Occupational structure and structural change in Indonesia, 1880-2000

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1. Introduction

Profound changes in the structure of labour markets are considered an important aspect of economic development (Manning, 1998, p. 12). Kuznets (1957, 1966) even argued that an indicator of economic development is the agricultural share in employment and output. He found that as countries develop the share of the labour force working in the agricultural sector decreases. At first this is due to an increasing share employed in the industrial sector. In a later stage of development this standard economic theory predicts that the share of employment in the service sector starts to rise. According to Kuznets these structural changes characterize the transition to what he calls 'modern economic growth' in which labour shifts away from low productivity (agricultural) sectors to high productivity (industrial/service) sectors.

The aim of this paper is to assess these changes for Indonesia by looking at developments in the occupational structure for the period 1880-2000. Generally it is believed that Indonesia only recently, more precisely since the 1970s onwards, made decisive steps to what Kuznets would call a modern economy. Since then a sharp relative decline of the agricultural labour force is found. The indigenous population in Indonesia is thought to have remained by and large subsistence peasants under the colonial rule. Anthropological researchers even characterized economic life in colonial Java in the nineteenth and twentieth century as an 'agricultural involution' in which the Javanese intensified subsistence agriculture instead of looking for other sources of income to provide each household a living (Geertz, 1963). Alexander and Alexander describe this rather persistent school of thought as follows:

> "For these writers, as for others who later drew on their work, the major reasons for the lack of economic progress should be sought in the essential nature of the Javanese: an amalgam of traditional society and archetypical personality. Javanese were characterized as essentially subsistence minded wet-rice agriculturalists with limited needs who placed a very high value on leisure and social obligations and preferred to share resources rather than compete for them" (Alexander and Alexander, 1990, p. 33).

In this paper I will argue that if we take the available labour force statistics at face value one indeed arrives at the conclusion that the process of modern economic growth only

started in the second half of the twentieth century. Looking at productivity figures one could even question whether Indonesia is already a modern economy. However, scrutinizing the data and especially accounting for the problem of by-employment leads to a more nuanced view: Whereas agriculture remained the most important sector, already in the second half of the nineteenth century increasing economic diversification appears to have been a result of a process of pre-modern economic growth (Fernando, 1996, p. 109).

The remainder of the paper is organized as follows. The next section will briefly discuss the available data sources for labour statistics in Indonesia. Section 3 analyzes these data for the twentieth century. In section 4 we will treat the issue of labour productivity and see what that can tell us about the process of modern economic growth. In section 5 it is shown how the picture is changed when taking by-occupation into account.

2. Data sources

Already for the early nineteenth century occupational statistics were collected on Java. For tax collecting purposes local officials kept records of non-agricultural workers, but unfortunately those records have not survived (Fernando, 1992, p. 3). Into the early 1870s the colonial administration began to systematically collect statistics on the number of Javanese engaged in non-agricultural occupations. These statistics were published into the early 1900s in the Koloniaal Verslag (KV, Colonial Report). Unfortunately these statistics, while still being collected where no longer published afterwards.

Beginning in 1880 a population survey was carried out every five years. In that first year, this was only done in the areas under government control in Java and Madura and in the Residency of Sumatra's Westcoast. But by 1900 surveys were carried out wherever possible, although the reliability remained in doubt. Initially data concerned male adults only.

The most important source which contains detailed information on occupational structures for our ends is the enumeration of 1905. While this enumeration is considered of poor quality in absolute terms, it gives a rather accurate picture of the relative distribution of the labour force. Moreover it is the first time data on both men and women were collected, and secondary jobs were considered.

The inaccuracy resulting from the time it took to complete the surveys and the local differences in the commencement and completion times increasingly came to be regarded as a drawback. Therefore plans were made to hold a real census, at least in the government

territories on Java. This census was planned to be carried out on one day, which was set at 1 June 1910. However, due to its high costs and the lack of manpower, this count was postponed, first to 1915 and then to 1920. When the enumeration of 1920 was finally carried out, it was held both in Java and in the Outer Islands, but instead on one day, it was spread over one month.

In comparison with the last population survey, the population census of 1920 produced less information, while the reliability of the results was not much better. For example, data concerning occupations and numbers of head of livestock were completely lacking. Because of all this Boomgaard and Gooszen conclude that "in view of all the inadequacies, which were clearly recognized at the time, the population census of 1920 can best be considered as a rehearsal for the 1930 census" (Boomgaard en Gooszen, 1991, p. 28).

The quantity of data collected during the 1930 census was considerably greater than in 1920. Not only had it been possible to carry out true counts in greater parts of the Outer Islands, but also more questions had been asked. Apart from name, sex, civil status, physical defects, quality of residence and literacy, there were, among others, detailed questions concerning education, occupation (including secondary occupations) and positions held.

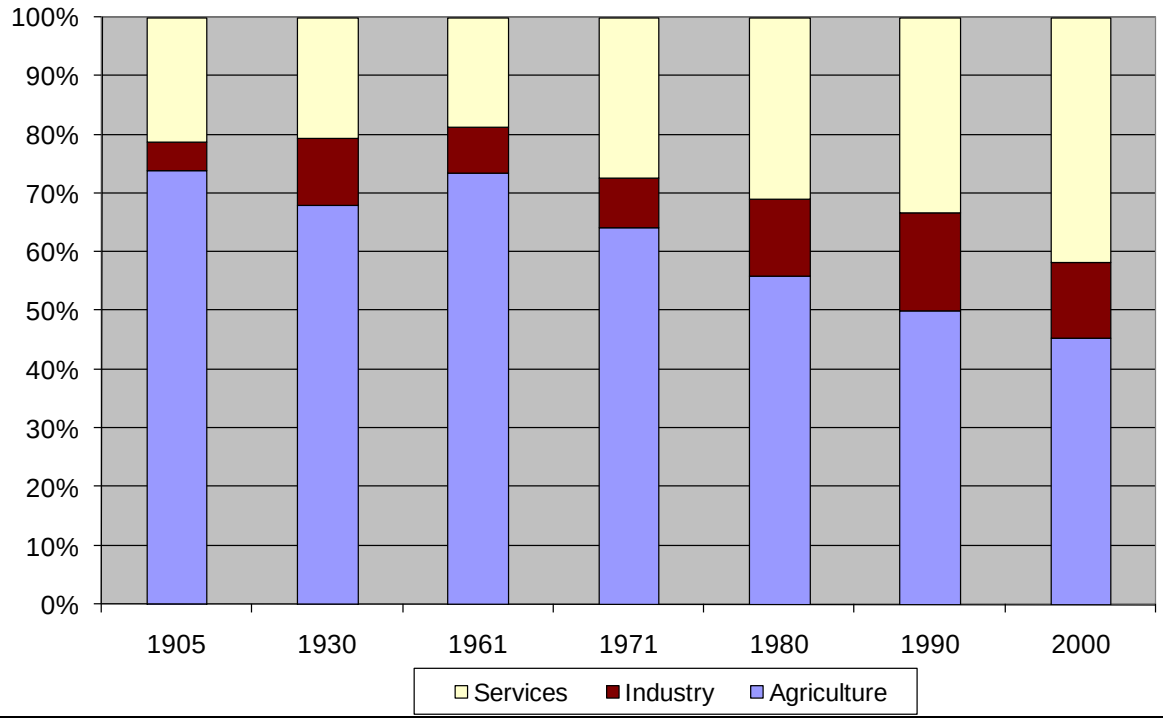
Considering the careful preparation and organization, it seems reasonable to assume that the 1930 census produced quite reliable results. Encouraged by these results officials started preparations in the second half of the thirties for a census to be held in 1940. Unfortunately this census was abandoned because of World War II.

World War II and the subsequent struggle for independence seriously halted back progress in data collection. It was only in 1958 that new data become available on the occupational structure, although this survey was limited to Java and Madura. Starting in 1961 data become more abundant and reliable with the population census held in that year. In 1971 a further population census was held and subsequently in 1980, 1990 and 2000. Furthermore intercensal surveys were conducted in 1976, 1985 and 1995. Moreover, since 1976/7 National Labour Force Surveys (*Sakernas*) are conducted annually with the exception of the years 1981, 1983 and 1984. This survey provides a rich data set on the labour force situation in Indonesia, including data on employment, unemployment, wages, age structure of the labour force and education.

3. Labour force statistics, 1905-2000: Structural change?

As can be seen in figure 1 only a modest number of people was employed in either the industrial or the service sector at the start of the 20th century. Not surprisingly, the majority of the labour force was occupied in agriculture. However, one has to be careful when analyzing these 1905 data. The share of the category 'others' in 1905 was namely substantial with 17.1 per cent. This share is most likely not evenly distributed over the primary, secondary and tertiary sector, and probably biased towards the tertiary sector. These problems can distort the picture.

Figure 1: Occupational structure, 1905-2000



Sources: 1905: Koloniaal Verslag 1907, appendix A; 1930: Volkstelling 1930; 1960, 1971, 1980, 1990 and 2000: Sensus Penduduk
Note: The category 'Others' mainly consists of 'activities not adequately defined'.

The 1930 census is considered to be of quite a high standard. However, the category 'activities not adequately defined' is still large with 9.6 per cent. Nevertheless the 1930 employment figures give a fairly accurate picture of the occupational structure. Therefore it is promising that this census seems to support the findings for 1905: During the colonial period agriculture is by far the most important sector with more than 2/3 of the labour force employed in this sector. During the first decades of the 20th century there seems to be a

moderate shift to the manufacturing sector. The number of people employed in the service sector does not change much, neither does the composition of the occupational structure within the service sector.

Unfortunately data on employment are unavailable for the period between 1930 and 1961. The 'excellently' prepared census that was planned for 1940 was abandoned when World War II broke out (Van de Graaff 1955, p. 147). This war and the subsequent struggle for independence seriously halted back data collection. It was not until 1961 that a new population census was held.

The results of this census reveal some interesting points. Not surprisingly employment in agriculture was still dominant. What is striking though is that also in relative terms employment in this sector was even larger than in 1930. At the same time the share of employment in industry decreased from 11.0 per cent to 7.9 per cent. In 1961 the service sector absorbed 18.3 per cent of the total labour force. Probably this growth of service sector employment is partly a statistical reality, since the category 'activities not adequately defined' dropped from to 9.6 per cent in 1930 to 1.9 per cent in 1961. However, partly, this increase is real, mainly because of a rapidly growing bureaucracy. This was a consequence of Sukarno's policy of '*Socialism a la Indonesia*' which resulted in increasing intervention by the central government. Because of this pattern in which the share of the labour-intensive or traditional sectors in total output increased while that of the modern, capital-intensive sectors declined, Booth calls this a period of retrogression (1998, p. 70-72).

From 1961 onwards we see some signs of what Kuznets would call modern economic growth. The share of agricultural employment decreases to 45.3 per cent in 2000. Striking is that between 1980 and 1990, a period that was characterized by relatively slow economic growth and a re-orientation of the economy, this share remained almost constant.

Another remarkable feature is that the share of industry in total employment only slowly increases from 7.9 per cent in 1961 to 10.8 per cent in 1990 and 13.0 per cent in 2000. This contradicts the commonly held view that during the process of modern economic growth there is a shift in employment first from agriculture to industry and in a later phase to services.

Table 1: Occupational structure in Indonesia, 1905-2000

(in thousands)

	1905		1930		1961		1971		1980		1990		2000	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1. Agriculture, Hunting, Forestry and Fishing	8,868	73.9%	14,274	68.4%	23,516	71.9%	26,473	64.2%	29,069	56.4%	42,378	55.9%	40,677	45.3%
2. Mining and Quarrying			90	0.4%	87	0.3%	86	0.2%	389	0.8%	528	0.7%		
3. Manufacturing	571	4.8%	2,209	10.6%	1,856	5.7%	2,682	6.5%	4,651	9.0%	7,693	10.1%	11,642	13.0%
4. Electricity, Gas & Water					51	0.2%	37	0.1%	66	0.1%	135	0.2%		
5. Construction					582	1.8%	678	1.6%	1,667	3.2%	2,060	2.7%	3,497	3.9%
6. Trade, Hotels and restaurants	508	4.2%	1,293	6.2%	2,194	6.7%	4,262	10.3%	6,723	13.0%	11,067	14.6%	18,489	20.6%
7. Transport & Communication	67	0.6%	316	1.5%	691	2.1%	951	2.3%	1,477	2.9%	2,313	3.0%	4,554	5.1%
8. FIRE and Business services			685	3.3%	3,095	9.5%	93	0.2%	304	0.6%	478	0.6%	883	1.0%
9. Community, social and personal services	211	1.8%					4,120	10.0%	7,187	13.9%	9,070	12.0%	9,578	10.7%
0. Activities not adequately defined	1774	14.8%	2,003	9.6%	635	1.9%	1,878	4.6%	21	0.0%	128	0.2%	523	0.6%[a]
Total	11,999	100%	20,870	100%	32,707	100%	41,261	100%	51,554	100%	75,850	100%	89,843	100%

Notes:
[a]: including major divisions 2 and 4

Sources:
1905: Jaarboek koloniën, 1909/10; 1930: Volkstelling 1930; 1961: Sensus Penduduk 1961; 1971: Sensus Penduduk 1971, Seri D; 1980: Hasil Sensus Penduduk 1980, Seri S; 1990: Hasil Sensus, Seri S.

The case of Indonesia reveals two important findings. Firstly, already in an early phase of development service sector employment is significant and higher than industrial employment. Secondly, growth of service sector employment is not preceded by a growth in industrial employment, but rather coincides or is even followed by it.

This argument can further be strengthened if we look at the annual growth in employment. Looking at the growth rates of the different sectors in table 2, we see that during the 20th century service sector employment growth is constantly high. Especially until 1971 this growth is higher than in industry. When industrialization takes off from the mid-1970s onwards growth in industrial employment becomes slightly higher than that in service sector employment.

Table 2: Annual growth in employment

	Agriculture	Industry	Services	Labour Force
1930-1961	1.6%	-0.5%	3.1%	1.5%
1961-1971	1.2%	3.6%	4.7%	2.4%
1971-1980	1.0%	6.9%	5.8%	2.5%
1980-1990	3.8%	5.0%	3.9%	3.9%
1990-2000	-0.4%	3.5%	3.9%	1.7%

Source: own calculations from table 1

Horlings (1995) found that the Netherlands did not follow the 'sectoral model' either. He argued that 'instead of transfers of labour from agriculture into industry and then into services, the structure of the Dutch economy became more advanced without significant growth of industry' (Horlings 1995, p. 107). This scenario seems to hold for its former colony as well. In the case of the Netherlands Smits attributes this development path to important linkages between agriculture and the service sector, especially distributive services (Smits 1990, p. 90). More research is necessary to explain this 'unusual' development that emerges from an analysis of the occupational structure in Indonesia. This is partly done in the next section where we will look at developments in labour productivity.

4. Labour Productivity

The employment figures from the previous section can be combined with GDP estimates[1]. This makes it possible to draw some conclusions about developments in labour productivity. Labour productivity estimates are presented in table 3.

The first remark that has to be made is about the rather high labour productivity in 1905. This is mainly due to weakness in the data. As said before the enumeration of 1905 is considered of poor quality in absolute terms, resulting in an underestimation of the number of people employed in most sectors. From 1930 onwards estimates are quite reliable. They are based on a well-conducted population census combined with careful estimates of value added in the different sectors. A number of interesting observations can be made.

Table 3: Labour productivity in Indonesia, 1905-2000
(in fl/Rp per labourer)

	Agriculture	Industry (excl. oil and gas)	Trade	Transport & Communication	Financial sector	Total service sector
1905	1,018.3	4,071.0	3,961.1	1,497.8		3,291.7
1930	978.4	2,625.1	3,726.6	2,976.2		3,682.2
1961	939.5	3,559.2	2,208.6	3,289.8		2,385.7
1971	1,148.7	5,346.7	1,545.9	3,212.3	5,602.6	2,112.0
1980	1,170.0	11,742.8	3,118.8	5,101.4	7,057.0	2,724.1
1990	1,205.8	12,526.8	3,310.5	7,077.7	22,689.9	3,789.7
2000	1,685.6	15,764.6	3,115.8	6,964.6	27,038.2	4,390.4

Sources: Employment figures: Population censuses; GDP estimates: for Agriculture and Industry: vd Eng (2002). Other sectors: own estimates

To begin with labour productivity in the service sector turns out to be, as expected, higher than in agriculture. Labour productivity in industry, however, is, except in 1930, significantly higher than in the service sector, even four times higher in 2000.

Mulder (1999) came to different results in his study on the service sector in Brazil, Mexico and the USA. He found that productivity in services was indeed highest at the beginning for all three countries, just as in the case of Indonesia. In the course of time, productivity levels in services and other sectors converged, because of slower growth in

[1] The GDP estimates are not yet published estimates made as part of the Indonesia Historical National Accounts Project supervised by Pierre van der Eng (ANU) and Jan Luiten van Zanden (IISH) in collaboration with the Asian Historical Statistics Project at Hitotsubahi University.

productivity in services.[2] In Indonesia such a convergence in productivity can not yet be found. Labour productivity in manufacturing in Indonesia is still much larger than in the other sectors. This suggests that the shift from labour to services that is taking place now, raises the overall performance less than a shift to manufacturing.

The findings above are strengthened if we look at growth rates in labour productivity. As can be seen in table 4 growth in labour productivity in industry was especially high in the 1970s, when industrialization took off in Indonesia. The decrease in labour productivity in trade between 1961 and 1971 and again between 1990 and 2000 is probably because the labour surplus as a result of the crises that took place in these periods was mainly absorbed in this sector.

Table 4: Labour productivity growth, 1930-2000

	Agriculture	Industry (excl. oil and gas)	Trade	Transport & Communication	Financial Sector	Total service sector	Total labour productivity
1930-1961	-0.13%	0.99%	-1.67%	0.32%		-1.39%	
1961-1971	2.03%	4.15%	-3.50%	-0.24%		-1.21%	2.32%
1971-1980	0.20%	9.14%	8.11%	5.27%	2.60%	2.87%	4.97%
1980-1990	0.30%	0.65%	0.60%	3.33%	12.39%	3.36%	2.31%
1990-2000	3.41%	2.33%	-0.60%	-0.16%	1.77%	1.48%	2.62%

Source: own calculations from table 3

Growth in labour productivity in transport and communication has been quite steady. This can probably be attributed to the technological developments in this sector and the investments the government has been making in infrastructure. Promising developments also took place in the financial sector. In this sector labour productivity is by far the highest, although the Asian crisis has halted back further growth.

With the inputs so far it is possible to estimate the contribution of structural change to productivity growth. This method is usually called the shift-share method introduced by Fabricant (1942). The shift-share methodology is still popular in decomposing aggregate productivity growth (see Syrquin, 1984, for an overview and for more recent applications van Ark, 1996; Mulder, 1999; Timmer and Szirmai, 2000; Lains 2004).

$$LP_t = Y_t / L_t = \sum_{i=1}^{n} (Y_{(t,i)} \times L_{(t,i)}) / (L_{(t,i)} \times L_t) = \sum_{i=1}^{n} L_{(t,i)} \times S_{(t,i)}$$

[2] Similar findings were reached by Maddison (1980), Ohkawa (1993) and Syrquin (1986).

where LP denotes labour productivity, Y output, L the labour force, and S the share of labour in each sector.

The difference in aggregate labour productivity levels at time 0 and t can be written as:

$$LP_t - LP_0 = \sum (LP_{(t,i)} - LP_{(o,i)}) \times S_{(o,i)} + \sum_{i=1}^{n} (S_{(t,i)} - S_{(o,i)}) \times LP_{(o,i)} + \sum_{i=1}^{n} (S_{(t,i)} - S_{(o,i)}) \times (LP_{(t,i)} - LP_{(o,i)})$$

The first term on the right hand side represents the intrasectoral productivity growth, and corresponds to that part of the productivity change which is caused by productivity growth within the sectors. The second term is referred to as the static shift effect, and represents the effect of the change in sectoral employment shares on overall growth. This effect is positive when labour moves to branches with relatively high productivity levels. The third effect measures the dynamic shift effect, and is positive when labour shifts to sectors which improve their productivity performance. The sum of the second and third term is referred to as the total structural change effect.

Table 5: Decomposition of labour productivity growth, 1930-2000

		1930-1961	1961-1971	1971-1980	1980-1990	1990-2000
Labour productivity growth per year		-0.03%	1.53%	4.94%	2.57%	2.97%
Intrasectoral growth			52.4%	67.0%	84.0%	56.4%
Structural change	Static		62.0%	21.8%	12.8%	38.4%
	Dynamic		-14.4%	11.2%	3.1%	5.1%
	Total		100.0%	100.0%	100.0%	100.0%

Source: own calculations

The results of this exercise are given in table 5. In Indonesia productivity growth is increasingly explained by productivity growth within sectors. Structural change accounted for almost 50 per cent of the growth between 1961 and 1971, but only 15 per cent of the growth between 1980 and 1990. The static effect was especially large in the 1960s and the 1990s indicating that in these periods labour shifted to more productive sectors. The dynamic effect has been relatively small.

5. Distorting the picture? The issue of by-employment

> "Although it has not been completely neglected, an entire socio-economic stratum of rural (...) society is not easily accounted for in any of the taxonomic formulations presently available (...). Characteristic of this population segment is occupational multiplicity or plurality wherein the modal adult is systematically engaged in a number of gainful activities, which for him form an integrated economic complex." (Comitas, 1973, p. 157)[3]

If we take the figures in the preceding paragraphs at face value, we would conclude that a shift in employment from agriculture to industries and services only took place in the second half of the twentieth century, especially since the late 1970s. Moreover, the decisive step to a truly modern economy still has to be made since the number of workers employed in high productivity sectors is still limited. However, and maybe quite surprisingly, one could say that already in the second half of the nineteenth century a first wave of development towards a modern economy took place in Indonesia. This argument can be made when we critically assess the statistical data and take into account some descriptive evidence and anthropological studies. That is, as we will see below, tackling the problem of by-employment significantly alters the picture.

Table 6: Proportion of agricultural workers to total labour force in Java, 1837-1930

Year	No. of agricultural workers	Total labour force	% of total labour force
1837	1,277,297	1,388,366	92%
1867	1,911,595	2,471,008	77%
1880	2,565,974	3,362,159	76%
1905	5,508,347	7,611,674	72%
1930	8,230,087	12,594,369	65%

Note: before 1880 numbers refer to all households, thereafter to the labour force
Source: Fernando (1992), p. 4.
Original sources:
1837: 'Kultuur Verslag', ARA, Archief Ministerie van Kolonien
1867: Koloniaal Verslag (KV) 1870, appendix A
1880: KV 1892, appendix A
1905: KV 1907, appendix A
1930: Volkstelling 1930, vol. 8, table 19

[3] While Comitas makes this argument for the specific case of Jamaica, I think it is more generally applicable.

In table 6 labour force statistics in Java for the colonial period only are summarized. It must be noted that strictly speaking the figures before 1867 and after 1867 cannot be compared, since before 1870 agricultural workers were counted as households whereas thereafter individual workers were registered. Nevertheless, table 6 clearly shows that the number of agricultural workers increased steadily from the 1830s onwards.

The increase in the number of agricultural workers would seem to confirm that for the native people agriculture was still by far the most important occupation. At the same time, however, the number of agricultural workers as percentage of the total labour force was declining, implying that more and more people were looking for means of livelihood outside agriculture. In this respect Fernando argues:

> "This moving out of agriculture became widespread in the first three decades of this century [i.e. 20th century] as shown by the slow pace of absorbing people into the agricultural sector at a time when other sectors of the economy were developing rapidly with more employment opportunities on a large scale" (Fernando, 1992, p. 4).

The statistics clearly suggest a significant transformation from a subsistence peasant economy to a more diverse economy in which a growing number of people earned their living from a range of activities outside agriculture. It is probable that these developments were even more significant than table 6 would suggest since quite a significant part of the population had more than one job, a phenomenon that is not well captured in these early statistics.

There is thus quite some anecdotal evidence of this phenomenon. This, however, is insufficient to draw any conclusions to the level of such economic activity. The enumeration of 1905, however, provides some 'hard' evidence. Fernando (1989) put together table 7 below.

This table shows that by-employment was not evenly distributed around Java. The number of peasants having a secondary job was relatively low in areas where a majority of peasants had access to farm land and subsistence agriculture still provided for nearly all their needs, such as in Banten, Semarang, Rembang and Besuki. In regions where land ownership was more limited agricultural labourers had to find other means of income to meet ends.

Table 7: Peasants engaged in by-employment, 1905

Residency	No. of peasants	% of peasants with land	No. of peasants in by-employment	% of all peasants
Banten	256,522	80	119,647	47
Batavia	362,914	75	152,510	42
Priangan	665,414	50	416,387	63
Cirebon	412,577	50	299,961	73
West Java	1,697,427	60	988,505	58
Pekalongan	406,046	52	249,555	61
Banyumas	272,378	95	158,304	58
Semarang	554,028	68	266,522	48
Kedu	567,638	51	368,240	65
Rembang	313,174	73	121,519	39
Central Java	2,113,264	60	1,164,140	55
Madiun	297,527	53	184,717	62
Kediri	344,506	57	195,275	57
Surabaya	468,173	62	277,915	60
Pasuruan	455,368	54	288,540	63
Besuki	212,009	78	66,770	32
East Java	1,777,583	60	1,013,217	57
Java	5,588,274	60	3,165,862	57

Source: Fernando 1989, p. 157.
Note: by-employment also includes those working as wage-labourers on a farm.

He thus argued that it is the division of the agricultural population into a group of land-holding peasants, who could live as subsistence farmers and a group of agricultural labourers who worked for land-holders that initiated the transformation to a more modern economy. The polarity namely weakened the subsistence peasant economy (Fernando, 1992, p. 8). Without access to land and enough resources the landless peasants had to work either as agricultural labourers of the land-holding peasants or to find other means of income. Moreover, in the early twentieth century peasants with very small holdings of farm land could not produce enough food crops to support their families. Even peasants with one *bouw* of farm land (0.7 ha) which was considered the standard size of a farm that could support a family of five people, did no longer earn enough to live solely from agriculture. Both these groups of economically weaker peasants had to earn a supplementary income from a range of by-employment to deal with the increasing cost of living.

The findings of Fernando are in some respect misleading however. In his table he also includes peasants working as agricultural labourers as being engaged in by-employment. He does not make explicit why he chose this procedure. A possible explanation can be that the transition from a peasant society towards one in which wage working becomes more important.

Table 8: 1905 enumeration

		Java & Madoera	Outer Islands	Total
Agricultural workers				
Landowners		3,787,564	1,744,040	5,531,604
Landless				
Renting land		341,110	152,007	493,117
Wage labourers		2,599,557	252,934	2,852,491
Total		6,728,231	2,148,981	8,877,212
Non-agricultural workers				
Central Government		31,172	10,485	41,657
Local Government	A	322,640	46,219	368,859
	B	26,910	10,074	36,984
Religious services	A	8,272	10,325	18,597
	B	8,009	5,654	13,663
Teachers	A	10,166	4,415	14,581
	B	5,993	2,379	8,372
Trade	A	187,070	24,317	211,387
	B	455,202	52,967	508,169
Transport workers	A	63,144	14,853	77,997
	B	54,044	12,661	66,705
Industry	A	145,609	46,489	192,098
	B	384,891	72,190	457,081
Proto-industry		62,866	49,835	112,701
Domestic servants		100,181	10,057	110,238
Others	A	483,698	63,431	547,129
	B	1,625,204	149,013	1,774,217
Total work force		9,482,712	2,524,296	12,007,008

Note:
A: already included as agricultural worker (thus having a secondary job);
B: not yet included

Source: Koloniaal Verslag 1907, appendix A

Table 8 presents the raw data from the 1905 enumeration. If we take all categories classified with an A (indicating already being included under agricultural labourers) and not

including the category agricultural wage labourers it turns out that 18.2 per cent of all peasants on Java and Madura has a secondary job. For the Outer Islands this figure is 9.8 per cent, while for the Netherlands-Indies as a whole it is 16.1 per cent. This is equal to 12.9 per cent, 8.3 per cent and 11.9 per cent of the labour force for Java and Madura, the Outer Islands and the Netherlands-Indies respectively. So while by-employment is definitely not negligible, it is much less common than suggested by the figures from Fernando.

Now we try to assess to what extent the issue of by-employment distorts the overall picture of the occupational structure. The available statistics of the 1905 enumeration allow us to take by-employment into account and adjust the figures for this. In table 9 the adjustment is done by assuming that those classified as also employed in agriculture are assigned for 50 per cent to agriculture and 50 per cent to their secondary job. Admittedly this is quite a rough measure and might result in a slight overestimation of off-farm employment. Table 9 shows that the occupational structure is somewhat changed by this adjustment.

Table 9: Consequence of by-employment in the 1905 enumeration, Netherlands-Indies

	1905 (adjusted)		**1905 (unadjusted)**	
	No.	%	No.	%
1. Agriculture, Hunting, Forestry and Fishing	8,162	68.0%	8,877	73.9%
2. Mining and Quarrying				
3. Manufacturing	666	5.5%	570	4.7%
4. Electricity, Gas & Water				
5. Construction				
6. Trade, Hotels and restaurants	614	5.1%	508	4.2%
7. Transport & Communication	106	0.9%	67	0.6%
8. FIRE and Business services				
9. Community, social and personal services	412	3.4%	211	1.8%
0. Activities not adequately defined	2,048	17.1%	1774	14.8%
Total	11,999	100.0%	12,007	100%

Note: Adjustment is done by assuming that those classified as also employed in agriculture are assigned for 50% to agriculture and for 50% to their secondary job.

Source: based on table 8

That the phenomenon of by-employment does distort the overall occupational structure picture can be seen in table 9. This table both gives adjusted and unadjusted figures. The unadjusted figures only consider main occupation. It shows that 74 per cent of the

population in the Netherlands-Indies in 1905 had its main occupation in agriculture. However, if we correct for the fact that quite a significant number of agricultural workers also worked part of their time in non-agricultural sectors this percentage declines to 68 per cent.

Striking is the large number of workers having activities classified as 'not adequately defined'. It is believed that this is caused by the fact that officials who compiled the workforce data encountered considerable problems in classifying certain activities in the other categories, so they lumped these together as 'other'. Fernando suggests that part of these 'others' were probably wage labourers employed by craftsmen and manufacturers (Fernando, 1992, p. 12). I would argue that also a significant part of these workers should be classified as service workers. I think that problems with classifying agricultural work were less frequent than with classifying non-agricultural work.

Peasant by-employment can be categorized into rural manufacturing industries, petty trade, transport and services. It is believed that the officials who compiled the workforce data encountered considerable difficulties in ascertaining the actual number of peasants engaged in the first three categories so that they lumped together a large number of people employed by manufacturers, traders and transporters as being engaged in services (Fernando, 1989, p. 158).

Table 10 shows that manufacturing, mainly small scale, attracted around 100,000 people who were classified as peasants as seasonal or part-time workers. Petty trading was slightly more important as secondary employment. Almost 165,000 traders or 31 per cent of all traders still had their roots in agriculture. Rural manufacturing and petty trading undertaken as by-employment were usually conducted on a small scale, centred around the peasant household. These activities required only a very small capital input, but consequently generated only a small cash income. Often this was just enough to meet the needs of families, but hardly enough to improve their social standing (Fernando, 1989, p. 155).

Also the transport sector was a substantial source of by-employment, but because draught animals, carts and boats required a fairly big capital outlay this was usually beyond the capacity of many peasants.

Table 10: Peasants engaged in by-employment in 1905, by category of employment

Residency	No. of peasants manu facturers	% of all manu facturers	No. of peasant transporters	% of all transporters	No. of peasant traders	% of all traders	No. of peasants in services	% of all in services	No. of peasants in unspecific work	% of all in unspecific work
Banten	3,981	86	4,034	88	11,676	81	37,269	95	1,690	14
Batavia	6,416	20	1,739	40	8,592	25	9,327	37	23,380	51
Priangan	9,373	31	1,713	59	25,591	48	23,086	22	3,816	14
Cirebon	3,176	48	1,598	61	14,199	47	52,993	66	3,614	16
West Java	22,946	31	9,084	63	60,058	45	122,675	49	32,500	30
Pekalongan	11,881	30	3,643	71	12,210	21	8,465	10	3,696	17
Banyumas	5,981	22	197	61	10,158	36	1,901	1	2,113	3
Semarang	6,968	27	3,873	56	14,013	19	16,446	51	8,654	25
Kedu	18,318	24	2,070	77	20,979	35	6,679	8	6,446	8
Rembang	4,010	15	2,292	82	7,957	31	1,960	17	5,515	15
Central Java	47,158	24	12,075	60	65,317	27	35,451	9	26,424	10
Madiun	10,840	83	3,627	86	12,348	49	955	52	5,035	84
Kediri	6,560	28	6,848	73	5,886	20	1,925	4	8,809	16
Surabaya	6,581	14	10,057	66	8,647	16	5,044	7	34,852	27
Pasuruan	4,604	27	13,455	59	9,462	20	18,557	19	17,566	17
Besuki	1,693	41	8,545	82	2,552	37	702	5	1,020	13
East Java	30,278	29	42,532	67	38,895	24	27,183	11	67,282	22
Java	100,382	27	63,691	63	164,270	31	185,309	21	126,206	19

Source: Koloniaal Verslag 1907, appendix A

In conclusion it seems fair to say that for peasants in Java in the late nineteenth/early twentieth century by-employment was an important feature of the changing rural economy. The majority of peasants with access to cultivated land had only small holdings of wet-rice fields, hardly enough to meet their food requirements even under favourable conditions (Fernando, 1989, p. 169). Therefore self-sufficient subsistence peasant households had largely disappeared and, except in remote and isolated areas, peasant households had become accustomed to buying a proportion of their domestic requirements in the local markets.

6. How distorting is the effect of by-employment?

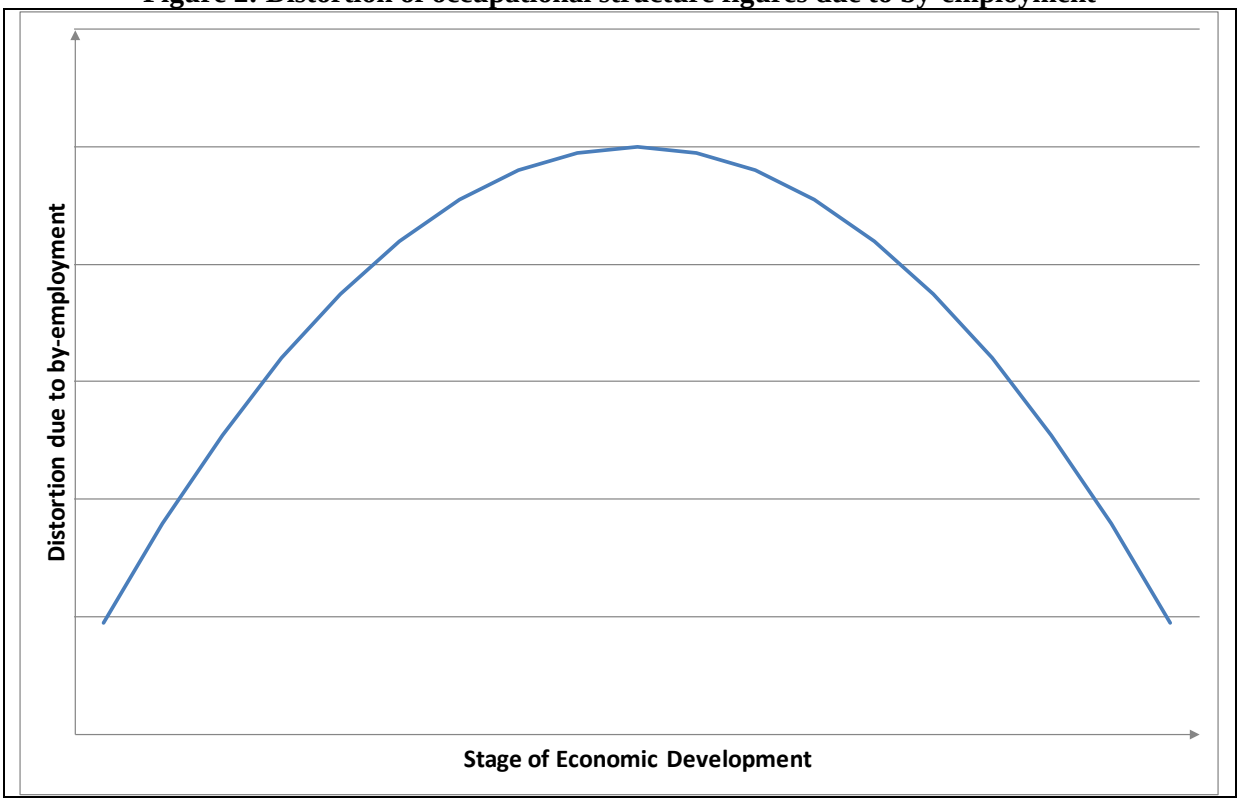
I believe that the extent to which by-employment distorts the overall picture of occupational structure depends very much on the stage of economic development. In initial stages of development most households will depend solely on agriculture. The first steps of economic diversification will be taken besides the agricultural occupation. Only in the later stages of development a majority of labourers will find full-time wage employment outside agriculture and consequently by-employment will decrease.[4] This path of development is illustrated in figure 2.

In the specific case of Indonesia I would argue that not taking by employment into account significantly changes the picture somewhat for the period 1905 through 1980. Evidence suggests that before 1890 by-employment distorts the picture of the occupational structure in Indonesia to a negligible extent. Arminius (1889) presented an account of the hours worked for the head of the family. Allowing for one day off per week it turns out that in all three cases the men worked more than 7 ½ hours per day throughout the entire year. Clearly, this does not leave much time for a secondary job. For the 1970s evidence is mixed. One study found that male heads of agricultural households worked more than 8 hours per day, and their wives worked even longer (Edmundson and Sukhatme, 1990, p. 265-266). A different study found that in ten villages in Java in 1980-81 out of 2393 persons 1297 were solely employed in agriculture. 665 were employed in the non-agricultural sector and 431 had mixed employment (Kasryno, 1986, p. 294). This means that 18.0 per cent of the total labour

[4] A similar argument is made by Manning (1998) concerning underemployment. He argues that with economic development underemployment is expected to decline, because of a shift from family work and self-employed jobs in agriculture into non-agricultural wage employment. At later stages of development more flexible work arrangements may lead to an increase in those working less than a full-time working week (Manning 1998, p. 189, footnote 28).

force in these villages was engaged in by-employment which is roughly equal to the proportion in 1905.

Figure 2: Distortion of occupational structure figures due to by-employment



For 1905 it has been possible to make some adjustments. Unfortunately for later years data on secondary occupation is missing.

7. By-employment: individual versus household income diversification

Surprisingly little attention is paid to this problem of by-employment in the literature on employment in Indonesia. Discussion often concentrates on non-farm income of agricultural households. Based on a substantial sample of farms households for the whole of Java and Madura Meijer Ranneft and Huender estimated for 1925 that 30 per cent of total income before tax was off-farm income (Meijer Ranneft & Huender, 1926, p. 41). Moreover, Booth shows that in 1984 18.3 per cent of agricultural households had their main income for non-agricultural activities rising even to 21.5 per cent in 1993 (Booth, 2002, p. 184).

But this is a different, although related issue. It is mainly an issue of definition. In most cases these workers are probably rightly classified as being employed in, for example, petty trade or small scale industry. But since their husband is working in the agricultural sector, the household is also classified as agricultural. In this case there is no distortion in the occupational structures obtained from population censuses, although these issues of definition can be very confusing. Often it is unclear which definition is used and definitions are used interchangeably. But rural is not equal to agricultural. And a rural non-agricultural household is a possibility. We even find urban agricultural households in Indonesia's population statistics. And are we talking about households or individuals?

Table 11: Definition checklist

Agricultural	or	Non-agricultural
Rural	or	Urban
Individual	or	Household

Relating the table above to our findings on the occupational structure and by-employment the following can be said. In our discussion we concentrated on the level of the individual and did not look at households. Moreover no distinction between rural and urban is made. We looked at by-employment of agricultural workers in the non-agricultural sector. However it should be kept in mind that workers in the non-agricultural sector can also have a secondary job in a different sub-sector of the non-agricultural sector. This is probably more often found in later stages of development as a survival strategy of the urban poor.

Census statistics are usually collected at the level of an individual. Therefore by-employment only blurs the overall picture if individual household members have more than one job. In many cases however, diversification of income occurs on a household level and not necessarily on an individual level. In cases where each member of a household has a different, but only one job, this is probably pretty well captured in the census statistics. Most research, however, is at the level of the household and therefore it is frequently found that an agricultural household earns a significant part of its income in the non-agricultural sector. These effects of income diversification do not, however, distort the picture of the occupational structure in a country. However, one should acknowledge both the structural change on the level of an individual as well as changes in employment within a household to understand the dynamics of employment, structural change and economic development.

8. Conclusion

Simply looking at the Indonesia's employment statistics would lead one to conclude that only in the second half of the twentieth century a shift from agriculture to industry and services occurred. In Kuznets terminology only then Indonesia made a step towards a modern economy. Strikingly, developments in Indonesia's occupational structure seem to reveal an unusual pattern. Whereas according to standard development theory labor moves first from agriculture then to industry and then to services, in Indonesia the service sector turns out to be already a large labor-absorbing sector in early stages of development.

If we look at labor productivity we have to adjust the conclusion a little. It was shown that the labor shifting away from the agricultural sector did not go to higher productive sectors. In this respect one could question whether Indonesia truly made a step towards a modern economy.

Taking into account the problem of by-employment further nuances the picture. It is quite common and persistent to portray the Javanese peasant economy as solely agricultural. Even the term 'agricultural involution' is used to describe developments during the colonial period. However, if we adjust the available statistics for the fact that quite a significant number of people had some kind of secondary job, we see that non-agricultural employment already played an important role in the Javanese economy in the late nineteenth century. In most cases looking for other means of income was necessary to earn enough income to support the family.

Whether this sectoral shift out of agriculture in colonial Java can be compared to the phenomenon of 'proto-industrialization' in Europe is not clear (Mendels, 1972). Different from Europe or late Tokugawa Japan, the growth of non-agricultural economic activity during the phase of pre-modern economic growth in Java failed to produce a steady growth in per-capita income, stimulating capital formation leading to the industrialization (Smith, 1973). At the same time one could argue that these changes could be indeed be characterized as a modern economic transformation, but retarded by the Great Depression, Japanese occupation and struggle for independence (Fernando, 1992, p. 16).

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