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Sanjaya Acharya
Hokkaido University,
Sapporo, Japan



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A COMPARATIVE APPROACH OF THE AGRICULTURAL AND INDUSTRIAL LABOUR PRODUCTIVITIES IN POVERTY ALLEVIATION

Sanjaya Acharya*
Hokkaido University, Sapporo, Japan

Abstract

In this article we explore the avenue to alleviate pervasive poverty in a small, underdeveloped, and labour abundant dualistic economy. We take the case of Nepal, analyze its income expenditure flows and compare its macroeconomic structure with post-war Korean economy. We conclude that in the given agrarian nature and land distribution pattern in Nepal, the existing flow mechanism can hardly work in favour of the poor. Consequently, raising the labour productivity is the effective strategy left to reduce poverty in Nepal. This effort is urgent as the existing trend of sectoral labour productivities in Nepal are discouraging, which is even far behind the post-war South Korean performance.

JEL Classification: D63, E25, I30, I32, J52.

Key words: poverty, income distribution, labour productivity, Nepal, and South Korea

1. Introduction

Widespread poverty is the major development challenge to the Nepalese economy. Various studies have estimated the head count index of the poverty in Nepal for the last three decades; but their estimates vary considerably. It has been estimated as low as 40 percent and as high as 60 percent of the total population based on the methodological differences they followed. However, these differences did hardly matter to the planners to keep poverty alleviation in the top priority in development plans. The last three development plans, each of them were for five fiscal years, were all optimistic to reduce the poverty index by 10 percentage points during the respective plan period, thus, they regarded poverty alleviation as the foremost national objective by the turn of the century.

In this paper, we try to examine the root cause of the dreadful poverty in Nepal from the viewpoint of its persistent labour surplus dualistic economic structure. Abundance of unemployed labour force in the country led huge emigration every year. Centre Bureau of Statistics (CBS) (2001) recorded 762181 emigrants upto the year 2001, 3.25% of the whole population, due to the civil war that erupted in 1995. Everyday, hundreds of youths are emigrating, especially to India and Arab world, in search of work. India constituted nearly 68% of the total emigrants followed by Saudi Arabia with 8.9%, Qatar 3.2%, and Hong Kong 1.6%. Other countries accounted for nearly 18%. Though this outflow of labour has ultimately lessened the pressure on agriculture to some extent, the depletion of the skilled workers would lead the country towards low-skilled economy and retard its growth potential. Therefore, Nepal must explore a sustainable approach of labour management in the domestic economy

The author is a post-doctoral foreign researcher in the Faculty of Economics, Hokkaido University, Japan.

* Correspondence: Sanjaya Acharya, Faculty of Economics, Hokkaido University, Kita Ku, North 9 West 7, 060-0809 Sapporo, Japan.

E-mail: acharya@pop.econ.hokudai.ac.jp or sanjaya_acharya@hotmail.com.

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along with improving labour productivity that could be conducive to the poverty reduction as well.

Labour productivity growth is inextricably linked to economic growth and welfare. As most of the differences in cross-country per capita GDP growths is due to multifactor productivity growth rather than input accumulation (Easterly and Levine, 2002), understanding and investigating the evolution, sources and determinants of productivity growth is essential to address economic growth and welfare. To start with factors of production, there are a number of approaches for measuring factor productivity; the most frequent one is by using the index number. Diewert and Lawrence (1999) examined New Zealand's productivity performance for the period 1988-2002 using index number techniques. They defined productivity index as the ratio of an output index to an input index; each index representing accumulated growth from during the period 0 to t. When input index consists of a single factor, most commonly labour or capital, we get partial rather than total multifactor productivity index. Owing to the nature of this study, we calculate the partial productivity of labour in this paper.

The partial productivity indexes measure changes in the ability of factor inputs to produce output over time. Caution is required when using partial productivity measures because changes in the mix of inputs can influence these measures. For example, substitution of physical capital for labour, owing to a relative change in the price of labour to physical capital, may raise labour productivity. As cited by Dixon (1990), p. 6, "...productivity statistics do not always represent true changes in the underlying productivity of labour...". This is why one should be careful in confirming the productivity growth either originating from factor substitution or not. In this study, we have paid adequate attention to the changes in factor proportions along with the change in factor productivity to detect the possible biasness.

In theoretical ground, we assess Lewis dual sector model with reference to the inter-sectoral labour transfer in Nepalese economy. The dual-economy models of Lewis (1954) and Fei and Ranis (1964) provided a first attempt to understand the dynamics of the development process in labour surplus developing economies. It was argued that incentives to the agricultural sector were necessary to increased agricultural production which would, in turn, support domestic industry as a producer of final goods. Although those earlier models took a too-simplistic view of various aspects of dualism, renewed interest in this area has provided some interesting developments. These dual inter sectoral models attracted academia for further research in subsequent years.

Traditionally, inter-sectoral linkages were thought as synonymous with increased demand for intermediate goods when production of the basic goods increases (backward linkages), or with cheapening of final production when the sectors in question cheapen another's input (forward linkages) (Delgado et al., 1999). While earlier works focused on backward linkages, the focus today is much on forward linkages (Bigsten and Collier, 1995). Thorbecke and Stiefel (1999) expand the standard dualistic framework into a dual-dual framework, which distinguishes modern (formal) and traditional (informal) sector activities in both urban and rural areas. With this framework, they show the population shift among socio-economic groups as an important factor in explaining changes in poverty. Moreover, traditionally, linkages were mainly analyzed from the production side of the economy. However, recent evidence shows that in rural economies, the primary inter-sectoral linkages occur on the consumption side, based on how rural poor people spend increments in income (Delgado et al., 1999). Some observers argue that increased focus should be on the pro-urban

infrastructure, light manufacturing, and peri-urban agriculture, which ultimately integrates rural activities to the urban activities (World Bank, 1999). Still, more attention requires to inter-sectoral dynamics especially in the areas where the incidence of poverty is high like sub-Saharan Africa and south Asia (Verner and Blunch, 1999).

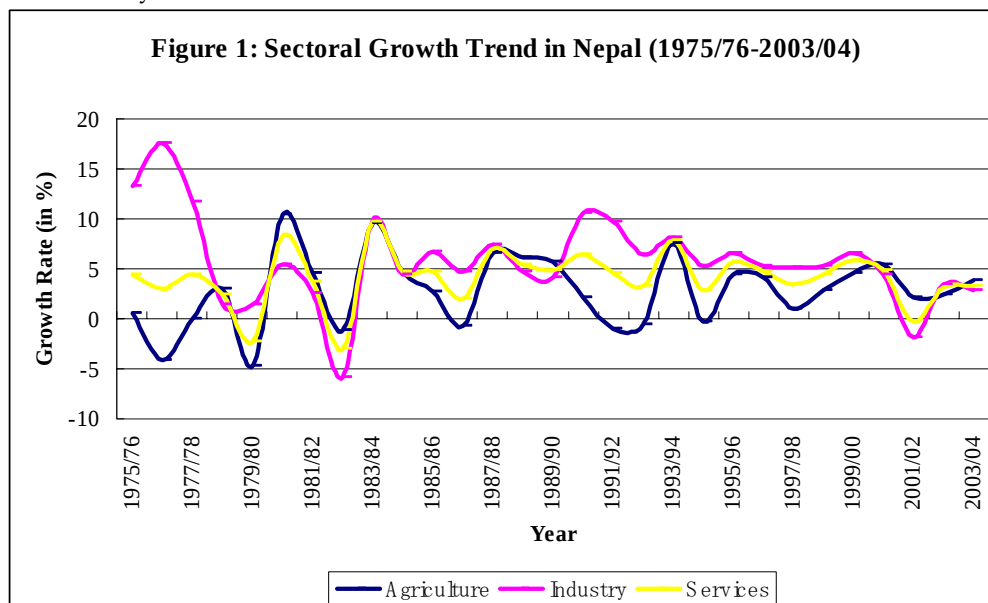
Inter-sectoral linkages are considered important when formulating development strategies. In 1960s and 1970s, those strategies were mainly focused on the expansion of industrial activities in order to increase demand for agricultural products. In an extended dualistic framework, Bourguignon and Morrison (1998) found that the extent of economic dualism is a major factor explaining differences in income distribution across developing countries. Higher agricultural growth is the most efficient way of reducing inequality and poverty as shown by the household surveys in India undertaken between 1951 and 1991 (Ravallion and Datt, 1996). Mellor (1999) also argues that, even if manufacturing growth is more important for overall growth, agricultural growth is more important for employment, growth and poverty reduction. However, this paper shows that even the higher agricultural growth is not enough to reduce poverty. It is the growth rate of the agricultural workers' productivity originated in and influenced by the higher growth of industrial labours productivity that matters much in poverty reduction.

Studies on growth, inequality and poverty are substantial. This study, however, tries to give a new glimpse by enriching the poverty-inequality-growth nexus of a small developing economy with incorporation of labour productivity in the conventional story. Moreover, this study examines the trend of labour productivity growth over the last three decades in Nepal and compares the trend with that of post-World War II South Korean economy. This comparative analysis of labour productivity to explore avenues for effective and sustainable poverty alleviation among developing countries in general and for Nepal in particular is the first one that has been carried out by this study. There are some good reasons to validate this comparison. Many socio-economic development indicators of Nepal during the mid-1970s seemed quite similar to that of South Korea during late 1940s and the beginning of 1950s (See Appendix A1). There is little question that post-World War II economic history of Korea resulted in a development process that not only benefited upper and middle income groups, but also substantially raised the welfare of the poorest members of society. The study of the Korean experience should thus offer hints for selective and careful generalization to other developing countries as well (Adelman and Robinson, 1978, p. 47).

The remainder of the paper is organized as follows. Section 2 provides the trend analysis of growth, inequality, and poverty in Nepalese economy. Section 3 constructs the Social Accounting Matrix (SAM) for Nepal and presents the macroeconomic flow structure of Nepalese economy. The input-output relationship among major economic sectors as revealed by this SAM has been compared with that of South Korean economy 35 years ago to explore the replication of labour reallocation strategy as productive as that of a fast growing East Asian economy in similar stage of her development. Section 4 measures the labour productivity trends for current Nepalese economy and post-war Korean economy. Our productivity index is based on sectoral production share and respective labour employment share. Section 5 explores the avenues for the improvement of labour productivity in Nepal for poverty reduction and assesses the relevance of Lewis dual sector model in this regard. Section 6 concludes the paper.

2. Growth, Poverty and Inequality in Nepal

Growth pattern during the last three decades is very volatile in Nepal as revealed by Figure 1. This volatility, especially after 1983/84, is more in agriculture and industries than in services. Moreover, industrial growth rate has substantially declined after 1990.



Date source: Ministry of Finance (2005).

Agricultural growth in Nepal mainly depends on monsoon. Industrial growth, on the other, rests upon many internal and external factors. The internal one includes the factor relations and input output linkages whereas the external one is mainly the impacts of globalisation. The service sector is primarily a domestic one; its growth rate was relatively stable during 1980s and 1990s (Figure 1).

Four national representative surveys on income and employment provide the trend of distribution pattern in Nepal during 1976/77-2003/04; these are the most reliable data for studying growth, poverty and inequality in Nepalese economy. These surveys were in fiscal years 1976/77, 1984/85, 1995/96, and 2003/04 and they presented the distribution pattern as shown in Table 1.

Table 1: Income distribution pattern in Nepal during 1976/77-2003/04

% of population	% of total income			
	1976/77	1984/85	1995/96	2003/04
Bottom 10%	0.9	4.3	1.7	2.1
Next 10%	1.9	5.8	3.6	3.2
Next 10%	2.4	7.1	4.5	4.0
Next 10%	3.5	7.9	5.5	4.9
Next 10%	4.0	8.6	6.4	5.8
Next 10%	5.1	9.6	7.6	7.0
Next 10%	10.9	10.2	9.1	8.6
Next 10%	11.5	11.9	11.3	11.0
Next 10%	12.8	14.5	15.3	15.7
Top 10%	47.1	20.1	34.9	37.7
Total 100%	100.0	100.0	100.0	100.0

Sources: NPC (1983), NRB (1988), and CBS (1997), CBS (2005).

Inequality in income distribution declined during 1976/77-1984/85 but increased afterwards. The bottom 40% of the population shared about 9, 25, 15,

and 14 percentages of the total household income in 1976/77, 1984/85, 1995/96, and 2003/04, respectively. The distribution pattern is becoming increasingly uneven after mid-1980s. Despite the decline in poverty during 1995/96-2003/04, inequality continued widening; it could only be attributed to the increasing inequality among the non-poor. According to the experiences of some middle income countries, Dollar and Karrey (2004, F46), the income of the poor is mostly tied to the overall state of the economy. Their studies, particularly on the Mexican economy, found the income of the poor declining sharply during recession years of 1980s and growing during recovery years of 1990s. However, in case of Nepal, we do not find such trend. The average GDP growth rates during the five years preceding the survey (survey year included) mentioned above remained 3.7, 4.7, 4.9, and 3.4 percentages, respectively; however, head count poverty ratio remained 60, 41, 63, 49 percentages for the survey years. It shows the lack of direct relationship between the economic growth and poverty reduction in Nepalese economy.

The most important turning point in Nepalese economy was during the mid-eighties when the government initiated macroeconomic policy reform in connection with IMF/World Bank's Structural Adjustment Programme (SAP). During the one and half decades after mid eighties, Nepalese government privatised numerous public enterprises, and liberalised macroeconomic policies along with many legal and administrative reforms. It reduced custom duties and other trade barriers in an effort to transform Nepalese economy into fast growing, competitive, vibrant, and globalised economy. However, these policy reforms caused the marginalisation of the poor as evident from the increasing inequality and poverty during 1985-1996. Similar impacts were reported by Szekely (1995) and Marquette (1997) in case of some Latin American and African countries during the structural adjustments.

We calculate the poverty and inequality indices to this small economy based on the data given in Table 1. The FGT class of poverty indices (Foster, Greer and Thorbecke, 1984)¹ for the period 1976/77-2003/04 is given in Table 2.

¹ These calculations follow from the formulation $P_{\alpha} = \frac{1}{N} \sum_{i=1}^Q (\bar{y} - y_i)^{\alpha}$ where N = total

population, $\bar{y}$ = the poverty line, y_i = income of individual i who is below the poverty line, and Q = total population below the poverty line. When $\alpha = 0$, it measures the Head Count Ratio (HCR) of poverty; when $\alpha = 1$, we get the Poverty Gap (PG); and when $\alpha = 2$, we get the Squared Poverty Gap (SPG) index. These HCR, PG, and SPG measure the number of poor, how much percent of the per capita income is deficient to bring all the poor out of the poverty line, and degree of income inequality among the poor, respectively (Foster, Greer and Thorbecke, 1984). The World Bank has also been using this method for calculating the three basic poverty indices (World Bank, 2000, p. 207).

Table 2: Trend of poverty (1977 - 2004) using 1984/85 poverty line

Year	1984/85 poverty line adjusted to all the survey years (in Rs.)	Poverty indices			
		HCR	PG	SPG	GINI
1976/77	982	60	35	25	59
1984/85	1971	41	14	6	31
1995/96	6874	63	27	15	44
2003/04	9648	49	19	9	47

The level of poverty is all fluctuating in Nepal; however, inequality is constantly increasing after 1984/85. Poverty indices (HCR, PG, and SPG) and inequality (GINI) both declined first and then rose during 1977-1996. However, during 1996-2004, poverty level has declined but inequality further widened. Moreover, the income share of the bottom 30% of the population has declined just by 0.5%; however, the income share of the richest 30% of the population has increased by 3 percentage points during 1996-2004 (Table 1) indicating the further rise in inequality particularly among the richer population.

Table 2 shows a virtual reduction of poverty during 1995/96-2003/04. It is attributed to the high influx of foreign remittances to the households from their family members working abroad. After the outbreak of the civil war in 1995/96, many youths emigrated abroad in search of employment; consequently, the remittance income of households rose substantially, more than 12 folds during 1995/96-2003/04. Moreover, additional 10% of the total households started receiving foreign remittances.² The declining poverty despite the declining overall growth of the economy (Figure 1) was due to the increasing foreign remittances.

3. The Flow Structure in Nepalese Economy

The best way to examine whether the pro-poor growth is possible in Nepal under the current fundamental economic structure is by understanding the product, factor, and institutional inter-linkages existing in the economy. In this section, we present the schematic form of the income expenditure flow of Nepalese economy. Here, Nepalese households are classified into four groups (Urban Households, Large Rural Households, Small Rural Households, and Land-less Rural Households). Likewise, we have four production activities (agriculture, industry, commercial services, and public services), four final commodity markets (agriculture, industry, commercial services, and public services), three factor types (high skilled labour, low skilled labour, and capital), and four institutions (households, firms, government, and rest of the world). Moreover, there is one national capital account. We use the following parameters and variables to get the schematic flow structure of Nepalese economy as given in Table 3:

Parameters

ica_{ca}	quantity of commodity c as intermediate input per unit of activity a
aps_h	average propensity to save for household h
aps_f	average propensity to save for firm
ty_h	rate of income tax to household h
ty_f	rate of income tax to firms
$ncir_a$	non-competitive import share per unit of activity a

² Nepal Rastra Bank (Nepalese central bank), Quarterly Economic Bulletin, 2006.

Variables

EXR	foreign exchange rate (domestic currency per unit of foreign currency)	QM_c	quantity of imports of commodity c
$FSAV$	foreign savings (in foreign currency)	WF_f	average wage (rental rate) of factor f
PA_a	price of activity a	YH_h	total income of household h
PWE_c	export price (foreign currency) of commodity c	$TR_{h,row}$	transfer income of household h from rest of the world
PWM_c	import price (foreign currency) of commodity c	$TR_{h,gov}$	transfer income of household h from government
PQ_c	composite price of commodity c	$TR_{firm,gov}$	transfer income of firms from government
QA_a	level of activity a	$TR_{gov,row}$	transfer income of the government from rest of the world
QE_c	export quantity of commodity c	YFF	factor income of firms
QF_{fa}	quantity demanded of factor f by activity a	$YFIR$	total income of firms
QF_{hf}	income of household h from factor f	GC_c	government consumption of goods c
QH_{ch}	quantity of consumption of commodity c by household h	GS	government saving
$QINV_c$	quantity of investment demand of commodity c	$STAX$	sales tax revenue
		TAR	tariff revenue
		YA_{ac}	income of activities from commodity market

Table 3: Flow structure in Nepalese economy

	Expenditures							
	factors	households	firms	government	capital	activities	commodities	rest of the world
factors						$\sum_a QF_{fa} \cdot WF_f$		
households	$\sum_f QF_{hf} \cdot WF_f$			$\sum_h TR_{h,gov}$				$\sum_h TR_{h,row}$
firms	$\sum_f YFF_f$			$TR_{firm,gov}$				
government		$\sum_h ty_h \cdot YH_h$	$tyf \cdot YFIR$			STAX	TAR	$TR_{gov,row}$
capital		$\sum_h aps_h \cdot (1 - ty_h) \cdot YH_h$	$apsf \cdot (1 - tyf) \cdot YFIR$	GS				$FSAV \cdot EXR$
activities							$\sum_c YA_{ac}$	
commodities		$\sum_c QH_{ch} \cdot PQ_c$		$\sum_c GC_c \cdot PQ_c$	$\sum_c PQ_c \cdot QINV_c$	$\sum_a ica_{ca} \cdot QA_a$		$\sum_c PWE_c \cdot QE_c \cdot EXR$
rest of the world						$\sum_a QA_a \cdot ncir_a \cdot PA_a$	$\sum_c PWM_c \cdot QM \cdot EXR_c$	

Incomes

Based on the structure in Table 3, we have constructed the Social Accounting Matrix (SAM) of Nepal for the year 2006 as presented in Appendix A2.

3.1 Input-output relationship

Here we present a comparative picture of the input-output relationship among different sectors of the Nepalese economy, based on SAM 2006, with that of Korean economy in 1970.

Table 4: Input-output relation in Nepalese economy (2006) and South Korean economy (1970)

Commodities	Activities							
	Korea 1970				Nepal 2006			
	Agri	Ind.	Com.Se	Pub.Se	Agri	Ind.	Com.Se	Pub.Se
	r	r	r	r	r	r	r	r
Agriculture	0.546	0.041	0.002	0.016	0.604	0.409	0.001	0.005
Industry	0.145	0.613	0.491	0.636	0.009	0.432	0.208	0.319
Com.Services	0.289	0.323	0.437	0.346	0.355	0.109	0.559	0.588
Public Services	0.020	0.022	0.070	0.002	0.032	0.051	0.232	0.087

Note: Agri. = Agriculture, Ind. = Industry, Com.Ser = Commercial Services, Pub.Ser = Public Services.

Source: For Korea, calculation is based on the data available at the Institute of Developing Economies (1976); for Nepal, based on Table 3 and Appendix A1.

A brief comparison between the input output table at macro level for Nepal 2006 and South Korea 1970 explores some interesting facts. Agricultural intermediate deliveries have major share in agricultural and industrial activities in Nepal whereas it was industrial intermediate deliveries in case of Korea. To put it in other words, small scale industrial activities caused the expansion of large-scale industrial activities in Korea whereas in Nepal the primary agricultural activities cause the industrial expansion. It shows agriculture as the backbone of Nepalese economy (Table 4) because both of the commodity sectors, agriculture and industry, primarily depend on agriculture for intermediate deliveries. The Korean economy, however, had already crossed this stage before 1970 as industrial sector was primarily supplying intermediate deliveries to three major activities: industry, commercial services and public services by this year. This shift of the centre of gravity of Korean economy from agriculture to industry paved the way for developing this economy into newly industrialized economy during 1970s and early 1980s.

3.2 The Structure of household income in Nepal

Among the four household groups mentioned above, all landless rural households are poor, and majority of the small rural households are also poor. The rest of the household groups are, in general, non-poor. The factor income shares to the total household income of different groups are as follows:

Table 5: Factor income composition in household income

Household group	Factor income (% of household income)		
	Low-skilled labour	High-skilled labour	Capital
Urban households	30.29	17.66	51.02
Large rural households	21.83	21.12	55.80
Small rural households	42.84	10.21	43.37
Landless rural households	52.74	10.16	28.55

Note: The row total does not sum up 100 because households also have transfer income.

Source: Appendix A2.

Poor households in Nepal primarily depend on labour income, whereas non-poor households on capital income (Table 5). Though low-skilled labour income is higher than high-skilled type among all household groups, it is significantly higher among the poor households.

In traditional agrarian societies, land is the single most important asset for the capital income of households. Though mostly dependent on agriculture, poor people in Nepal have smaller landholdings and their land productivity is also lower, almost half of the non-poor (Table 6). The poor often own marginal land and lack fertilizers and irrigation facilities. Those without land are even poorer, working as sharecroppers for the landholders.

Table 6: Land holding and land productivity between poor and non-poor households

Household	Ecological region					
	Mountain		Hill		Terai	
	Per capita landholding (ha.)	Productivity (Rs. per ha.)	Per capita landholding (ha.)	Productivity (Rs. per ha.)	Per capita landholding (ha.)	Productivity (Rs. per ha.)
Poor	0.1162	7568	0.1320	7802	0.1197	7271
Non-poor	0.2502	16387	0.2059	15258	0.2301	13900

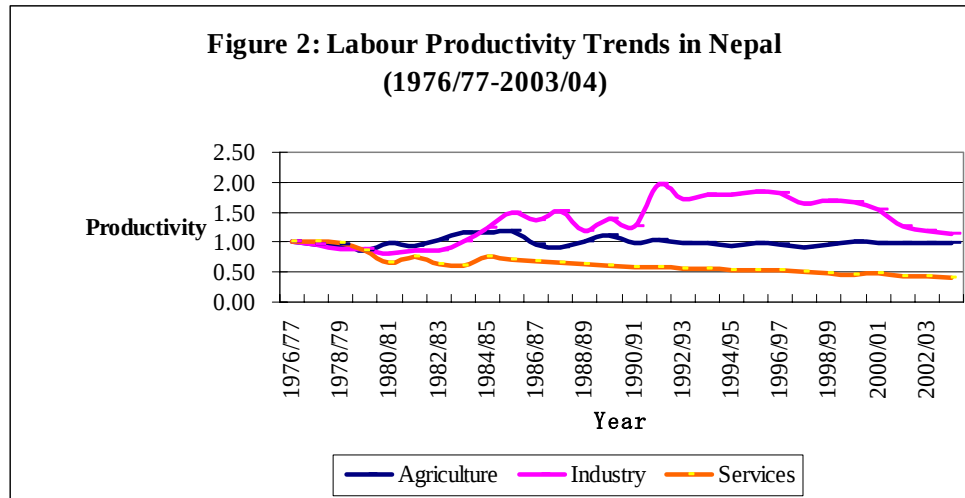
Source: NRB (1992).

CBS (1992) also reveals similar picture; 70% lower income households possess only 30% of the available agricultural lands; whereas the higher income 30% acquires the rest. No land transfer/distribution programme has been implemented after this survey; therefore, the landholding pattern might not have changed much till now. Consequently, even if there is high agricultural growth, it could not translate into much welfare gain to the poor. This finding is quite similar to what Gibson and Rozelle (2003) had concluded; even substantial investment in agriculture could not favour the poor so long as land rentals of productive land are high and land productivity of the poor is low. A quick observation on Table A2 (Appendix), particularly in factor activity flow relations, reveals the share of profit significantly higher as compared to the share of wage bills in industrial and commercial services activities and marginally higher in case of agricultural activities. Therefore, mere the transfer of surplus agricultural labour to industries and commercial services does not benefit the poor labour unless their labour productivity is improved. It follows that improving the labour productivity would be the best way to reduce poverty so long as the poor possess little or no capital.

4. Trend in Labour Productivity

Nepalese labour productivity index, broadly disaggregated into agriculture, industrial, and service sectors, has been measured as production index per unit labour index. Figure 2 shows the labour productivity trend during

1976/77-2003/04.



Note: Productivity index has been calculated based on data from Nepal Rastra Bank Survey (various years) and Ministry of Finance (2005).

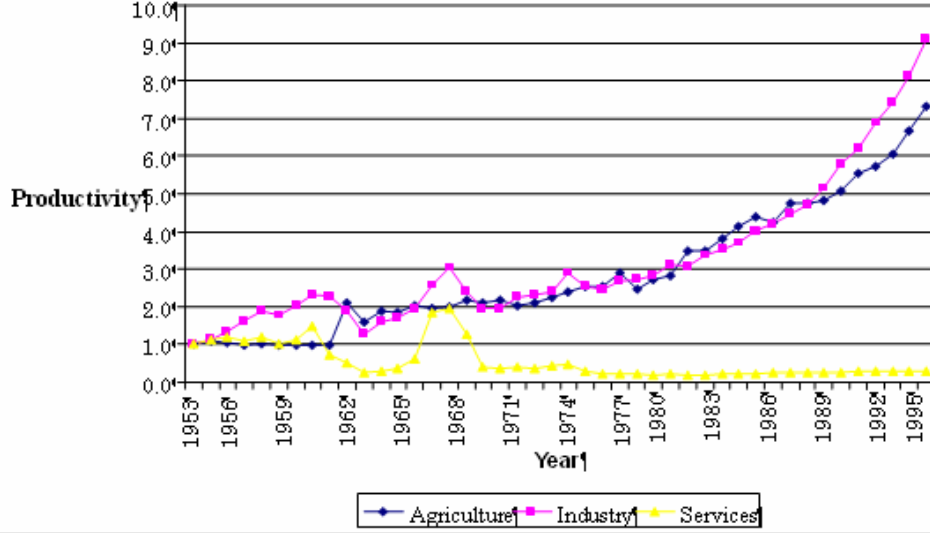
The agro-industrial input-output linkages in Nepalese economy partially validate the Lewis dual sector model for underdeveloped agrarian economy (Lewis, 1954), which we will discuss in detail in Section 6. From 1981/82, productivity of both agriculture and industrial labours improved but the latter increased faster than the former. Both reached saturation in 1985/86 temporarily. Afterwards, it remained somewhat stable in industries for few years except slight fluctuations but the productivity of agricultural labours started declining. During 1987/88-91/92, we could not find a trend relation between the labour productivities in these two sectors. However, from 1991/92 onward, it is declining apparently for industrial workers and no improvement for agricultural ones. The secular decline of the service workers productivity is because of the monotonic expansion of this sector. It absorbs more than 20% of the workforce now as compared to just 2% in 1971/72.³

Comparing the labour productivity in Nepal (1976-2003) with that in post-war South Korea, we can observe Nepalese performance still far behind the Korean progress during 1953-1981. Based on the availability of data, except the downswing during 1960-63, the agricultural and industrial labour productivities in Korea are increasing monotonically after 1953 (Figure 3). This is why it became possible for the sustainable poverty reduction in Korea as majority of the poor were working in agricultural and industrial sectors.⁴

³ The stable or declining agricultural labours' productivity is not due to the transfer of agricultural capital other than land to other sectors. Rather Nepalese agriculture is a subsistence one and it lacks other physical capitals for transfer. Likewise, declining industrial labours' productivity is also not by the transfer of industrial capital to some other sectors. Cumulative investments are declining neither in agriculture nor in industries.

⁴ Per capita GDP in Korea was US\$ 79 in 1962, US\$ 395 in 1973 and over US\$ 5,000 in 1989. Agriculture and industry comprised more than 73% of the total workforce in 1960 and approximately 62% in 1980. Therefore, this substantial improvement in per capita GDP must have been caused primarily from agricultural and industrial sectors.

Figure 3: Labour Productivity Trends in Korea (1953-1996)



Note: Labour productivity index has been calculated based on the data from Korea Economic Research Institute (1990) as cited by Hongyul Han and Insang Hwang (2000), pp. 43, 47, 82.

Going to the Nepalese case, the question arises why the higher productivity of industrial workers over agricultural ones after 1984/85 did not significantly withdraw the surplus agricultural labour so that productivity of the left over agricultural workers could go up? It can only be explained on the ground that comparatively higher labour productivity in the modern industrial sector is not the sufficient condition to absorb the surplus agricultural labour so long as the growth rate in labour productivity in the former is declining. Though the absolute productivity level is higher in industry over agriculture, its growth rate is declining (Figure 2). Therefore, it is neither strong enough to withdraw surplus agricultural workers nor raise productivity of existing agricultural workers.

Now we measure the growth rate of labour productivity. Following Taylor et al. (2002), one can decompose the growth of overall labour productivity as follows:

Labour productivity is defined as: $\hat{\rho} = X/L = \sum X_i / \sum L_i$, where X is output and L is labour. The first difference version is:

$$\begin{aligned} \hat{\rho} &= \sum [(X_i/X) \hat{X}_i - (L_i/L) \hat{L}_i] \\ &= \sum (L_i/L) \hat{\rho}_i + \sum [(X_i/X) - (L_i/L)] \hat{X}_i \\ &= (X_i/X) \hat{\rho}_i + \sum [(X_i/X) - (L_i/L)] \hat{L}_i \end{aligned}$$

where the hats indicate growth rates and ρ_i the labour productivity by sector⁵.

⁵ The first line decomposes overall productivity growth into movements in output and employment, weighted by the sectoral shares of these two variables. The second and third lines show how overall productivity growth can be written as a weighted average of sectoral productivity shifts, plus a "correction" term involving weighted reallocations of output or employment across sectors. The reallocation weights $[(X_i/X) - (L_i/L)]$ reflect differing productivity levels in different sectors. An output or employment loss in a low productivity sector [agriculture, for example, with a negative value of $(X_i/X - L_i/L)$], will reduce overall productivity growth, whereas employment or output

Using this relation, we estimated growth rates in labour productivities in different sectors (Table 7) as follows (for data, please see the Appendix A3):

Table 7: Annual rate of labour productivity growth in Nepal (1976/77 - 2003/04)

Sectors	Years			
	1976/77	1984/85	1995/96	2003/04
Agriculture	-0.041	0.021	-0.006	-0.002
Industry	0.001	0.007	0.006	-0.002
Commercial Service	0.041	0.018	0.011	-0.011
Public Service	0.004	0.006	0.002	-0.002
Total	0.005	0.052	0.013	-0.017

Note: Calculations are based on the data from NPC(1983), NRB (1988), CBS(1997) and CBS (2005).

Small and volatile labour productivity growth is along with high level of poverty in this small village economy. However, after the year 1995/96, massive influx of the foreign remittances caused poverty indices go down despite negative growth rate of labour productivity. In rest of the cases, poverty reduction did not become sustainable due to the volatility in labour productivity growth. Korea, even half a century ago, was able to maintain a sustainable growth of the labour productivity (Figure 3), which became the landmark in Korean economic development during 1960-70. Labour productivity growth was by almost 20 percentage points during this period. Even after this period, the productivity growth rate is always positive (Table 8).

Table 8: Annual rate of labour productivity growth in Korea (1954-1981)

Sectors	Years				
	1954	1960	1966	1970	1981
Agriculture	0.054	0.012	0.057	0.042	0.062
Industry	-0.006	-0.009	0.012	0.047	0.032
Services	0.067	0.007	0.063	0.113	0.006
Total	0.115	0.010	0.132	0.202	0.099

Note: Calculations are based on the data from Bank of Korea (1988); EPB (1988) as cited by Jene K. Kwon (1988) (ed.); Charles Harvie and Hyun-Hoon Lee (2003), p. 3.

In the next section, we explore an avenue for the productivity growth of Nepalese labour in light of the post-war Korean experience.

5. Improving the Labour Productivity

The input-output block in the Nepal SAM, Appendix A2, shows the strong inter-linkages between agricultural and industrial sectors in production activities. Therefore, the scope of absorbing surplus Nepalese agricultural labour is more in industries than in services. This transfer would, in turn, raise the productivity of the agricultural labours. But, it requires higher productivity growth and higher wages of industrial workers. Industrial growth also needs has to be high enough to create new jobs at higher wage rates. The low, fluctuating, and long-term declining growth rate of industrial sector as shown by Figure 1 is the barricade to meet this end.

As the productivity of agricultural labours is intrinsically linked with the productivity of industrial labours according to the nature of dualistic economy, the sole effort of poverty reduction in Nepal ultimately rests upon the success of raising industrial labours' productivity. It requires their skill upgrade. The workers hired in the industrial sector, no doubt, require a minimum skill somewhat higher than that of average agricultural workers'. The incentive to the

skill upgrade of industrial workers requires two things. First, investment to the industrial sector must increase faster as compared to other sectors. Second, government subsidies to secondary education must be almost equal to that of the primary education under the assumption that industrial workers require secondary schooling as compared to the primary schooling to the majority of agricultural labours. In this connection, we propose the following labour reallocation strategy by skill categories.⁶

$$\frac{QF(HSL)}{QF(LSL)} = \varsigma \left[\frac{\frac{WF(HSL)}{[\xi_1 \cdot (1 - \psi_1)]}}{\frac{WF(LSL)}{[\xi_2 \cdot (1 - \psi_2)]}} \right]^\eta$$

where

QF(HSL) total quantity (number) of high skilled labour

QF(LSL) total quantity (number) of low skilled labour

WF(HSL) annual wage of high skilled labour

WF(LSL) annual wage of low skilled labour

ς calibration constant in labour supply equation

ξ_1 total education cost for a high skilled labour

ξ_2 total education cost for a low skilled labour

ψ_1 subsidy by the government (% of the total cost) to secondary education

ψ_2 subsidy by the government (% of the total cost) to primary education

η education cost exponent coefficient

According to this expression, distribution of labour by skill categories depends on three factors: wage rate of skilled to unskilled labour, education cost of skilled to unskilled labour, and the education cost to be borne by the individual. In general, subsidy to the primary education is higher than the secondary education, approximately 80% to primary and 40% for secondary education in Nepal. Following the above relation, other things remaining the same, higher the subsidy to the secondary education, the more low-skilled labour transfer to the high skilled category. As the industrial sector generally possesses more skilled labour than the agriculture does, this skill upgrade must go together with the investment growth in industries that promotes the overall industrial employment. Therefore, this labour market policy must be consistent with investment policy highly supportive to the industrial growth. In this environment, higher effective demand of industrial labour will be met by relatively high skilled labour because of the increased subsidy in secondary education. Skilled labour entered to the fast growing sector pushes the labour productivity upward which is supportive to the higher growth of the economy. This situation of skill upgrade, investment and growth spiral in industrial sector must be maintained for a fairly long period until the surplus agricultural labours are fully transferred. This strategy would, in turn, enhance the labour

⁶ ξ_1 and ξ_2 are Rs. 5280 and 1032, respectively for 2006, in 1996 price level. Likewise, WF(HSL) and WF(LSL) are 11038 and 17422, respectively. ψ_1 and ψ_2 are 40% and 80%, respectively. Projected high-skilled and low-skilled labour supplies for 2006 are respectively 2.76 and 12.75 millions based on the population censuses of 1991 and 2001. We assume the education cost exponent coefficient (η) equal to 1. These specifications fix the value of the calibration constant (ς) equal to 2.1.

productivity of poor agricultural workers too, thus, help reduce poverty in Nepal.

Now question arises how might this transformation come to pass? Which industries do have potentialities of absorbing the surplus agricultural labours in Nepal? Here, the Korean experience and the prospect for Nepalese economy differ remarkably. Post-war Korean industrialisation was based on the promotion of heavy industries supported by banking, Foreign Direct Investment (FDI), and strong government which all lack in Nepal now. Nepal's situation is dreadfully poor, landlocked, isolated and unstable with less prospect of FDI inflow. As the Nepal SAM in Appendix A2 shows, agricultural sector still has dominant role in Nepalese economy; consequently, agro-processing and labour intensive industries are more appropriate at the beginning of Nepalese industrialization. Currently, carpet and garment industries constitute more than half of the industrial value added and almost two-thirds of Nepalese export. They are followed by food processing industries. Global technological intensity shows that these industries are labour intensive and possess low-level industrial technologies, Hatzichronoglou (1997), see Appendix A4 for detail classification. Therefore, the spiral of Nepalese labour reallocation and poverty reduction ultimately rests upon skill upgrade and productivity growth of labour, and investment growth in labour intensive low-technology industries like agro-processing, and textiles like carpets and garments.

The input-output analysis in this paper at macro level shows the strong inter-dependence between agricultural and industrial activities in underdeveloped economy like Nepal; whereas such strong linkages develop between industrial and service activities in the process of industrialisation and agro-industrial linkages become weaker at this later stage as shown by the Korean experience⁷. Currently transfer of surplus agricultural labour to industrial activities, therefore, could be the effective policy instrument to the Nepalese economy which could improve the labour productivity in agriculture and solve the problem of labour surplus in agrarian economy to a large extent. However, it requires two things. First, the effective demand of labour must increase in industries. It is possible by the higher growth rate of labour productivity and investment in industries. Second, skill upgrade of low-skilled agricultural labours is necessary for their transfer to industries because the latter requires relatively skilled labour than agriculture does. Considering the minimum secondary schooling to the industrial labours against primary schooling to agricultural labours, the subsidy to secondary schooling needs to be almost the same to primary schooling.

6. Conclusion

The level of poverty is fluctuating in Nepal for the last three decades. Nepalese poor are basically from agricultural rural households; therefore, it is expected that higher agricultural growth would reduce poverty. This expectation would not realize because significantly higher share of agricultural value added, basically land rental, goes to the landlords as revealed by factor distribution analysis. In this situation, there are two avenues left for the effective poverty reduction in Nepal, either redistribute land in favour of the agricultural workers or transfer surplus agricultural workers from agricultural to the non-agricultural sector raising their work productivity.

Poverty in Nepal highly correlates with the growth of labour productivity in agriculture which on productivity of industrial workers. Dualistic nature of

⁷ Traditionally, all economies grow from agrarian nature so is the case of Korea also.

Nepalese economy requires the improvement of labour productivity of industrial workers for the effective transfer of agricultural labours to the industrial sector. The absence of skill upgrade of workers coupled with the frequent labour unrests has resulted in declining labour productivity and increasing capital labour ratio in Nepalese industries,⁸ which must be the reason for lower industrial wage and a barricade in transferring surplus agricultural workers. In the existing industrial factor relations and labour productivity, Nepalese industries can not absorb surplus agricultural labours. Only higher growth in labour productivity and industrial investment can reallocate surplus agriculture labour resulting into higher labour productivity in agriculture and declining overall poverty in the country.

In light of dualistic model, the transfer of surplus Nepalese agricultural labour to industrial sector remained very sluggish during 1976-2004 as compared to that of South Korea during 1953-81. Korea made a great leap during this period in developing strong input-output linkages between growing service sectors and industries, thus, shifting the centre of gravity of the economy from agriculture to industries. Similar trend is not occurring to Nepalese economy for two reasons: industrial investment/growth is slow due to the labour unrest and no clear strategy of skill upgrade of labours. These factors have retained abundant workers in traditional agriculture with low labour productivity and high level of poverty.

How could the Korean experience be useful to Nepal? Productivity of agriculture and industrial workers never deteriorated, with few exceptions, in post-war Korean economy causing a great success in poverty reduction as majority of the poor used to work in these two sectors. Similar path would become effective in addressing Nepalese poverty in the situation of concurrent but opposite movements of growth rate in labour productivity and the level of poverty. This study, unlike the orthodox dualistic model, stresses on the need of labour productivity growth in modern industrial sector rather than on absolute higher level of labour productivity to absorb surplus labour from traditional agriculture.

Though country-specific details and economic history of post-war Korea closely resemble present Nepalese economy, institutional realities of contemporary Nepalese economy deserves different mode of industrialisation than post-war Korea followed. Landlocked Nepal with unstable political environment has the prospect of FDI inflow less than the historic Korea had. Therefore, skill upgrade and absorption of surplus agricultural labours in industries requires higher industrial investment in agro-processing, and labour intensive industries like carpet and garments to speed up the labour reallocation. This strategy is expected to raise the labour productivity of both industrial and agricultural labours and, thus, help reduce poverty in Nepal considerably.

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⁸ After democratic change in 1990, trade unions have become much stronger and labour policy is still not able to create a candid environment between workers and employers. Therefore, industrial unrest is too frequent in Nepal, consequently, industries are moving towards capital intensive mode of production with retrenchment of employment level.

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Appendix

Appendix A1

Table A1: Socio-economic characteristics of Nepal mid-1970s and South Korea early 1950s

Characteristics	Nepal mid-1970s	South Korea early 1950s
<u>Macroeconomic structure</u>	(1974-1988)	(1950-1955)
Average annual growth rate of real GNP	3.54%	3.8%
Proportion of agriculture, industry and services activities in GDP	61:5:34	50:10:40 (1953-55)
Average annual growth rate of agriculture, industry and services activities	0.9%, 6.8%, 8%	2.3%, 11.2%, 3.4%
Labour force dependent on agriculture	90%	75%
Population living below poverty line	48%	more than 50%
Foreign capital inflow (% of GNP)	negligible	negligible
<u>Foreign sector</u>		
Import	11% of GNP	12.9% of GNP
Export	6% of GNP	8.3% of GNP
Foreign aid	35% of imports	58.3% of imports
Proportion of consumer, intermediate and investment goods imports	67:19:14	70:22:8
Proportion of primary and manufacturing exports	85.5:14.5	85.7:14.3
<u>Some socio-demographic indicators</u>		
Population growth rate (annual)	2.37% (1971-81)	2.41% (1940-53)
Rural population	90% of total	70% of total
Literacy rate of adults (15+ yrs.)	25% (1971)	30% (1955)

Sources:

- i. Bank of Korea, Economic Statistics Yearbook, various volumes (esp. 1953, 1954, and 1973). Seoul.
- ii. Bank of Korea (1955). Annual Economic Review. Seoul.
- iii. Bank of Korea (1972). National Income Statistical Yearbook. Seoul.
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Appendix A2

The following table is the Social Accounting Matrix of Nepal base on the schematic form given in Table 4. The full forms of the abbreviations used are as follows:

SRHH = Small Rural Household

LRHH = Large Rural Household

LLRHH = Landless Rural Household

UHH = Urban Household

GOVT = Government

FIRM = Business firm

ROW = Rest of the World

WLSL = wage to low-skilled labour

WHSL = wage to high-skilled labour

PROFIT = Profit to the invested capital

S-I = National Capital (Saving-Investment)

AGR-A = Agricultural Activity

IND-A = Industrial Activity

CS-A = Commercial Service Activity

OS-A = Other Service Activity (public services)

AGR-C = Agricultural Commodities

IND-C = Industrial Commodities

CS-C = Commercial Service Commodities

OS-C = Other Service Commodities

YTAX = Income Tax

STAX = Domestic Indirect Tax

TAR = Tariff

ERR/OMM = Error/Omission

Table A2: Social accounting matrix of Nepal 2005/06 (values in million Rupees, constant price of 1995/96)

	Activities				Commodities				Factors				Households			FIRMS	GOV	S-I	RO	Total
	AGR-A	IND-A	CS-A	OS-A	AGR-C	IND-C	CS-C	OS-C	WLSL	L	T	H	SR-HH	LR-HH	H	FIRMS	GOV	S-I	RO	W
AGR-A					174831															174831
IND-A						164265														164265
CS-A							138064													138064
OS-A								63598												63598
AGR-C	19901	28482	18	98								3289						1455		
IND-C	302	30053	6238	5903								1456						5377	3800	
CS-C	11688	7566	5	2								3540						2365	1795	
OS-C	1048	3521	6952	1613								7803	7264	4883	7624		4006	9	3709	0
WLSL	56171	15104	8	5																
WLSL				1763																
WHSL	11248	13039	8003	4																
PROFI			6664																	
T	63842	45136	1	2444																
U-HH										1824										
SR-HH									31290	9	52709						494	575		103318
LR-HH									41504	9887	42015						2204	1263		96873
LLR-H										1615										
H									16692	0	42663						435	514		76454
FIRMS												29272	5638	15846			2066	2683		55505
GOV	3255	8774	3586	1244	1860	2952	3225	4718				24830					9901			34731
S-I												8174	7795	28016	1637	24356		8399	2392	56954
												4472	0	4095	0	10375	1784		5	95688

ROW	10631	21364	7609	3429	9086	18530	14249	1492											
			1380	6359				6											18941
								8448	4992		1033						5695	9568	1894
Total	174831	164265	64	8	189033	194521	159125	6	118758	4	178063	18	99873	76454	55505	34731	4	8	1

Note: Author's construction of this Social Accounting Matrix has been based on the input-output model of Sapkota (2001).

Appendix A3

Table A2: Growth and labour distributions in major economic sectors

Sectors	Distribution of labour ($L_i/\Sigma L$)				Sectoral shares of value added ($X_i/\Sigma X$)				Growth rate of economy ($\hat{X}_i$)				Growth rate of labour ($\hat{L}_i$)		
	Fiscal Year				Fiscal Year				Annual growth rate during				Annual growth rate during		
	1976/77	1984/85	1996/97	2003/04	1976/77	1984/85	1996/97	2003/04	1975-80	1980-90	1990-00	2000-04	1971-81	1981-91	1991-01
Agriculture	0.929	0.890	0.791	0.746	0.628	0.512	0.410	0.387	-0.011	0.037	0.025	0.034	0.037	-0.002	0.021
Industry	0.026	0.035	0.049	0.056	0.048	0.061	0.094	0.093	0.083	0.142	0.109	0.021	0.102	0.045	0.079
Com. Service	0.036	0.092	0.140	0.171	0.251	0.341	0.396	0.421	0.186	0.092	0.068	0.020	0.169	0.149	0.111
Pub. Service	0.009	0.010	0.020	0.026	0.073	0.086	0.100	0.099	0.058	0.082	0.05	0.026	0.016	0.080	0.159
Total	1	1	1	1	1	1	1	1	0.029	0.055	0.05	0.020	0.041	0.007	0.035

Sources: Author's own calculations based on:

- i. Economic Surveys, various issues, Ministry of Finance, and
- ii. Population Census 1971, 1981, 1991, and 2001, Central Bureau of Statistics.

Note: Com. and Pub. refer to commercial and public services, respectively. Growth rate of labour for the year 2003/04 has been considered equal to that of the survey year 2001/02.

Appendix A4

Manufacturing industries classified according their global technological intensity

High-technology

1. Aerospace
2. Computers, office machinery
3. Electronics-communications
4. Pharmaceuticals

Medium-high-technology

5. Scientific instruments
6. Motor vehicles
7. Electrical machinery
8. Chemicals
9. Other transport equipment
10. Non-electrical machinery

Medium-low-technology

11. Rubber and plastic products
12. Shipbuilding
13. Other manufacturing
14. Non-ferrous metals
15. Non-metallic mineral products
16. Fabricated metal products
17. Petroleum refining
18. Ferrous metals

Low-technology

19. Paper printing
20. Textile and clothing
21. Food, beverages, and tobacco
22. Wood and furniture

Source: Hatzichronoglou (1997), p. 6.