an increase by 10.3% compared to 2011), while in Nam Dinh was 98.2 % and Ninh Binh were 87.7%, increased by 19.5% and 10.23%, respectively compared to 2011. Thus, after the Industry

Restructuring Plan in 2013, Nam Dinh and Thai Binh Provinces are more effective in sectoral shift than Ninh Binh Province when the proportion of labor productivity growth due to sectoral shift is increasing and has a faster growth rate (see table 4).

Table 4: Labor productivity resulting from sectoral shift

Year	2010	2011	2012	2013	2014	2015	2016	2017
General labor productivity								
Thai Binh	19.63	26.6	24.80	24.86	28.1	32.55	35.88	43.4
Nam Dinh	10.87	13.9	13.96	14.32	15.6	16.65	17.65	18.14
Ninh Binh	16.33	20.55	20.17	20.51	16.73	17.68	20.65	23.65
Labor productivity resulting from sectoral shift								
Thai Binh	-	19.45	26.52	24.99	25.27	28.51	32.86	36.2
Nam Dinh	-	10.94	13.94	14.12	14.44	15.65	16.61	17.81
Ninh Binh	-	15.96	20.69	20.19	20.69	16.92	17.85	20.74

Source: Calculated from General Statistics Office (2017)

4. Conclusion and Recommendations

Labor productivity growth is always an important indicator of the development level of the sector and the whole economy. Based on the SSA method, the authors have performed calculations on Vietnam's economic statistical data from 2011-2017. The results show that: Firstly, labor productivity growth in agriculture of Coastal provinces in the South of the Red River Delta in the period of 2011-2017 tends to increase. The reason of the increase in labor productivity is due to the impact of intra-sector impacts and the impact of sectoral transformation, in which the impact of the intra-sector effect is stronger. Second, agriculture in the coastal provinces of the South Red River Delta labor productivity growth depends on the expansion of the fisheries sector and based on the effect of the movement of production factors with little attention paid to capacity and technological depth. Third, the pure agricultural sector, which contributes the most to the increase in labor productivity, experiencing a major shift in production factors from pure agriculture to fisheries and forestry. Therefore, the increase in labor productivity is mainly due to the effect of the "static" impact meaning from industries with low labor productivity to sectors with high labor productivity, not from industries with low labor productivity growth to sectors with high labor productivity growth. Fourthly, Thai Binh is still the province with the highest growth in labor productivity and the largest contribution of sectoral shift to the growth of labor productivity among the three localities along the South Red River Delta.

Based on these results, the authors believe that to promote the quality of agricultural productivity growth in the coastal provinces of the Southern Red River Delta, some conditions needed, including: Firstly, review the local agricultural planning to provide a strong basis for attracting investment in agriculture, shifting the model of agricultural growth from resource-based and labor-intensive exploitation to a model based on knowledge and technology. Planning must be based on local comparative advantages in the fields and details of the local key industries. Further, there must have breakthrough policies to promote industry growth such as: (i) Improve land policies to accelerate the process of land accumulation in order to facilitate the application of science and technology in production process, aiming at large-scale agricultural production. (ii) Interest rate support and loan procedures must be simplified in stages of mortgage and guarantee. Increasing medium and long-term loan to create conditions for enterprises and business individuals to recover capital. (iii) Improve investment policies to develop agricultural infrastructure,

encourage investment in science and technology in which enterprises play an important role in agricultural production innovation and product value added. Third, strengthening agricultural production links embedded in the product value chain. Fourthly, improve labor qualifications for farmers to facilitate the application of scientific and technological advancement in agricultural production.

This is an important empirical evidence for policy makers in the field of developing agricultural sector to take measures to change the growth model from the width-to-depth basis, improve the depth of technology in production along with maintaining a high rate of productivity growth to develop the agriculture of the whole region.

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