Rural and structural transformation and their impacts on household in East Java

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Abstract. Empirical evidence shows that rural transformation and structural transformation in Indonesia vary between provinces in both the depth and speed of the change. One province that the local government has claimed to undergo a rapid rural transformation is the province of East Java. This paper aims to analyze the structural and rural transformations in East Java using district-level secondary data for the 2000-2020 period, obtained from East Java Provincial Statistics. Data analysis uses qualitative and descriptive methods. The results show that structural and rural transformations in East Java vary between districts and development clusters. Some districts in East Java experienced a rapid decline in the agricultural sector's contribution in 1990-2020, both in terms of regional gross domestic product and employment, compared to other districts. The results also show that there has been a transformation within the agricultural sector, with the sub-sectors of non-food (commodities) have gradually shifted out the contribution of the food crop subsector. The relatively rapid structural and rural transformation in East Java has succeeded in increasing rural household incomes and reducing poverty incidence in the province. In the future, to continue increasing household income and reduce poverty, the East Java government needs to maintain the momentum of its success through more targeted pro-growth and pro-poor investment policies.

1. Introduction
In the past three decades, Indonesia has experienced rapid agricultural growth and rural transformation. Agricultural output value grew at an annual rate of 5.4% in real terms. Although grain production has grown steadily, as Indonesia reached rice self-sufficiency in 1984, other crops have grown much faster, particularly horticulture and plantation [1]. High-value commodity production, including livestock and fishery, has increased even faster than food crops within agriculture. Over the same period, rural labours have increasingly engaged in non-farm employment.

Evidence shows that rural transformation in Indonesia and its success in raising rural income and reducing rural poverty differ from one province to another. The diversification of agriculture from a low value to a higher value has varied between the provinces. There are provinces undergone rapid rural transformation while others are relatively slower. One province that is claimed to be having a rapid rural change is East Java. The East Java government has proudly declared its rapid economic growth and significant poverty reduction in both rural and urban areas. Although average rural income has increased significantly, regional income disparity has remained wide. This evidence is true in other countries, including China, and it is one of the challenges in the years to come [2,3]. This paper aims to analyze structural and rural transformation and their impacts on household incomes and poverty reduction in
East Java. The analyses include (1) analysis of structural changes in the economy in East Java, changes in the structure of production in the agricultural sector, from subsistence and traditional to commercial commodities, and changes in employment in rural areas, and (2) analysis of the impacts of these changes on households' incomes and poverty reduction in rural areas of East Java.

2. Materials and methods

2.1. Conceptual framework

Structural transformation (ST) refers to the reallocation of economic activity across the broad sectors of agriculture, manufacturing, and services [4]. One of the earliest and most central thoughts in the economic development literature was that development goes hand in hand with structural change. The countries that are able to get out of poverty and get richer are those that are able to diversify away from agriculture and other traditional products. As other resources shift from agriculture to other economic activities, overall productivity and incomes rise. The speed of transformation is the key factor that differentiates successful countries from unsuccessful ones [5].

Rural transformation (RT) often refers to comprehensive changes in rural society, economy, culture, and other aspects. From the economic perspective in international literature, RT covers transformations both in agricultural production and rural labour' employment from farm to non-farm [3,6,7,8]. The definition of RT given by IFAD and cited by FAO is “a process involving rising agricultural productivity, commercialization and diversification of production patterns and livelihoods, and expanded off-farm employment” [9,10].

While the outcome of rural transformations has many dimensions (e.g. growth, equity, sustainability, etc.), this study focuses on two major outcomes, namely rural household income and poverty incidence. Two specific indicators, of which data available at the provincial level, are the per capita income of rural households and rural poverty incidence.

Poverty is measured from the percentage of the poor of the population which lives below the poverty line (poverty incidence), the poverty gap index (PGI), and the poverty severity index (PSI). Poverty incidence is the proportion of families (or individuals) with per capita income/expenditure less than the per capita poverty threshold to the number of families (or individuals).

The poverty gap index measures the intensity of poverty, defined as the average poverty gap in the population as a proportion of the poverty line. The poverty gap index improves the poverty measure headcount ratio, which counts all the people below a poverty line in a given population and considers them equally poor. The poverty gap is a ratio showing the average shortfall of the total population from the poverty line—the minimum income level required to secure the basic necessities for survival. A higher poverty gap index means that poverty is more severe, that is, it reflects the intensity of poverty [11].

The poverty severity index (PSI) is an index that provides information about the distribution of spending among the poor. It provides complementary information on the incidence of poverty. For example, it may be the case that some groups of the poor have a high incidence of poverty but a low poverty gap, while other groups of people have a low incidence of poverty but a high poverty gap for the poor. The higher the index value, the higher the disparity of expenditure among the poor [11].

2.2. Data and source of data

This paper uses secondary data, both statistics at national and provincial levels. Statistics at the national level were obtained from the Statistics Indonesia (Badan Pusat Statistik/BPS) in its various dataset and reports, while data at the provincial and district levels were obtained from the East Java Statistics Office in its reports and publications entitled Provinsi Jawa Timur dalam Angka, Statistik Pengeluaran untuk Konsumsi Rumah Tangga, Data dan Informasi Kemiskinan Kabupaten/Kota, and Keadaan Angkatan Kerja Jawa Timur.

2.3. Data analysis

Data analysis was carried out using descriptive-qualitative methods, including growth rates or trends and shares. Results of the analyses were presented in cross-tabulation and charts. The data analyses were
mainly aimed at computing output (RT1 and RT2) and outcome indicators of rural and structural transformation, as presented in Table 1.

Due to the large number of districts in East Java, this paper presents data and indicators according to development clusters as stated in Presidential Decree No. 10 2019, regarding the acceleration of development in East Java. There are 5 development clusters, namely (1) Cluster GKS+: Sidoarjo, Mojokerto, Jombang, Bojonegoro, Tuban, Lamongan, Gresik and Bangkalan; (2) Cluster Wilis: Pacitan, Ponorogo, Trenggalek, Tulung Agung, Blitar, Kediri, Nganjuk, Madiun, Magetan, and Ngawi; Cluster BTS: Malang, Lumajang, Probolinggo dan Pasuruan; Ijen: Jember, Banyuwangi, Bondowoso, Situbondo; Cluster Madura: Sampang, Pamekasan, and Sumenep.

Table 1. Indicators for measuring rural transformation.

| Drivers | Indicators | Descriptions |
|---------|------------|--------------|
| RT1     | Urbanization and health services facilities | Number of urban villages, hospital, clinics and medical personnel. |
|         | Share of high-value agriculture | Share (percentage) of non-food crops in agricultural GDP and GDP |
| RT2     | Share of rural non-farm employment | Percentage of rural labors engaged in non-farm and non-agricultural employment |
|         | Rural household income | Per capita rural household income in real terms |
| Outcome | Rural poverty incidence | Percentage of rural population under poverty |
|         |                        | Poverty gap index (PGI) |
|         |                        | Poverty severity index (PSI) |

3. Results and discussion

3.1. Factors or drivers affecting rural and structural transformation

There are many driving factors or drivers that determine the success and speed of structural transformation and rural transformation, which can be grouped into three categories: institutions, policies, and investments (IPIs). The development and improvement of public facilities and infrastructure, including roads and transportation, education, and health are important factors determining the speed of success in rural transformation. Due to the limited number of pages, however, this paper only presents urbanization and health service facilities considered to be essential drivers of successful rural and structural transformation.

3.1.1. Urbanization. An increasing number of urban villages, as one of the characteristics of urbanization, is an indicator of rural transformation. Empirical evidence indicates that changes in the rural to urban environment are usually followed by changes in employment opportunities from on-farm to off-farm and from agriculture to non-agriculture [12].

During the period 1990-2020, the number of urban villages in East Java increased significantly from 1979 villages in 1990 to 2424 villages in 2020. As shown in Figure 1, the increasing number of urban villages varied between priority development clusters and districts. The GKS Cluster and Wilis Cluster were recorded as the two clusters with the highest number of urban villages, which in 1990 were recorded at 844 and 573 urban villages respectively and increased to 956 and 707 urban villages in 2020. However, the fastest growth rate of the number of urban villages occurred in the cluster BTS, rising at a rate of 3.7% per year, from 167 urban villages in 1990 to 267 urban villages.

3.1.2. Health service facilities. Figure 2 shows the development of the number of hospitals in each cluster in East Java. The GKS+ Cluster experienced the most significant increase in the number of hospitals during the 1990-2020 period, increased from 12 hospitals in 1990 to 85 hospitals in 2020, followed by Wilis Cluster from 10 to 49 hospitals, and BTS Cluster from 7 to 40 hospitals (2020). The marked increase in the number of hospitals and other health facilities in East Java cannot be separated from the implementation of the national program to improve public health.
Figure 1. Development of urban villages in East Java 2003-2017.

Figure 2. Development of the number of hospital in East Java 2000-2020.

The East Java government has successfully built community health centres (Puskesmas) throughout the province. If hospitals are generally located in district cities, the locations of Puskesmas are in sub-districts or even in the villages. One Puskesmas generally provides health services to the community in several adjacent villages. As with the number of hospitals, the fastest growth in Puskesmas occurred in the GKS Cluster, followed by the Wilis Cluster, Ijen Cluster, Madura Cluster, and BTS Cluster. However, the largest number of Puskesmas is in the Wilis Cluster, which was 237 Puskesmas in 1990 increased to 262 Puskesmas in 2020. The most significant number of Puskesmas is in the Wilis Cluster because this cluster has the largest number of districts and sub-districts.

Figure 3. Development of the number of community clinics in East Java, 1990-2020.

Figure 4. Development of the number of medical personnel in East Java, 1990-2020.

3.1.3. Medical personnel in East Java. Figure 4 shows a significant increase in the number of medical personnel in East Java during 2000-2020, from only 472 people in 1990 to 5,468 people, or increasing at an increasing rate of 7.6% per year. The fastest growth rate of medical personnel occurred in the GKS Cluster, at a rate of 8.2% per year, followed by the BTS Cluster (8.0% per year), the Wilis Cluster, and Ijen Cluster, each growing at a rate of 7.1% and the Madura Cluster at a rate of 6.9% per year. The districts with the most and the fastest rate of growth of medical personnel were Sidoarjo and Gresik in the GKS cluster, followed by Malang district in the BTS cluster, and Kediri district in the Wilis cluster.

3.2. Indicators of structural and rural transformation

3.2.1. Structural change in Economy. The trend of economic development in some countries is the decline in the contribution of the agricultural sector to GDP due to the increased contribution of the non-agricultural sector [13]. Changes in the structure of the economy are characterized by a decrease in the
 contribution of the agricultural sector and an increase in the contribution of the industrial sector to both GDP and employment [14]. This pattern of structural transformation is consistent with many previous international comparison studies based on the national aggregated data [8,14,15].

The share of the agricultural GDP in East Java has gradually dropped from 21.3% in 2000 to 12.0% in 2018. Meanwhile, as shown in Figure 5, the shares of some sectors such as processing and manufacturing, construction, transportation, and communication have increased steadily during the 2000-2028 period. This structural transformation in East Java economy has further been followed by structural transformation in the agricultural sector, as the sector has diversified and that non-food crop sub-sectors, including livestock and fishery, shifted out the food crop sub-sector.

![Figure 5. Share of agricultural sector in GRDP of East Java, 2000-2018.](image)

![Figure 6. Shares of food crops and high value commodities in Agricultural GDP, 2000-2018.](image)

3.2.2. Structural production change in agriculture. More commercialized and diversified production in the agricultural sector and the rapid rise in off-farm employment have been major features of rural transformation in East Java. In this study, we define rural transformation as a process of gradual shifts the structure of agricultural production from food crop-based or low-value agriculture to more diversified and commercialized high-value agriculture and the rural employment from farm to off-farm and from agriculture to non-agriculture.

Main food crops in Indonesia include rice, maize, soybean, and cassava. During the 2000-2018 period, as shown in Figure 6, the share of food crops has significantly dropped from 59.0% in 2000 to 29.8% in 2018. Moving from low-value to higher-value food crops and other commodities, including livestock and fishery, is the main feature of agricultural production structural changes and rural transformation [3]. The shares of livestock and fishery to agricultural GRDP increased significantly from 11.3% and 7.1% in 2000 to 21.3% and 21.3% in 2018, respectively. It is worth noting that slightly different from Huang et al who used the shares of the total value of non-food crops in gross agricultural output values, this paper uses the shares of high-value commodities in GRDP of agriculture. In other words, this paper uses the added values, not the gross values of agricultural output [17].

3.2.3. Rural employment. Figure 7 shows the rising trends of rural labour employment in the non-agricultural sector during 1989-2018. The speed of rising non-farm rural employment has been faster in many districts in the past four decades. In 1989, only about 43.8% of rural labour worked in non-farm sectors, then increased to 67.5% in 2018 [17,18,19]. Structural transformation driven by urbanization and industrialization has increased employment opportunities for rural labour. This pattern of structural transformation is consistent with previous international comparison studies based on the national aggregated data [8,14,20].

The results are in line with the results of studies in rural Southeast Asia, of which the diversification of the rural and urban economy has increased job opportunities for rural communities to work both off-farm and non-agricultural sectors [21]. For small farmers, working in off-farm activities
is an option to take advantage of the excess family labour to meet household subsistence needs and to increase household income [22].

3.3. Outcomes indicators of structural and rural transformation

3.3.1. Rural household income. As discussed above, we use rural income and rural poverty as two major indicators to measure the outcomes of rural transformation. Figure 8 shows that per capita household income at a constant price in East Java during 1990-2020, both urban and rural households, has steadily increased. An increasing level of education of farmers and relatively higher wages in off-farm activities encourage farmers to work in off-farm activities and non-agricultural sectors such as industry and services [23]. The decision of farmers to work in off-farm and non-agricultural sectors, which generally apply regional minimum wages, has significantly increased household income [24]. This significant and steady increase in rural household income is evidence of the East Java government's success in accelerating rural and structural transformation in East Java.

3.3.2. Poverty Incidence. As depicted in Figure 9, the poverty incidence in East Java has dropped from 21.9% to 11.1% during the 2000-2020 period, although varied between development clusters. During the period, the poorest and slowest area of poverty reduction was the development cluster of Madura, where the rate of poverty reduction was only 3.3% per year, and the poverty incidence in 2020 was still high at 19.4%. The poverty incidence in other development clusters is relatively the same, in the range of 10.21% - 10.81% in 2020, with the poverty reduction rate ranging from 3.6% to 3.9% per year. In 2020, the city (municipality) of Surabaya recorded as the city with the lowest poverty incidence (5.02%), followed by the Districts of Sidoarjo (5.6%) and Tulung Agung (7.3%).

The success of the East Java regional government is not only in reducing poverty incidence but also in reducing the depth and severity of poverty, which is shown by a reduction in the poverty gap index (PGI) and the poverty severity index (PSI). Figure 10 shows that during the 2002-2020 period, the PGI declined from 3.9 in 2002 to 1.8 in 2020 or at an annual reduction rate of 3.7%, while the PSI declined from 1.0 to 0.4 or at the reduction rate of 4.2% per year. This was a success for the provincial government in alleviating poverty in East Java.
4. Conclusions

The structural and rural transformations in East Java varied between districts and development clusters. During the 2000-2018 period, the share of agriculture GDP has significantly dropped from 21.3% in 2000 to 12.0% in 2018. Meanwhile, the contribution of other sectors such as Manufacturing, Construction, transportation, and communication has increased steadily.

The results also show that there has been a rapid structural change in agriculture, of which non-food subsectors, particularly horticulture, livestock, and fisheries, have gradually shifted out the contribution of the food crop subsector. The relatively rapid structural and rural transformation in East Java has succeeded in increasing farm household incomes and reducing the poverty incidence in urban and rural areas. Rural household income in East Java has increased steadily during the 2000-2020 period.

During the 2000-2020 period, poverty incidence in all development clusters in East Java has declined significantly, except the poverty incidence in the development cluster of Madura. The success of the East Java Regional Government is not only in reducing poverty incidence but also in reducing the depth and severity of poverty, as shown by a reduction in the poverty gap index (PGI) and the poverty severity index (PSI).

The success in increasing rural households’ income and reducing the poverty rate is inseparable from the success of the East Java Government in implementing development programs and improving public infrastructures and facilities, including health services, throughout the region. In the future, to continue increasing household income and reduce poverty, the East Java Government needs to maintain the momentum of its success through more targeted pro-growth and pro-poor investment policies along with the development programs in all sectors, including agriculture.

Acknowledgement

The authors wish to thank the Australian Center for International Agricultural Research (ACIAR) for financial support to conduct this research (ADP/2017/024). Appreciation also extended to international collaborators of the project, Dr.Chunlai Chen (Australian National University), Prof.Christopher Findlay (Australia), and Prof.Jikun Huang (Peking University) for stimulating this research work.

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