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**Structural Changes in a Small and Open Economy:  
Evidences from Nepal**

*Guna Raj Bhatta\**

**ABSTRACT**

*This paper reviews existing structural transformation models and prominent literatures and then empirically examines Nepalese economic structure. The research findings reveal that industrial sector is significant to increase per capita income compared to the agriculture and services sectors in Nepal. Moreover, health as indicated by life expectancy and population at working age are found to be significant to increase the income but, education and capital formation are found inconsistent with the theory and international empirics. Likewise, developing agricultural sector looks prerequisite for high and sustainable growth however efforts should be made in increasing investment significantly for the mechanization and modernization of agriculture. Developing infrastructures and fostering favorable business environment are other pre-requisites to support growth. In addition, employment-led service sector development is must with more emphasis on the tourism and human capital development.*

**JEL Codes:** O10, O49, L16, N10

**Key Words:** Structural Change, Growth, Services Sector, Nepalese Economy

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\* Assistant Director, Research Department, Nepal Rastra Bank, Central Office, Baluwatar, Kathmandu.  
Email: gunaraj@nrb.org.np, bhatta.gunaraj@gmail.com.

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## 1. INTRODUCTION

Economic growth of the country is always a major concern worldwide since rise in GDP is a major human welfare determinant. Direct correlation is found between increased real output and income, with improvements in development factors in the history (Welker, 2012). Higher GDP growth not only provides better opportunities to improve access over basic requirements for the livelihood, but also provides more saving and revenue to the government. Nevertheless, economic transformation from rural agricultural to modern industrial or services sectors is the fundamental requirement to achieve high and sustainable growth. This can be said as the rapid and sustainable economic development in most of the developed as well as emerging economies has been achieved with the permanent shifts in their economic structure over the long-run. They have experienced a gradual transformation of the economy from rural subsistent agriculture to the modern industrial and then ultimately to the services dominant.

Although there are ample resources such as sufficient arable land, natural resources and labor force, Nepal is still among the poorest countries in the world as the latest human development index ranked the country 157<sup>th</sup> out of 187 and the rank for per capita income is 207<sup>th</sup> out of 229 countries (based on purchasing power parity). Nevertheless, the rank is 35<sup>th</sup> in labor force availability and 46<sup>th</sup> in percentage of arable land (CIA Fact Book, 2013). Likewise, Nepal is ranked fifth in employees per hectare, requiring 3.6 people to cultivate one hectare of land.

Economic growth is predominantly determined by the performance of agricultural sector in Nepal. This sector contributes more than one third to the country's gross domestic product (GDP) and employs more than two third of the total labor force inferring a low productivity. Moreover, the country experiences a monsoon-based growth as it witnesses improved agricultural GDP at the time of favorable rainfall (Acharya & Bhatta, 2013). With these scenarios, Nepal witnessed a 4 percent growth of the economy on an average in the recent ten years, in which agriculture and industry sectors had grown by 3.3 percent and 2.7 percent respectively whereas services sector had witnessed a growth of 5.3 percent. In 1998/99, the contribution of agriculture sector, industry and services were 38 percent, 23 percent and 39 percent respectively. The values in the respective sector were 36 percent, 16 percent and 48 percent in 2008/09 and by 2012/13; the values became 34 percent, 15 percent and 51 percent respectively.

These figures show services sector-led economy recently in Nepal as the contribution to the GDP has been more than half in 2012/13 from this sector. However, problem can be witnessed in the employment pattern. The agriculture sector contributes only one third to the economy but more than 74 percent of the total employment is on this sector. Similarly, the contribution of services sector to the economy has been growing rapidly but the total employment share of it is around 15 percent. In this milieu, this paper attempts to observe the Nepalese economic structure more closely by comparing and contrasting with the prominent literatures and prescribing some perceived policies for high and sustainable growth of the economy.

The rest of the paper flows as follows. The next section reviews the prominent literatures of structural change. Section three portrays structural change of Nepalese economy. Data and methodology are discussed in section four. Section five explains the results and findings and finally section six concludes the paper with some policy prescriptions for high and sustainable growth.

## II. STRUCTURAL CHANGE MODELS AND LITERATURES

The economic structural change is often considered as a permanent shift in the fundamental structure of an economy, basically an agrarian economy shifts to either industry or services based. In many countries, it primarily involves a decline in share of agriculture to the GDP and a rise in share of services (Maddison, 1991; Buera and Kaboski, 2012). It is believed that without the structural change, modern economic development is impossible (Kuznets, 1971) which is mostly associated with promising growth and continuous transformation (Pasinetti, 1981) in the globalized and dynamic economic system. Although employment shares in manufacturing were previously thought to be increasing monotonically as countries develop (Uy et al. 2013), the rise of new world economic powers has been primarily determined by the rapid structural change of their economies, that is, the shift from mining and agriculture to manufacturing and then to skill and technology-intensive sectors (Olga & Lelio, 2010).

Lewis (1954) emphasizes the need to transform the structure of an economy from low labor productive agriculture sector to the high labor productive modern industrial sectors. In the least developed countries (LDCs), a large population depends upon traditional rural subsistence sector with surplus labor and hence, such surplus labor will transfer to a highly productive modern sector in the process of development. Observing the happenings in the United States, Fuchs (1980) emphasized the importance of services sector in the economy, particularly, the changing patterns of employment, which grew across western economies as time passed. Likewise, Fuchs (1980) found that to augment the contribution of services sector, it is required to increase participation of females in labor force as working-wives who are more likely to spend more out of their earnings to the services. Further, as proposed by Baumol (1967) in cost-disease hypothesis, the growth rate of advanced economies lowered down significantly when contribution of services in the GDP expanded over time being concentrated share of it.

Besides the development of primary and secondary sectors, Fisher (1939) advocated about the emergence of large services sector for the economic progress, also known as tertiary sector development. Later on, Clark (1940) established the Fisher's theme as a tertiary sector development model. Fisher-Clark approach of structural transformation explains that large amount of labor force working in the services sector will lead the country to the development and high-growth. The model proposes two significant factors in the emergence of service sector, i.e., high income elasticity of demand and low productivity of labor in services. Fisher-Clerkanalogy is further supported by Cost Disease Hypothesis of Baumol (1967). This hypothesis argues that there will be shift to services from manufacturing due to low productivity, less progressiveness, higher costs and higher relative prices of it compared to manufacturing.

In the stage of economic development, innovation led by dissemination and imitation seems most dominant factor for structural change of the economy (Schumpeter, 1939) and structural change especially in specific industry is a significant determinant of aggregate income and growth (Pender, 2002). Today's advanced economies had followed two most prominent growth strategies, short-run strategy for stimulating growth, and a medium to long-run strategy to sustain that growth (Ocampo, 2003; Haggard & Kaufman, 1983).

The emergence of international trade has also shifted the pattern of employment as we observe the decline in U.S. manufacturing employment as an effect of its trade with China (Autor, Dorn, and Hanson; 2011). In addition, the gain received today by China and India from the external sector has been realized by the transformation of their economies. If they had not have emphasized on innovation and change towards industry and services, traditional garments and agricultural products would not have been sufficient to their economies to get advantage of international trade and investment (Rodrik, 2007). Nevertheless, the pattern of structural transformation varies with region even within the SAARC. The path followed by developed economies and SAARC countries is different being heterogeneity in the transformation processes (Sawhney, 2010).

### III. THE STRUCTURE OF ECONOMIC GROWTH : GLOBAL AND NEPALESE SCENARIO

#### 3.1 Global Structural Scenario

As discussed earlier in section II, the structure of the advanced economies has a very low contribution of agriculture sector and predominance of services sector. Depending upon the individual economy, the contribution of industrial sector to GDP is found less than 50 percent from the beginning of study period, being some percentage points above of the agricultural

Figure 1: Economic Structure and Employment of United States

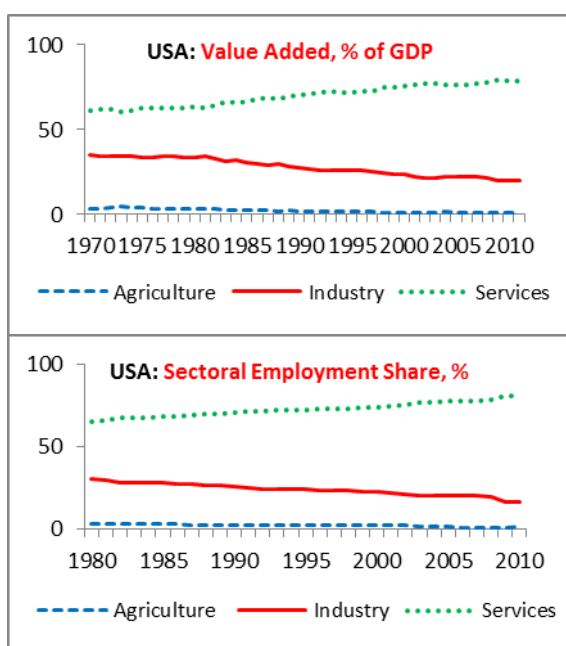
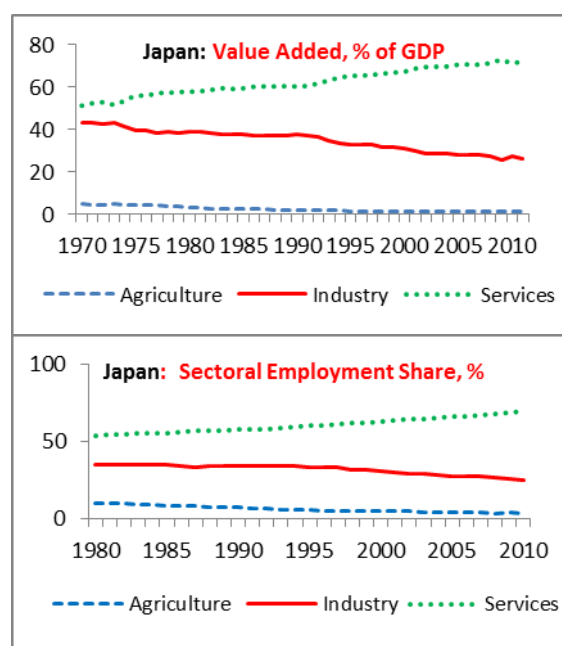


Figure 2: Economic Structure and Employment of Japan



sector recently. Likewise, pattern of employment from agriculture, industry and services are similar in the contribution to GDP. A significant dominance of service sector in job opportunities has been observed as compared to agricultural sector in most of the advanced economies.

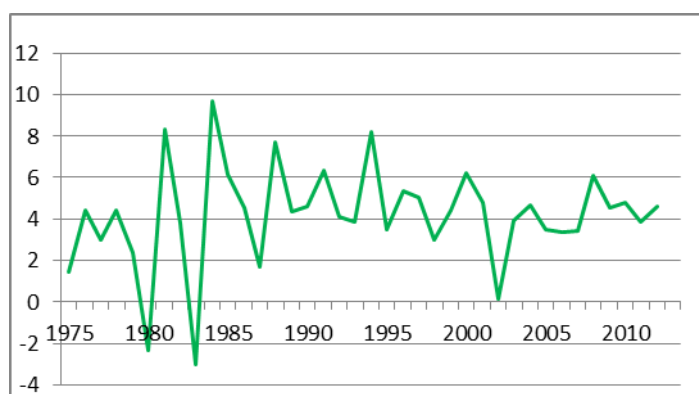
In emerging economies, share of each sector to the GDP has been oriented to catch the path of advanced economies though some countries are still far behind. It can be identified as a declining share of agriculture and increasing share of services to GDP over time. But sectoral contribution to employment has yet to be balanced with the contribution to GDP in these economies. Thus, the structure of developed and emerging economies shows a similar trend in contribution to GDP and employment. Nevertheless, the perfect balance can be observed on employment and sectoral share only in the advanced economies (Figure 1 and 2).<sup>1</sup>

### 3.2 Structure of Nepalese Economy

Even though Nepal has sufficient natural resources and labor force among others, the historical average GDP growth rate is just about 3.7 percent since 1960 onwards. The latest figure shows a much volatile growth of agriculture sector determining the overall growth rate of the economy. Relatively, growth of services is less volatile throughout the study period (Figure 3 and 4).

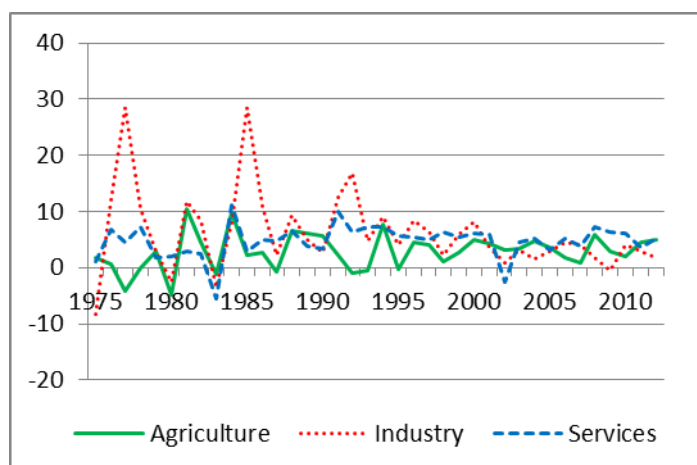
According to Nepal Labor Force Survey (NLFS) 1998-99, 76 percent had been in agriculture, 10 percent in industry and 14 percent in services in the total employment figure. After about one decade, NLFS-2008 had presented 74 percent in agriculture, 11 percent in industry and 15 percent in services. Nevertheless, share of these three sectors to the GDP had transformed quickly between these two survey period. In 1998/99, the

Figure 3: Real GDP Growth Rate in Nepal



Data Source: World Development Indicators, World Bank

Figure 4: Sectoral GDP Growth Rate in Nepal

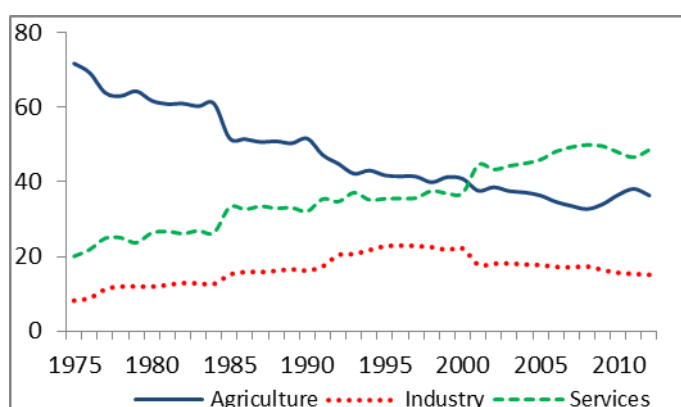


<sup>1</sup> For more graphs of the sectoral composition and employment pattern of additional economies, see Annex-II Figure 12-19.

contribution of agriculture sector was 38 percent, industry 23 percent and services 39 percent which altered into a 36 percent contribution of agriculture, only 16 percent of industry and 48 percent of services in 2008/09. In 2012/13, the structure is further changed; agriculture sector contributed 34 percent, industry 15 percent and services 51 percent.

In short, a gradual change is observed in fundamental economic structure since the share of services sector to GDP exceeded the sum total of agriculture and industry sectors so far (Figure 5).

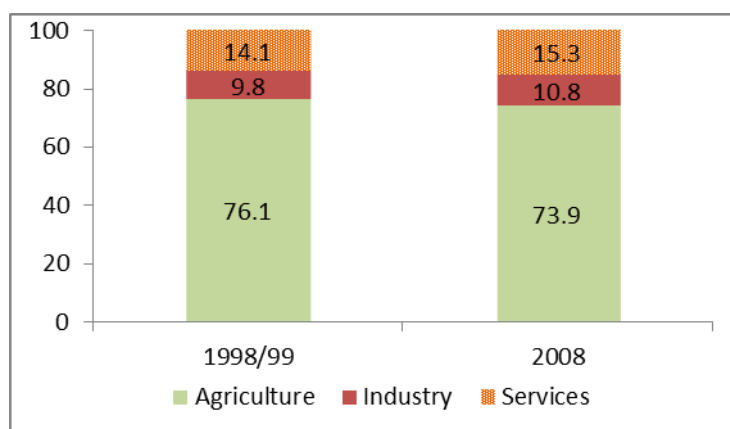
Figure 5: Sectoral Contribution in the GDP in Nepal



Data Source: World Development Indicators, World Bank

However, the major bottleneck in Nepalese economic transformation is in employment pattern. It is believed that increased employment opportunities are the prerequisites for continued and sustained economic growth. In Nepal, nonetheless, we can observe a massive underemployment with very low productivity in agriculture since its contribution to economy is only 35 percent against a 74 percent of total employment share. The opposite is the case of services as the contribution to economy is more than half but it provides employment only for 15 percent. From the economic sense, however, industrial sector is still playing vital role with closer similarities in contribution to both GDP and employment opportunities (Figure 6).

Figure 6: Share of Sectoral Employment in Nepal



Data Source: Nepal Labor Force Survey, 1998-99 and 2008.

To increase employment opportunities, we need to foster the investors to invest and expand the capacity of business, employ new technology, generate new products and services and also search for the new markets (Rodrik, 2013). Rodrik (2013) recommended a diagnostics study to identify the barriers to structural change that could be labor market imperfections, credit constraint, poorly performing financial markets, political institutions among others.

### 3.3 The Indian and Chinese Economic Structure

Economic structures of two giant Nepalese neighbors namely China and India are substantially different than the structure of advanced economies. Although Chinese economy gives a different picture, Indian economy still possess some fundamental structural problem. In India, service sector has 57 percent share to GDP whereas agriculture sector accounts for 17 percent in 2012. The problem for India is observed in employment pattern as in Nepal. In 2010, for instance, the contribution of agriculture and services to GDP are 18 percent and 54 percent respectively but contribution to the employment of those sectors for the same year accounted for 51 percent and 27 percent respectively, indicating a low productivity in agriculture and little contribution of services towards the employment generation. Nonetheless in China, the contribution of industrial sector to GDP has been 47 percent in 2010 being continually the largest sub-sector of the economy but for providing employment, the sector is at the lowest level with 29 percent. Similarly, services sector has 43 percent shares in the GDP with 35 percent contribution to employment generation in 2010. Compared to Nepal and India, Chinese economic structure has been better in productivity and in employment generation. But the problem is in industrial employment in China; as the contribution to GDP is the highest though, it is the lowest in employing population (Figure 7 and 8).

Figure 7: Economic Structure and Employment of China

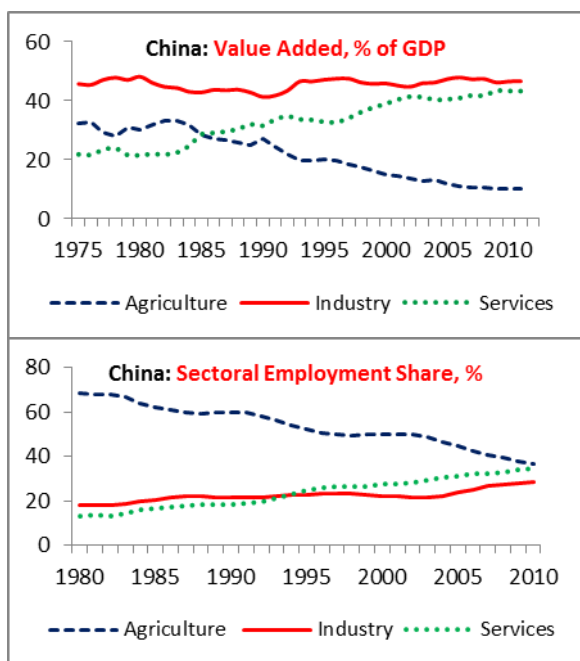
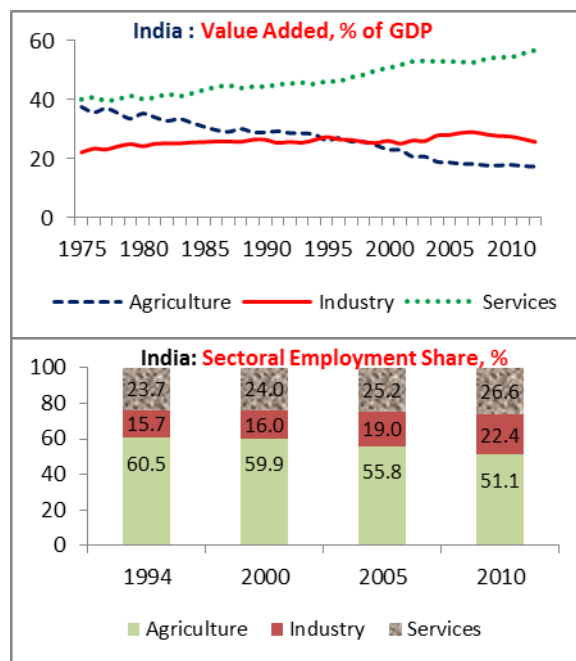


Figure 8: Economic Structure and Employment of India



### 3.4 Nepalese Agriculture and Industry Sector

British Philosopher Betrand Russel had said in early 20<sup>th</sup> century that “with the introduction of agriculture, mankind entered upon a long period of meanness, misery, and madness, from which they are only now being freed by the beneficent operation of the machine.” The former part of the quote perfectly matches in context of Nepal even today. It is still to worry about

the later part since our level of mechanization is very low. Also indicated by this quote, agricultural productivity matters for other sectors development too, as very low agricultural productivity can severely damage modernization of economy (Kim & Whang, 2012). Most importantly, since agriculture is the basic good for livelihood and providing food security, it has a specific contribution for social stability and environmental preservation. Hence, the sector cannot be ruled out. The weight of it to the economy and society is significant than its share to GDP. Understanding this, developed countries even today emphasize in modernizing and developing agricultural activities.

Developing agriculture requires mechanization, agricultural infrastructure development and development of strong market mechanism in Nepal. Nepal is 6<sup>th</sup> largest country in terms of recipient of remittance to GDP ratio in 2012. Most of the remittance goes to the rural farmers. So, some portion of the remittance income can be utilized in mechanization to enhance productivity and modernize the traditional agriculture sector. This would eventually support in fulfilling shortage of labor in agriculture, construction and other needy sectors.

The experience of developed and emerging economies states that high growth can be achieved in short period by focusing the specific industry. Although manufacturing sector seems viable for short term growth and employment generation in Nepal, the sector would not be able to face global competition especially with China and India. From growth and development perspective, hydro-electricity is the most emerging sector to boost economic growth in the short-run since it would be able to fulfill current power shortage, fulfill the soaring demand in the development phase of the economy and a large potential for export in the long-run. However, construction sector can be sustainable from employment perspective.

### ***3.5 Prospects of Services Sector***

Theoretical and empirical evidences suggest a service sector-led sustainable development of economy. Countries like Nepal can have good prospects on it. Service is the only sector that can bring absolute, comparative as well as competitive advantage in the globalized market. Service is more labor intensive by nature. Hence, more employment can be generated. Likewise, more uniqueness can be brought since human can make the service different that cannot be imitated in the short-run. Service industries can bring more spillover effects within its sub-sectors as well as other sectors of the economy. Most importantly, service business can have unique differentiating identity of the product and services from their competitors.

Service sector development is a long and challenging process and also essential to sustain economic growth. Notwithstanding, creating more competitive services market requires to increase productivity and complementary investments in infrastructure and human capital (Noland, Park and Estrada, 2012). Services sector development also depends upon primary and secondary sectors too. Kim (2006) suggests that to boost the growth of services sector, first and foremost is to expand and strengthen producer services (communication, finance, insurance, real state, business, renting, advertising and broadcasting) as well as enhancing education. Therefore, service sector development is a collective and interlinked effort that can only be possible with the coordinated and visionary manner.



Service sector has been contributing very nominal to the employment generation compared to the contribution to economic growth in Nepal. To increase employment opportunities and boost the growth, huge investments in physical infrastructure along with the emphasis on education and health for developing healthy, knowledge-based and skilled human capital are some prerequisites. As the country is rich in tourist destinations, peaceful environment facilitated with skilled manpower and coupled with sophisticated and secured transportation throughout the nation would help in attracting tourists from the world market, especially two most populate abut countries of Nepal, India and China.

#### IV. DATA AND METHODOLOGY

The methodology of Pender (2002) has been adopted to identify the determinants of structural change variables with slight modification. As Pender (2002) uses the concept with dynamic panel data analysis of OECD countries, the same technique has been adopted here only for Nepalese data to model as ordinary least squares (OLS) instead of fixed effect estimators.

Since per capita income of an economy is total production of the country within a year divided by the total population, the income function is hypothesized as:

$$\text{percapita income} = f(\text{agri\_growth}, \text{industry\_growth}, \text{service\_growth}, \text{education}, \text{health}, \text{total population}, \text{population at working age}, \text{capital}, \text{others})$$

It is presumed that rise in per capita income can be the result of high growth either of three sectors, human and physical capital, and people of the economy. For modeling these variables, data and its nature and sources are presented hereafter.

Per capita income (PCI) is the nominal annual US dollar per capita income in purchasing power parity. Growth rate of share of agriculture, industry and services are termed as AGRI\_CG, IND\_CG and SER\_CG in the model, which is the percentage growth of sectoral contribution into the total Nepalese GDP, calculated as follows.

$$\text{Here, AGRI\_CG} = \left[ \left\{ \frac{\text{Agricultural GVA}}{\text{Total GVA}} \times 100 \right\}_t - \left\{ \frac{\text{Agricultural GVA}}{\text{Total GVA}} \times 100 \right\}_{t-1} \right] \times 100 - 100 \quad \dots (1)$$

$$\text{IND\_CG} = \left[ \left\{ \frac{\text{Industrial GVA}}{\text{Total GVA}} \times 100 \right\}_t - \left\{ \frac{\text{Industrial GVA}}{\text{Total GVA}} \times 100 \right\}_{t-1} \right] \times 100 - 100 \quad \dots (2)$$

and

$$\text{SER\_CG} = \left[ \left\{ \frac{\text{Services GVA}}{\text{Total GVA}} \times 100 \right\}_t - \left\{ \frac{\text{Services GVA}}{\text{Total GVA}} \times 100 \right\}_{t-1} \right] \times 100 - 100 \quad \dots (3)$$

Life expectancy (LE) is the expected years of life at birth, total population (POP) is the total number of population in million residing in the country and population at working age (POPW) is the population ranging from 15 to 64 years. The above data are obtained from World Bank Database.

Gross fixed capital formation (GFCF) is the annual fixed capital formation in million rupees, obtained from national accounts statistics published by central bureau of statistics (CBS). Years of schooling is the average year of schooling of working age population, calculated self by multiplying currently available information of enrollment of the students ranging from primary school to advanced university degree that is obtained from Economic Survey (Various Editions). Dummy variable (dum01) is the variable with value one if the year of analysis is 2001 and zero otherwise. Dummy variable is to capture compilation break from 2001 as Nepal switches in accounting GDP with new system of National Accounts (SNA), 1993 with the broad categorization of the sectors especially that of services.

The augmented Dickey-Fuller (ADF) test for unit root has been presented below (Table 1).

**Table 1: Augmented Dickey Fuller (ADF) Test for Unit Root**

Variable	Level		First Diff	
	t-Stat	P Value	t-Stat	P Value
AGRI_CG	-5.93	0.000		
IND_CG	-4.59	0.001		
SER_CG	-7.57	0.000		
LOG(GFCF)	-0.78	0.813	-6.786	0.000
EDU	-1.51	0.518	-8.183	0.000
LE	-2.90	0.058		
LOG (LE)	-3.24	0.028		
Log (PCI)	0.61	0.988	-6.475	0.000
Log (PCI) @ Trend (AIC)	-3.303	0.086		
POP	0.72	0.991	2.822	0.066
Log(POPW)	-0.16	0.934	3.134	0.034

The Augmented Dickey Fuller (ADF) test for unit root shows the variables AGRI\_CG, IND\_CG, SER\_CG and Life Expectancy (LE) stationary at level whilst rests are found to be non-stationary. After differencing once, log(GFCF), EDU, POP and log(POPW) has shown the stationary behavior. Nonetheless, per capita income (PCI) variable shows a trend stationary nature. When time trend is included in the test equation, it is found to be stationary even in level data at 10 percent significance.

The Hodric-Prescott filter is applied to the trend-stationary series that minimizes the variance of the old series around the new one, subject to a penalty constant  $\lambda$ . Hence, the filter chooses  $PCI\_Cycle_t$  to minimize:

$$\sum_{t=1}^T (PCI_t - PCI\_Cycle_t)^2 + \lambda \sum_{t=2}^{T-1} ((PCI\_Cycle_{t+1} - PCI\_Cycle_t) - (PCI\_Cycle_t - PCI\_Cycle_{t-1}))^2 \quad \dots (4)$$

By applying this method, the new series of per capita income,  $pci\_cycle_t$ , has been created for the estimation purpose.

Based on Pender (2002) modeling framework and considering the nature of data and properties, the best fit model can be presented as follows.

$$\begin{aligned}
 PC\_Cycle_t = & \alpha + \beta_1 AGR\_CG_t + \beta_2 IND\_CG_t + \beta_3 SER\_CG_t + \beta_4 \Delta EDU_t + \beta_5 \Delta (\log(GFCF))_t + \\
 & \beta_6 \log(LE)_t + \beta_7 \Delta(POP)_t + \beta_8 \Delta(\log(POPW))_t + \beta_9 dum01_{2001} + \varepsilon_t
 \end{aligned}
 \dots (5)$$

Equation (5) illustrates the prime factors in influencing per capita income of the citizens in an economy. Variable  $AGR\_CG_t$  is expected to reduce the per capita income as we assume the decreased share of it to GDP over time and lower productivity growth of agriculture sector compared to others. However, the positive sign of both  $IND\_CG_t$  and  $SER\_CG_t$  is hypothesized since more industrialization and increased share of services to GDP is assumed to be most dominant factor for the income. Level of education, as explained by  $EDU_t$  is also expected to increase the income since education is a human capital. Gross fixed capital formation is assumed to impact positively to income as capital is most significant factor for productivity increment and high growth. Effect of Life expectancy (LE) and population at working age (POPW) has also hypothesized positive to income growth. Nevertheless, total population (POP) is presumed to reduce the income, as the population rises, income is to be distributed among citizens.

There may be the possibility of multi collinearity among the regressors. To identify whether there exists serious collinearity problem, a Variance Inflation Factor (VIF) has been estimated. VIF helps quantifying the inflation of the variance due to the collinearity with other regressors in the estimated equation. The VIF factor for  $\tilde{\beta}_i$  have been calculated as follows:

$$VIF = \frac{1}{1 - R_i^2} \dots (6)$$

## V. MODEL ESTIMATION AND RESULT ANALYSIS

Equation (1) is estimated by applying ordinary least squares (OLS) method of estimation in EViews. The estimated coefficients of equation (5) have been presented in Table 2.

**Table 2: Estimates of the Coefficients of Equation 5**

S.N.	Variable Name	Coefficient	t-Stat
1.	Constant	- 166.24	-2.196**
2.	AGRI_CG <sub>t</sub>	0.695	0.597
3.	IND_CG <sub>t</sub>	0.936	2.251**
4.	SER_CG <sub>t</sub>	- 0.092	-0.139
5.	ΔEDU <sub>t</sub>	-5.017	-0.452
6.	Δlog(GFCF) <sub>t</sub>	8.32	0.314
7.	Log(LE) <sub>t</sub>	32.62	1.742*
8.	ΔPOP <sub>t</sub>	-93.12	-2.081**
9.	Δlog(POPW) <sub>t</sub>	3032.91	3.431**
10.	Dum01	50.71	3.088**

Adj. R<sup>2</sup> = 0.41 DW = 1.6 F-Stat = 3.60\*\*

\*=significant at 10 percent level \*\* = significant at 5 percent or less level

In contradiction to the hypothesis, coefficient of  $AGRI\_CG_t$ , represented by the growth rate of the respective share to the GDP, is found with positive sign and  $SER\_CG_t$  with a negative, both the coefficient are insignificant though. The  $IND\_CG_t$ , which represents the growth rate of industrial share to GDP, has expected sign and is significant at 5 percent level indicating that increased share to industrial GDP has a vital role in increasing per capita income, even though agriculture and service are not affecting to raise income. This can be further confirmed by the descriptive analysis in section three, as it has observed the closest combination of industrial sector in the share to employment and to GDP. As the sector gives more employment opportunities, this would eventually help to raise the income directly.

As hypothesized earlier, both life expectancy and population at working age have significant positive impact to per capita income; the coefficient of  $log(LE)_t$  is significant at 10 percent level and  $log(POPW)_t$  at 5 percent or lower level. These statistical results can be inferred as the improved health and young working groups foster the overall per capita income. As presumed before, increase in country's population reduces per capita income,  $ΔPOP_t$  significant at 5 percent or lower level. The dummy variable,  $dum01$  is significant at 5 percent or lower level. Hence, it has captured the compilation break of services sector in 2001.

Nevertheless, education and gross fixed capital formation have been found insignificant to raise income. These empirical results are found against the economic theory, assumptions and international experiences. Although the sign of  $Δlog(GFCF)_t$  is positive as expected, the sign of  $ΔEDU_t$  is even negative. This can be argued as contradictory findings, that is, the growth of industrial share to GDP is significant but capital formation is not increasing the income. However, these two phenomena have been regressed with different scenarios, as the former indicates the sectoral growth in the share to the total production of the economy, and the later, with one of the factors of production that usually is of the three sectors in aggregate (agriculture, industry and services). Although capital injection may increase the productivity,

it should directly hit the income of the people, especially in employment creation, this might have missing in Nepalese context.

The insignificance of education and capital variable indicates that both the current level of education and capital injection are not being able to increase per capita income in historical observation of past data. Thus, it is essential to enhance the level of education and capital formation drastically in the days to come if Nepal intends to increase income of the people through education and investment as in advanced and emerging economies. This can be inferred on the basis of literature supports in the importance of capital, both human and physical, in OECD and other emerging economies.

The goodness of fit, diagnostic and stability tests satisfy the minimum criteria required for the statistical inference. The Lagrange multiplier (LM) test for autocorrelation shows no serial correlation in residual as p-value of the test is 0.64. The residual plot of the model shows a random move around mean (AnnexI - Figure 10). The stability test of the model is also significant since the recursive estimates represented by CUSUM and CUSUM squares test for stability lie within 5 percent range (Annex I -Figure 11).The adjusted  $R^2$ , Durbin- Watson statistics and F-Stat for overall model significance show the satisfactory results to statistically infer the coefficients of the estimated model.

The VIF estimates for identifying the multi collinearity among the regressors has been presented in Table 3.

**Table 3: Variance inflation factor (VIF) estimates**

Variable	Centered VIF
AGRI_CG	<b>7.82</b>
IND_CG	3.22
SER_CG	<b>6.39</b>
D(POP)	4.48
D(LOG(POPW))	3.82
D(EDU)	1.07
LOG(LE)	1.81
DUM01	2.43
D(LOG(GFCF))	1.51

Generally, a very low value of VIF is the indication of no multi collinearity problem, in which some researchers say only below 5 is the tolerable, for instance, Rogerson (2001). However, many researchers (Neter et al., 1989: 409; Hair et al., 1995; Marquardt, 1970; Mason et al., 1989) have set the centered VIF below 10 as a tolerable limit for collinearity. In our VIF estimates, all the values of the centered VIFs are below 10. The VIFs of  $AGRI\_CG_t$  and  $SER\_CG_t$  has been found to be higher than 5, although it has been identified as a tolerable limit in this analysis.

The empirical findings, hence, suggest the requirement of an employment-generating economic growth. Even though we may achieve a higher sector-specific growth, the concern would be whether there is new employment generation. The strong message is the balance of contribution to the GDP and to the total employment is a must for increasing the income of people. In case of Nepal, agriculture has been still for subsistence as the most of the people are unnecessarily engaged because of structural bottlenecks namely the use of modern technologies, infrastructure availability and geographical constraints. To increase per capita income, subsistent agriculture should be commercialized and so as the equal contribution to the employment share in line with the share to GDP. On the other hand, the share of services sector to the country's GDP has been gradually increasing each year, but no more gradual increment in the share to the total employment. For the increased income, hence, the higher growth of the services sector is not sufficient, what matters for income raise is the additional employment opportunities the sector can provide.

## **VI. CONCLUSION**

Although the contribution of industrial sector does not change much in Nepal, historical data shows a gradual shift in the share of economy from rural agriculture to services. But the employment pattern has been a major challenge with a stagnant contribution in the share of sectoral employment. Unbalanced contribution of agriculture, industry and services sectors is found in the share of GDP and total employment.

In Nepal, empirical estimates show that industry is the most significant sector to increase income compared to agriculture and services sectors. Improvement in health is also found significant to increase per capita income. Besides, working age population contributes to enhance per capita income of total population. Nevertheless, as against the theory and international empirics, capitals both human and physical have been found not contributing to raise per capita income, being investment and education variables insignificant in the empirical analysis.

The unbalanced contribution of employment, that is, high subsistence on agriculture and very low employment by the services sector could be blamed as the insignificance of these sectors in increasing the income. Hence, it has been found as the major structural problem in Nepal - the missed balance in the economic and the employment structure. Industrial sector relatively observed better in increasing per capita income as the sector is much closer in employment generation and the share of the economic growth.

Thus, agriculture sector needs to heavily mechanize and increase the productivity and the services sector needs to be more labor intensive, that generates employment in line with the increased size of the services economy. Nonetheless, massive employment can only be generated with huge investment in the aforesaid sectors along with the conducive business environment and addressing the existing structural bottlenecks.

Even though services sector is the most emerging, sustainable and ultimate goal in Nepal for higher growth and prosperity, actions are to be introduced from agriculture as a whole and

some specific sub sectors of the industry. The paper can be further improved by analyzing the panel data of similar economies that helps in identifying random and fixed effect estimations much comprehensively.

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Annex I

Figure 9: Hodrick Prescott Decomposition

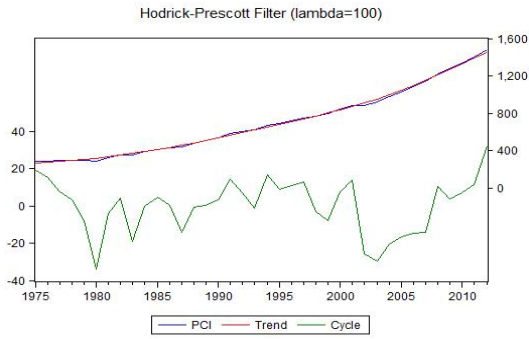


Figure 10: Residual Plot of the Model

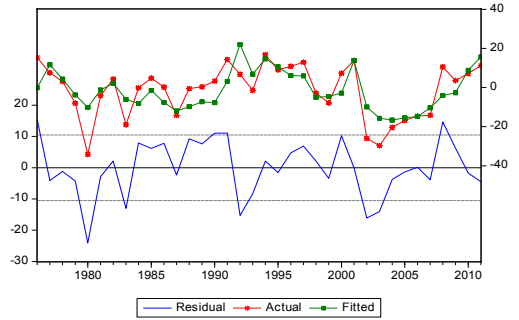
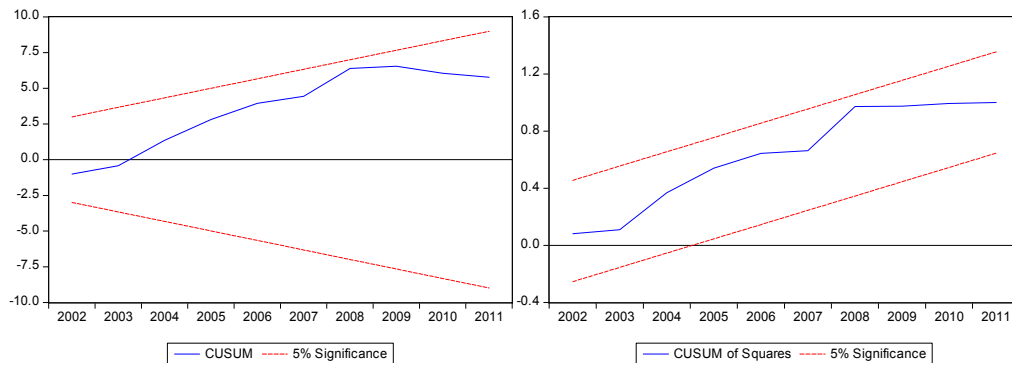


Figure 11: Stability Tests of the Model



ANNEX -II

Figure 12: Agricultural Contribution

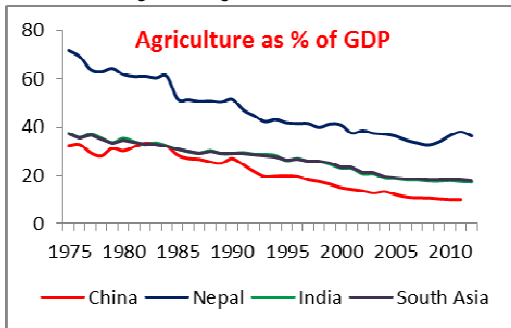


Figure 13: Growth Rate of Agriculture

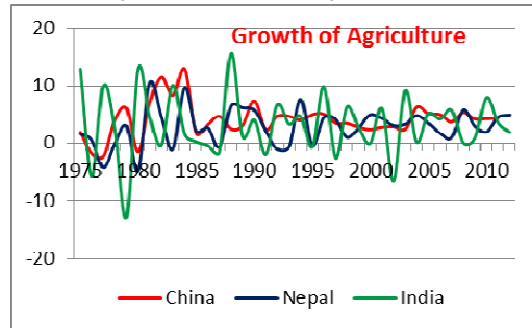


Figure 14: Share of Services

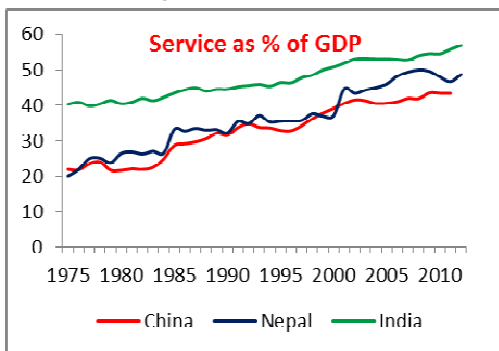


Figure 15: Growth Rate of Services

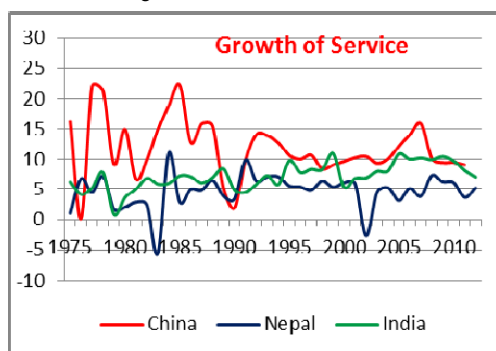


Figure 16: Sectoral Contribution, Philippines

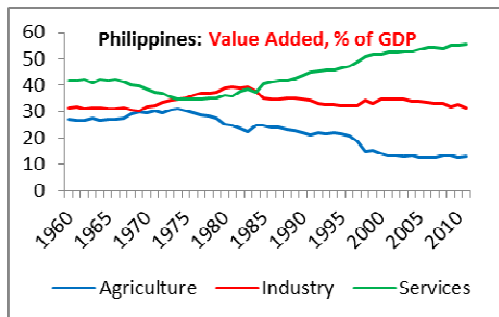


Figure 17: Share of Employment, Philippines

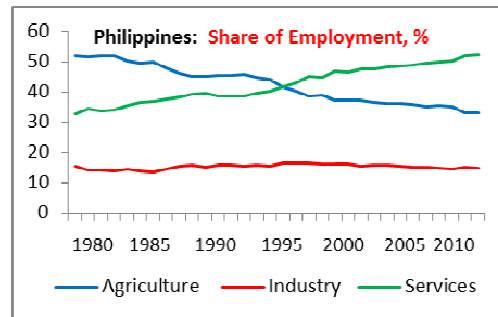


Figure 18: Sectoral Contribution, Thailand

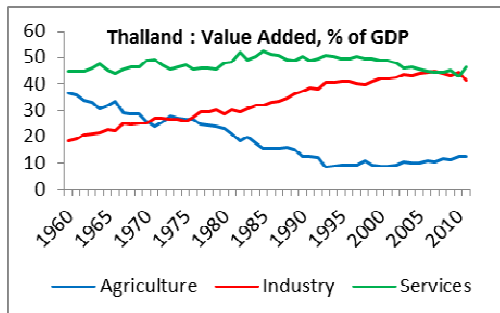
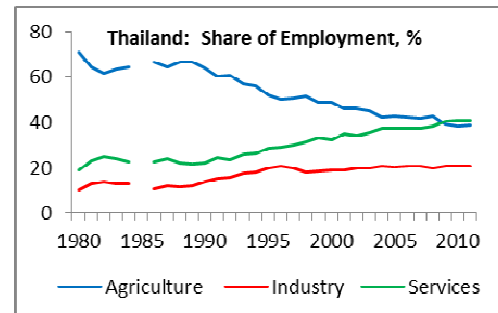


Figure 19: Share of Employment, Thailand



## ANNEX -III

Data on Average Years of Schooling for Population and Working age, 15-64 years

Year	Total Population, Million	Population at Working Age, Million	Average Years of Schooling
1975	12.87	7.16	0.86
1976	13.16	7.31	0.93
1977	13.45	7.46	1.05
1978	13.75	7.62	1.15
1979	14.06	7.78	1.34
1980	14.38	7.95	1.42
1981	14.72	8.12	1.47
1982	15.06	8.30	1.54
1983	15.42	8.48	1.60
1984	15.78	8.67	1.55
1985	16.14	8.85	1.70
1986	16.51	9.03	1.67
1987	16.89	9.21	1.73
1988	17.27	9.39	1.83
1989	17.68	9.60	2.07
1990	18.11	9.83	2.31
1991	18.57	10.10	2.40
1992	19.05	10.39	2.47
1993	19.55	10.71	2.41
1994	20.07	11.03	2.40
1995	20.59	11.36	2.37
1996	21.12	11.69	2.47
1997	21.65	12.02	1.89
1998	22.18	12.34	2.50
1999	22.69	12.65	2.58
2000	23.18	12.95	2.50
2001	23.66	13.22	2.63
2002	24.10	13.47	2.66
2003	24.53	13.72	2.74
2004	24.92	13.96	2.87
2005	25.29	14.20	3.01
2006	25.63	14.45	2.98
2007	25.95	14.69	3.01
2008	26.25	14.96	3.13
2009	26.54	15.24	3.28
2010	26.85	15.56	3.22
2011	27.16	15.92	3.21
2012	27.47	16.31	3.09

Note: Total Population and Population at Working Age Data is downloaded from World Bank Database and Average Years of Schooling Data is self-calculated by using school enrollment data available from Economic Survey,. Various Years.