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Productivity and Growth in Nepal: An Empirical Analysis

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Abstract
This paper is mainly concerned with how productivity growth can be achieved in Nepal. The paper builds by explaining that growth in Nepal is explained by capital accumulation that the higher the capital accumulation the higher the GDP – the lower the capital accumulation the lower the GDP. We calculate that Total Factor productivity in Nepal is negative, which is vastly responsible for the sluggish performance of the economy. We found that one way of improving TFP is through the reallocation of public spending. Public Spending of Education and infrastructure has higher returns in achieving productivity growth in Nepal.
This paper also discusses about institutional and structural barrier for the technological progress in Nepal Economy and suggests policies to promotes domestic innovation of technology which ultimately enhances productivity. In order to do so, Governance, institutions, companies and technology supporting organizations like university, research centers needs to have better facilitating inter-firm relationships/cooperation which allows domestic innovation of the technology. Since technology is the major factor for productivity increase, such domestic innovation can play great role for increasing the growth of the Nepalese economy.
Keywords: Total Factor Productivity, Growth, Institutions and Growth, Public Spending, Technological Innovation
JEL Classification : D24, N1, 004, P43, Q55

Introduction

This paper examines the effect of productivity in the growth of Nepalese economy using time-series data from 1975 to 2014. Economic Growth in Nepal has been only explained by the increased in factor inputs like capital accumulation. Growth generated by capital accumulation is not sustainable and in order to achieve sustainable broad base growth, growth must result from productivity factor. In this paper, we will see how total factor productivity can be increased in Nepal. Growth accounting in this paper suggests that total factor productivity can be increased by the reallocation of public spending, where government spends more on the areas which results in higher productivity growth. We have found that increasing expenditure on education and infrastructure raises the total factor productivity in Nepal. The paper also discusses that growth problem isnot merely associated with saving and investment but there are institutional and structural barriers to growth. The findings of the study is such that generating innovative technological growth is essential for productivity growth.

This paper is divided into five sections. This first section provides the objective, methodology and scope of the study. Section two measures total factor productivity in relation to Nepalese economy. We used production function that is applied to agriculture sector of Nepal, which is the main stay of the economy. In section three, we carry out empirical estimation to find out the impact of public spending on total factor productivity. In section four, we discuss about how developing economies like that of Nepal can achieve technological progress, which is mainly responsible for raising total factor productivity. In last section five, we recommend policies applicable to Nepalese economy on how productivity growth can be achieved. The input in agricultural sector is higher than output so the main policy implication is related to how to move the extra input of agriculture sector to other sectors of the economy. Then Nepal has also institutional and structural barriers to growth, which Nepalese policy should address. The study finds that institutions, both formal and informal, are responsible for the domestic innovation of the technology.

Objectives of the study:

The present study – Productivity and Growth in Nepal- mainly examines two main areas. In the first section, the study measures the total factor productivity of Nepalese economy since the year 1975 to 2014 and calculates TFP of the Nepalese economy for the period 1975 to 2104. Then the study further attempts to develop econometric modeling of TFP and tries to find out the determinants of TFP in Nepal. In addition to measuring TFP, the study also finds empirical estimation to find out the impact of public spending on TFP. On the second part, the study discusses how technological growth can be generated. Computer softwares like E-view has been used to carry out the econometric analysis. Specifically , the objectives of the present study are:

a) To examine the relationship between economic growth, capital accumulation, labor force and total

factor productivity in Nepal.

b) To examine the determinants of TFP in Nepal

c) To recommend policy for the productivity growth in Nepal.

We begin by defining productivity as the ratio of the output(s) that it produces to the input(s) that it uses. productivity = outputs/inputs.

In this study we use more than one input in the production function like, :Labor , Land, Fertilizer, Machinery, Livestock and aggregating these inputs into a single index of inputs must be used to obtain a ratio measure of productivity.

Here, when we refer to productivity, we are referring to total factor productivity, which is productivity measure, involving all factors of production. Other, traditional measures of productivity, such as labour productivity in a factory, fuel productivity in power stations, and land productivity (yield) in farming, are what is known as partial measures of productivity. These partial productivity measures can provide a misleading indication of overall productivity when considered in isolation. So we will consider Total factor Productivity.

Methodology of the study:

We use time series data from the year 1975 to 2014. Where available for the econometric purpose, the data has been used from 1964. The data source has been mainly the publications of central bureau of statistics, Nepal and other Economic Survey Reports of Ministry of Finance, Nepal. Data from World Development Indicators and International Finance Statistics have been also used. The agricultural data has been derived from Food and Agriculture Organization FAOSTAT.

There are essentially two major methods used in this study.

1. Least-squares econometric production models
2. Total Factor Productivity (TFP) indices

We used E-views software to carry out Least-square econometric estimation and Microsoft excel to measure Total Factor productivity indices.

Literature Review

Nepal, a land locked country in the center of South Asia, is one of 49 least developed countries in the world. The country's per capita income of US$ 430 in 2014 is one of the lowest in the Asian continent. Nepal has so far not seen either any economic miracle or economic debacle. The per capita income has been growing a little over 2 percent per annum in a situation where close to nine million people are currently estimated to be living in absolute poverty (UNDP 2002).

Low economic growth, growing unemployment and intensifying poverty culminating in a vicious cycle of low income, low savings, and low investment have led the country to a low level of equilibrium. Low savings, resulting in a over dependence of foreign capital for investment, has been a limitation for the country's sustainable development. Deteriorating performance of the agriculture sector, in spite of the highest priority laid on it, has been the major factor hindering economic growth and well being of more than three quarters of the population.

Table 1 GDP in Nepal 1974-75 to 2014

Year	Nominal GDP at factor Cost	GDP at constant Prices(2000-2001=100)	GDP growth rate
1974/75	16051	30449	
1975/76	16231	31462	3.33
1976/77	15784	31321	-0.45
1977/78	17541	32167	2.70
1978/79	19850	32806	1.99
1979/80	20428	32352	-1.38
1980/81	22938	35827	10.74
1981/82	26056	37288	4.08
1982/83	32219	37251	-0.10
1983/84	37671	41024	10.13
1984/85	44441	44441	8.33
1985/86	53215	46512	4.66
1986/87	61140	47427	1.97
1987/88	73170	50761	7.03
1988/89	85831	53518	5.43
1989/90	99702	56151	4.92
1990/91	116127	59768	6.44
1991/92	144933	62531	4.62
1992/93	165350	64586	3.29
1993/94	191596	69686	7.90
1994/95	209974	71685	2.87
1995/96	239388	75773	5.70
1996/97	269570	418,760	4.77
1997/98	289798	441,518	3.44
1998/99	329960	442,049	4.47
1999/00	365465	459,488	6.44
2000/01	392532	481,004	5.80
2001/02	406007	497,739	-1
2002/03	437072	514,486	3
2003/04	473876	532,038	3
2004/05	654,084	564,517	3.4
2005/06	727,827	590,107	3.4
2006/07	815,658	618,529	6.1
2007/08	988,272	639,694	4.5
2008/09	1,192,774	670,279	4.8
2010/11	1,366,954	697,954	3.4
2011/12	1,527,344	739,754	4.8
2012/13	1,695,011	764,336	4.1
2013/14	1,964,540	767,492	6.0

The challenges facing Nepal relate to addressing the long standing constraints on achieving significantly high growth, the key to poverty reduction, while maintaining economic stability. With an economic growth rate of about 4.6 percent on average (average of last 6 years), combined with a population growth rate of about 2.3 percent per annum, the main policy issue is how to enhance broad based economic growth with built in distribution of income. Then there are structural and institutional barriers to growth. The growth constraints identified include vulnerable agriculture, fragile industrial base, weak financial sector and inefficient public expenditures and state enterprises. Moreover, low agricultural productivity, combined with a high population growth rate and high illiteracy has perpetuated poverty.

Empirical evidences reveal that the speed of economic growth is contingent on the initial conditions of growth. The initial conditions of growth are measured through various indicators, the most frequently used variables being the total factor productivity in relation to the reference country in the initial stage, ratios of the stock of human capital and physical capital in comparison to the reference country in the initial stage and life expectancy at birth also. In fact, initial conditions are important determinants of the total factor productivity,

which has been the major contributory variable for the growth process of many countries.

On the whole, the initial economic and social conditions of growth were not very favorable for a number of reasons. First, there was virtually no physical infrastructure – no road, no electricity and no communication systems. Second, there was no human resource except for the abundance of unskilled and illiterate labour force. Third, there was almost no capital stock for the reason that industrial activities were limited to a few, private sector activities were confined to conventional labour-intensive agriculture and government investment in capital formation was constrained by a limited resource base. Fourth, social stigma like untouchablility and caste based division of labour prevented social mobilization and constrained labour mobility. And finally, the political leadership showed little will to change the orthodox social values and institutions system.

Table 2. Economic Performance Indicators (Average in %)

	1971-1980	1981-1990	1991-2000	2001-2014
Per Capita Income Growth	0.4	2.0	2.4	-1.5
GDP Growth	2.4	4.3	4.9	0.8
Share of Agriculture	62.7	52.8	41.8	38.8
Share of Industry	12.7	15.0	19.5	20.2
Share of Services	24.6	32.2	38.8	41.0
Investments as % of GDP	13.1	19.4	23.5	24.1
Public Investment	3.9	7.9	7.0	6.1
Private Investment	9.2	11.5	16.5	18.0
Revenue to GDP	6.5	8.5	9.8	11.6
Expenditure to GDP	11.0	17.6	16.8	16.8
Deficit to GDP (after grants)	4.4	6.5	4.9	4.4
Domestic Borrowing	1.1	2.8	1.8	2.8
Export to GDP	12.1	12.0	22.8	20.7
Import to GDP	17.3	22.0	34.1	31.1
Inflation (CPI Average)	7.8	10.2	8.3	2.8
Lending Interests Rate	13.5	15.6	11.6	7.7
Exchange Rate (NRS/US$)	11.4	19.6	58.6	76.5
Per Capita Income			US$200	US$240

Source: HMG Nepal Data

Table 3. Demand Side Sources of Economic Growth

	Contributions to Growth (%)					
	1976-85	1986-1990	1991-1995	1996-2001	1991-2001	2001-2014
Private Consumption	104.2	86.8	68.0	74.9	71.7	98.4
Government Consumption	10.0	9.0	10.9	11.5	11.1	25.5
Investment	13.3	16.4	33.1	23.8	28.0	9.4
Private	3.3	6.4	22.2	7.4	14.1	33.1
Government	6.7	8.5	6.1	9.3	7.9	2.4
Net-Export	-27.5	-12.2	-12.0	-10.1	-10.9	-33.4
Export	-1.6	10.3	34.5	17.0	24.9	-81.1
Import	25.9	22.5	46.5	27.0	35.9	-47.8

Productivity in Nepal

Productivity is the major factor for economic growth in any types of economies, but the realization of its crucial and significant role may varies from economies to economies. Productivity is not only important for a nation in terms of its economic growth but it equally important to every production unit or firm or enterprise and to every individual. It is productivity on the basis of which private firms and industries makes profits.

With the nations entering into Trade and external sector playing crucial role in any nation's economy, the concept of productivity is more relevant in this present era of free market economy and global competition because the goods the economy produced should be globally competitive. This is the reason why share of a nation in international trade is largely influenced by its national productivity. Hence improving productivity of an economy, has become extremely essential.

In general, literature suggests that the productivity level of Nepalese economy is very poor. It is because of the low productivity, that vicious circle of poverty has damaged our whole national and economic life. In agricultural sector, both land and labour productivity are too low that our per hector yield in different major and minor crops has remained almost stagnant at a very low level from the past decades. In industrial sector also technological ineffectiveness combined with less efficient managerial and unskilled labour sides have caused

productivity to remain at a considerably low level. It ultimately reflects itself into higher cost and hence import-substitution effect can't be generated. On the other hand, comparative advantage in international trade can't be harvested.

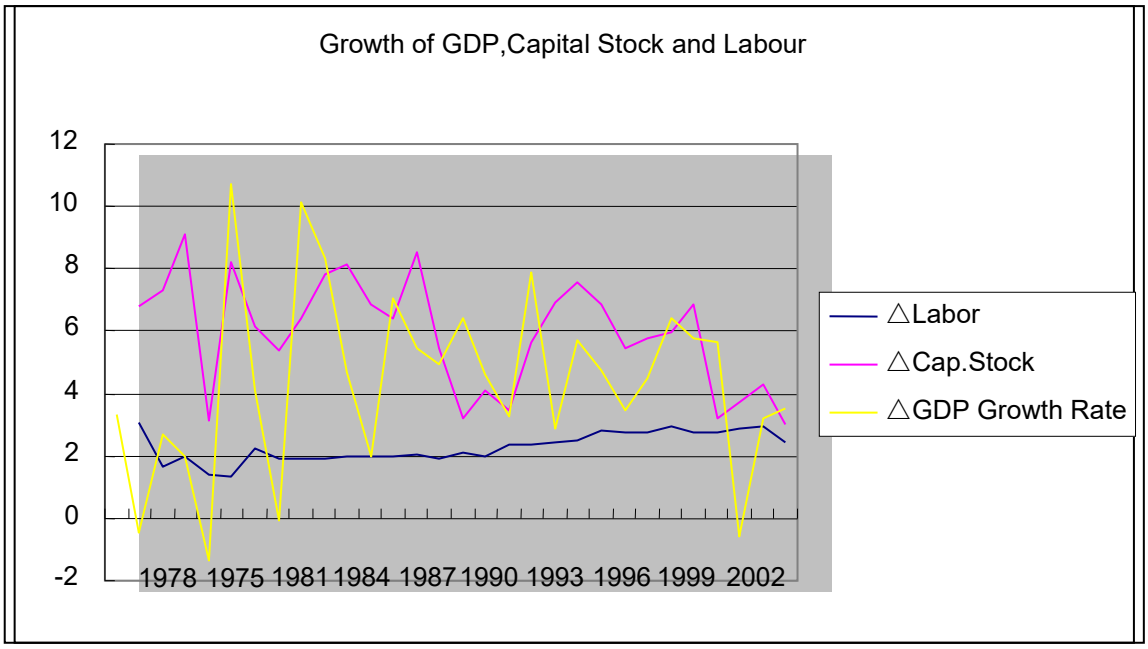

Figure 1. Growth of GDP, Capital Stock and Labour

From figure 2, we can easily understand that their exits high correlation between capital stock and GDP growth rate. In the year, when there is higher capital stock, their has been higher GDP growth rate. While labor force has been almost constant over the period, the growth hasnot been generated by productivity factor. As mentioned, the widespread prevalence of poverty (28.7% of the population below the absolute poverty line as of 2014) is being aggravated further by low economic growth and rapid population increase. So without introducing and enforcing productivity growth for the uninterrupted growth of productive forces, nothing fruitful can be imagined. Poverty in Nepal is not merely associated with distributional aspects and feudalistic norms and values, but is directly connected with productivity and efficiency in enterprises and formal & informal sectors and with the drawbacks in national policies and perspectives.

Role of government in productivity growth

Productivity statistics in Nepal indicate the decrease in sectoral level labour productivity during 1984/85 - 19995/96, although data-base is not reliable to the required extent. Statistics also indicate clearly that productivity problem is more acute in agricultural sectors in comparison to non-agricultural sector .

Therefore it is the responsibility of government, employers and workers to make committed efforts in order to improve productivity conditions. Otherwise, real income will further decline and saving and investment will get serious set-back. It will ultimately increase the hardships and sufferings of the working population. However, major responsibility rests on the government shoulder as it is the main policy making body and secondly on employers to generate considerable profits in their entrepreneurship.

As mentioned earlier, we are at the initial phase of building awareness on productivity issues. It has been already two decade since National productivity Council declared its productivity policy named 'National Productivity Council's policy 1996'. Government has also made various initial institutional arrangements. Efforts are being centered to design a productivity policy in line with current national development thrusts and incorporate it in the national development agenda.

Measurement of total factor productivity

The growth accounting exercise is normally conducted in terms of labor share and capital share in the output and the growth rates of these factors of production function. The output growth not explained by these variables is treated as the contribution of TFP.

The simple production function with two input vectors, land and capital, is how ever only a simplified production function. The production function is a technical relationship between the inputs and outputs of production process. In this case, the single output and two input model of production function is rarely applicable in reality because there are variety of inputs in production function. For example, productivity is affected by fertilizers and this should be taken as input in our production function. In this study we assume the production

function to be in the following form:

$$Y = A(t)\, F(N,L,M,F,S) \quad (1)$$

The growth in output can be approximated and decomposed into the following form for the discrete data assuming constant return to scale:

$$\frac{Y2-Y1}{Y1}*100 = \frac{A2-A1}{A1}*100 + W_L\frac{L2-L1}{L1}*100 + W_N\frac{N2-N1}{N1}*100 + W_F\frac{F2-F1}{F1}*100 + W_M\frac{M2-M1}{M1}*100 + W_S\frac{S2-S1}{S1}*100 \quad (2)$$

Notations:

1:Base Year, 2: Current Year, Y:Output, L:Labor , N:Land, F:Fertilizer, M:Machinery, S:Livestock,
A:Total Factor Productivity (Technological Change Factor, residual term) and W: weights on inputs.

The weights on the input variables can be production elasticities or cost shares of individual inputs under the assumption of a Cobb-Duglas type production function and the existence of competitive equilibrium. As the available time-series data are limited, the estimation of production function is difficult and also the information on cost shares is limited, a set of weights from previous studies of socialist Hayami(1996) and Ruttan (1990) is utilized for this current study[1]. Thus, the weights used are .155 for labor, .042 for land, .239 for fertilizer, .173 for machinery and .391 for livestock.

Similarly, for livestock calculation the weights are as follows .

Cattle: 0.8, Chicken : 0.01, Goats : 0.1 , Horse and Mules : 1, Pigs :2, Sheep ;0.1, Donkey and Asses : 0.8.

The contributing factors, individual inputs and total factor productivity, to the output growth are expressed in terms of percentage in equation 2. Total factor Productivity(TFP) is calculated as a residual of equation 2. TFP can explain the contributions of technical change and other miscellaneous factors such as improvement in management skills.

Data on output are the government figures on real GDP published annual in the Economic Survey reports. Further, the Food and Agriculture Organization, FAO database , has also data on output and other input variables which can be downloaded from <www.faostat.fao.org> .As for data on labor force, census figures will be used since the time series data on employed labor force is not available.

The change in TFP of Nepalese economy with special reference to agriculture sector came as in the following diagram.

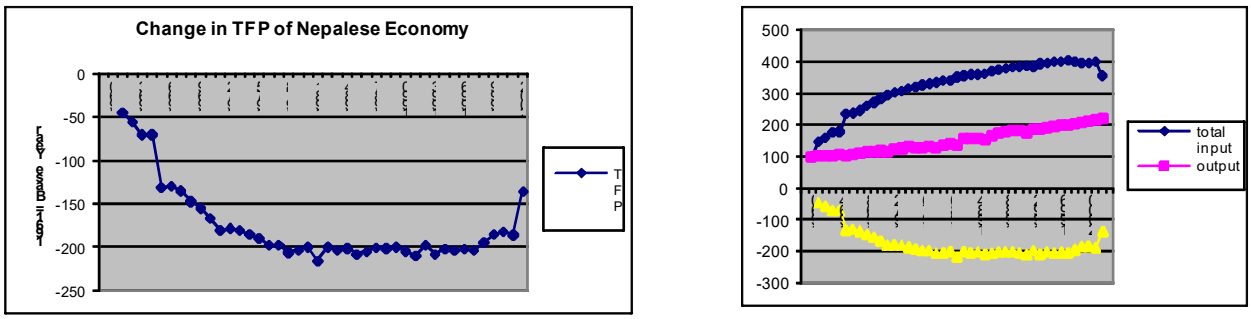

Figure 2. Change in the TFP of Nepalese economy

The change in TFP has been calculated as per the equation 2. From the above diagram we can clearly see, that when we use aggregate index of the inputs, than the TFP curve is negative. Although, the output is growing, it is this negative TFP curve which is stagnating the Nepalese economy. The major concern is how to improve this productivity and make it positive.

Determinants of Total Factor Productivity

In this section, we carry out a regression analysis to determine the factor of TFP. We also see, how TFP helps in improving quality of life. Following is the results of the regression analysis.

[1] *Y. Hayami and V. Ruttan. Agricultural Development: An international perspective. Using time series data of 43 countries inter country agricultural production function has been determined in Table 6.1, page 144-145.*

1. LLIFE = 4.90103405 + 1.077710128e-012*AGVA + 0.2543127189*LTFP

Dependent Variable: LLIFE
Method: Least Squares
Date: 06/09/16 Time: 08:10
Sample: 1 17
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.901034	0.209086	23.44032	0.0000
AGVA	1.08E-12	4.67E-13	2.306675	0.0369
LTFP	0.254313	0.044345	5.734871	0.0001

R-squared	0.986680	Mean dependent var	4.018638
Adjusted R-squared	0.984778	S.D. dependent var	0.047913
S.E. of regression	0.005911	Akaike info criterion	-7.265066
Sum squared residual	0.000489	Schwarz criterion	-7.118029
Log likelihood	64.75306	F-statistic	518.5394
Durbin-Watson stat	2.355247	Prob(F-statistic)	0.000000

2. LAGVA = 23.56989729 - 0.1264739559*LPSE + 0.1643392207*LPSH + 0.163215907*LPSSW

Dependent Variable: LAGVA
Method: Least Squares
Date: 06/09/16 Time: 08:21
Sample: 1 17
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.56990	0.150811	156.2879	0.0000
LPSE	-0.126474	0.092391	-1.368899	0.1942
LPSH	0.164339	0.091864	1.788942	0.0969
LPSSW	0.163216	0.037619	4.338675	0.0008

R-squared	0.978891	Mean dependent var	25.16527
Adjusted R-squared	0.974020	S.D. dependent var	0.149008
S.E. of regression	0.024018	Akaike info criterion	-4.417737
Sum squared resid	0.007499	Schwarz criterion	-4.221687
Log likelihood	41.55077	F-statistic	200.9534
Durbin-Watson stat	1.738982	Prob(F-statistic)	0.000000

3. LTFP = -5.795454655 + 0.1980264753*LPSE

Dependent Variable: LTFP
Method: Least Squares
Date: 06/09/16 Time: 08:17
Sample: 1 17
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.795455	0.107180	-54.07225	0.0000
LPSE	0.198026	0.010795	18.34417	0.0000

R-squared	0.957327	Mean dependent var	-3.833468
Adjusted R-squared	0.954482	S.D. dependent var	0.134323
S.E. of regression	0.028658	Akaike info criterion	-4.156647
Sum squared resid	0.012319	Schwarz criterion	-4.058622
Log likelihood	37.33150	F-statistic	336.5085
Durbin-Watson stat	0.694298	Prob(F-statistic)	0.000000

4. LTFP = 2.651390084 - 1.555279022*LILL

Dependent Variable: LTFP
Method: Least Squares
Date: 06/09/16 Time: 08:19
Sample: 1 17
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.651390	0.364562	7.272812	0.0000
LILL	-1.555279	0.087417	-17.79152	0.0000

R-squared	0.954756	Mean dependent var	-3.833468
Adjusted R-squared	0.951740	S.D. dependent var	0.134323
S.E. of regression	0.029508	Akaike info criterion	-4.098156
Sum squared resid	0.013061	Schwarz criterion	-4.000131
Log likelihood	36.83433	F-statistic	316.5380
Durbin-Watson stat	0.657933	Prob(F-statistic)	0.000000

The data analysis of Nepal has produced a conclusion that pubic spending on health and social security & welfare has important contribution in achieving higher value added in agriculture. Similarly public spending on education is important for achieving labor productivity and also the decrease in illiteracy increases labor productivity. The higher agriculture value added and labor productivity is responsible for improved quality of life in Nepal. From regression result 3, it is known that one percentage increase in PSE would increase the labor productivity by 0.197 %. Similarly from regression result 4 it is known that one percentage decrease in illiteracy would increase labor productivity by 1.556%.
Notes : Life expectancy at birth is taken as proxy for quality of life. Total factor productivity is taken from the previous analysis in chapter 2. The data from the year 1986 to 2002 has been used to calculate these results. Data source are mainly from online version of ADB, WDI,FAO, IMF/GFS sources.

*All variables are log transformed.
AGVA= Agriculture Value Added
ILL= Illiteracy
LIFE= Life Expectance at Birth
TFP =Total Factor Productivity
PSE=Public Spending on Education
PSH =Public Spending on Health
PSSW= Public Spending on Social Security and Welfare
PSA =Public spending on Agriculture

Increasing productivity of non-manufacturing sector

The growth rate of Nepalese economy is related with higher percentage to the growth rate of its non manufacturing sector than manufacturing sector. The empirical analysis revealed following estimation and formally it can be stated as:

$GGDP = c+a1GNM+\varepsilon$ ---------- (1)

Dependent Variable: GGDP
Method: Least Squares
Date: 04/19/16 Time: 00:51
Sample (adjusted): 1 29
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.585331	0.457957	5.645356	0.0000
GNM	0.573404	0.101153	5.668660	0.0000

R-squared	0.943408	Mean dependent var	4.116785
Adjusted R-squared	0.926497	S.D. dependent var	2.893884
S.E. of regression	1.991327	Akaike info criterion	4.281952
Sum squared resid	107.0653	Schwarz criterion	4.376248
Log likelihood	-60.08830	F-statistic	32.13370
Durbin-Watson stat	1.448275	Prob(F-statistic)	0.000005

GGDP = is the growth rate of the Gross Domestic Product
GNM = is the growth rate of the non-manufacturing sector
ε= is a normally distributed error term

A one percentage point increase in the growth rate of non-manufacturing sector will increase GDP by 0.5%

Equation 2 $GGDP = c + a1gM+\varepsilon$ --------- (2)

Dependent Variable: GGDP
Method: Least Squares
Date: 04/19/16 Time: 00:49
Sample (adjusted): 1 30
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.161157	0.599707	5.271169	0.0000
GM	0.145100	0.056300	2.577250	0.0055

R-squared	0.911738	Mean dependent var	4.104189
Adjusted R-squared	0.862871	S.D. dependent var	2.844388
S.E. of regression	2.602466	Akaike info criterion	4.815136
Sum squared resid	189.6392	Schwarz criterion	4.908550
Log likelihood	-70.22705	F-statistic	6.642215
Durbin-Watson stat	2.605849	Prob(F-statistic)	0.015518

GGDP = is the growth rate of the Gross Domestic Product
GM = is the growth rate of the manufacturing sector
ε= is a normally distributed error term
A one percentage point increase in the growth rate of non-manufacturing sector will increase GDP by 0.1%

This two regression analysis regressed above proves that non-manufacturing sector is higher in productivity than manufacturing sector. For developing countries, "the battle for the long term economic development will be determined by agriculture sector."[1] Agriculture Development plays a significant role in the development of Nepal and is considered to be "engine of the growth". Policies regarding Irrigation schemes, land ownership and improving rudimentary technology prevalent in agriculture sector can improve agricultural productivity.

Productivity and Technology

From the analysis in previous sections we see that a lot of the growth in economy can be generated, if we are able to implement policies that increase in Technology. An obvious question thus is, what are the policies that effect Technology. It can be, (i) Technological progress that can generate more production like invention of the diesel engine, the transistor, the microchip and so on which helps labor force (N) to generate more output with same capital (K) , (ii) The skill level of the labor force is another thing that can positively effect Productivity.. One of the big differences between rich and poor countries is that the former have better educated and more highly skilled workers, who generate more output working same numbers of hours as unskilled workers of poor countries, (iii) Weather. A drought or extreme cold snap might lead to lower output for given inputs. Droughts are a big deal in agricultural economy like Nepal and they affect very adversely to the production of agricultural output and proper irrigation and agricultural infrastructure helps agricultural labor force to generate more output despite drought, (iv) The economic and legal environment might also play a role in aggregate productivity. When legal and property rights are higher in economy and if economy has proper institutions at place to reduce transaction costs and increase interaction among firms, it affects positively to the production of goods. Conversely, corruption and uncooperative behaviour among economic agents provides setback to economy. The lethargic performance of Indian economy in 90s because of corruption and also political turmoil, the inconsistency between Monarchy and Democracy institutions, which is highly responsible for the sorry state of Nepal in present days, are some of the lack of institutions example - lowering the output of the economy year by year.

Although there are several policies relating to skilled labour, weather, oil price that positively affect A, Economists mostly agree that technological growth is the major factor for the productivity growth. One way to raise productivity is to spend money on research and development and innovate technology that is suitable for the specific production function of the economy. The trick here is to take basic scientific advances and convert them into profitable ventures. This technology is thus major factor that increases A in an economy and adequate information about how to increase technology level of an economy is very much desired. Thus the important

[1] Todaro, Michael. *Economics for a Developing World: An introduction to Principles, Problems and Policies for Development.* 3rd Ed. New York:Longman, 1992 pg 249.

becomes, "Who learns technology in an economy?". The aim of this section is to find a suitable answer this question and understand how such important technology is generated.

Generally speaking, there are two sources of the growth of technology i.e. A: a domestic source- associated with innovation – and in international one, related to the rate at which the country is able to learn from technological progress originated in the leading nations. The rate of domestic innovations is assumed to depend on the level of human capital which is education level of the labor force; and learning from technological progress in the leading nations, on the other hand, depends upon on at what cost the economy can learn technology from other advanced economies where higher level of technology exits?. When the cost of learning technology is higher, than an economy cannot learn such technology. If there is environment, When countries can learn the technology that exits in higher economies, it is general assumption that the countries, with a lower initial stock of knowledge will tend to imitate faster than those with a higher stock of TFP, because of the convergence theory.

The lesson from technically advanced countries lis that technology should be localized in the country context and than only such technology will help in the production of goods and later goods taking large share of market. Simply technology isnot enough, that technology must be able to produce goods and such goods must take higher market share. So the important point is to understand how countries can domestically innovate or localize technology to match with its production function. There are country specific things and we will analyze our objective in case of Nepal. In Nepal, firms donot have the ability to acquire and use new technology because of the absence of strong technology-transfer mechanisms such as in-firm training, business support, and foreign direct investment(FDI) and other possible factors which is key to raising productivity. The low level of productivity in Nepal is associated with the prevailing rudimentary technology in the country's most important agricultural area. Foreign direct investment can be a good mechanism to transfer technology.

Technology transfer mechanisms are weak in Nepal for three broad reasons . First, in-firm training programs are limited. The World Bank/FNCCI 2000 survey of firms found that 84% of the firms in the sample invested little or nothing in the training. Where training investments were made, only about 10% of the workforce in the company received formal training. This is about one-third of what is found in Western Europe and East Asia, where average percentage of workers trained is 25-36%, and more than 65% of firms provide some type of formal training. Second, lack of business support services for training, technical assistance and market information is a major handicap in raising firm's technical capabilities and 30% of the firms surveyed identified this as a major constraint. Third, Nepal needs more access to FDI – a key instrument for transferring technology. FDI doesnot only bring foreign capital in the domestic market but FDI also brings management and technology. A country with higher rate of FDI can quickly learn new technology – because there is much incentive to learn such technology.

The problem of lack of training is compounded by poor human capital in Nepal. Nepal's adult illiteracy rate is one of the highest in the world and such low skill development indicators are reflected in the number of foreign workers brought into filling skill-intensive jobs in Nepal. More than 15% of technical jobs in manufacturing are filled by foreign nationals. This percentage is probably understated because it is often difficult to discriminate between locals and foreigners in the boarder with India. Finally, the Government's contribution to R&D expenditures is also low by regional standards. As a percentage of GDP, India's R&D expenditure is two times that of Nepal. It is very important for Nepal to analyze and understand how its rudimentary technology, prevalent in country's most important agricultural sector can be improved. Unless the technological level of Nepal's agricultural sector is improved, Nepal isnot going to experience any economic miracle.

Lundvall (1992) also argues that because interactive learning is a key element of technological innovation and is basically a social process, innovation is greatly influenced by relations between the structure of production indicated by intra- and inter firm relations on the one hand, and the institutional setup, such as the role of the public sector, financial institutions, culture, ideologies and government policies on the other. Institutional theorist, like Douglas North, more strongly emphasizes the importance and continuity of institutions and the path dependent nature of institutional development. He defines institutions as "rules enforcement characteristics of rules, and norms of behavior that structure repeated human interaction". (North, 1989). They are the rules of games in human interaction, consisting of informal rules such as social norms, codes of conduct, customs, culture, etc.) and formal ones such as constitutions, laws, etc. Through such restrictions, institutions reduce uncertainty, solicit credible commitment to a set of behaviors and minimize transaction costs. This institutional approach to technological governance largely how economy learns dynamic innovative behavior of technological progress. Hence, Techo-governance becomes important focus of technological innovation.

The basic ideas here is that technology shouldnot be only taken as the narrow sense of scientific breakthroughs, but organizing management and workers to operate more effectively as a team. This management philosophy is as important is technological breakthrough. Thus the management policy should be based on inter firm cooperation and such cooperation can be on both inter firm and intra firms. Japan has proved this philosophy and is a leading example on what can be achieved through cooperation and dependence. Economists,

by and large, find that competition among firms has been useful. But maybe there should be room for cooperation, too. The tension between these two forces is a continuing theme firstly in management studies and now in economic studies as well.

Productivity and Technology transfer

Is Growth automatic? Is the growth of an economy merely concerned to savings and investment? Are the policies related to savings and investment only enough for the growth of any economy or do We need to develop careful about other policies as well? . Depending on our analysis on the role of technology in the production function and how an economy learns technology, we have somewhat highlighted the view of cooperation and competition in the economy. Policies are required for the exchange of communication between two firms and more or less we see government involvement in it. The argument for less government is that free market forces lead to efficient production and low prices for consumers. In this sense, excessive government "interference" gets in the way of the operation of the market system. But the history of successful nations generally includes examples of active government involvement, especially in infrastructure and education, and especially promoting inter firm relationship between different companies have played high role in the technological innovation. Thus we can conclude our discussion on technology transfer mechanisms as follow:

1. Growth in output comes from increases in factor inputs and growth in productivity (the letter A in our production function). The growth generated from factor inputs isnot sustainable and thus we need to learn about how productivity growth is achieved.
2. Technology growth alone isnot enough but such technological progress should result in more efficient methods of goods production which takes higher share in the market. Localization of the technology learned from world stock of knowledge is extremely important.
3. Technology is stored and generated by companies rather than individuals and the inter-firm relationship between companies in the economies are highly responsible for the technological progress.
4. Clearly defined property rights, trust and dependence among economic agents creates better institutional basis for the companies to come together, share their knowledge base and innovate new technology. Such institutions which establishes the rules of the game and enforcement mechanims, can foster technological growth in the economy.

Policy Recommendation

The total population of Nepal is around 25 million and the labor force is slightly over than 11 million. If we further classify the labor force, we will come to the statistics that the agriculture sector has 7 million labour force, the manufacturing sector has 0.5 million labour force, the mining sector has 0.01 million labor force. Government is a very small employer in Nepal with only about 0.02 million labour force employed in it. When 7 million labour force is engaged in country's agricultural sector, the input in agriculture sector is higher than the output, thus the productivity curve (figure 3) is negative. When the input is higher than output, the economy is not improving. The major policy of Nepal in coming days, should be to bring at least 1/3 of 7 million agriculture labor force to other sector of the economy. Growth can be generated in this way in Nepal.

The movement of the labour force is determined by the employment. People will move to other sectors, if they find employment their. In order to generate employment, investment is required and saving is required for that as we know from the identity S= I. With low income, low savings rate and low investment, Nepal is a country in low equilibrium. Does this mean that Nepal can never achieve a higher equilibrium?

While Nepal should work on policies to improve savings like capital gains tax, small central government in order to raise investment – more than that Nepal needs economic stimulus in the non manufacturing sector. If investment projects are announced in non-manufacturing sector financed through FDI, or NRN (Non-Resident Nepalese) investment – the labour force in the non-manufacturing sector can move to other sectors. Major policy implications lies with bringing 1/3 of the agricultural labor force to other sector of the economies.

Conclusion

For the real growth to occur, Growth generated by only increasing factors inputs like capital or labor willnot be sustainable. Only when total factor productivity growth is generated, than will real efficiency result. Growth strategies should thus encompass generation of TFP growth. Higher productivity will result in sustained growth and thus the nation can compete globally.

The empirical analysis in this paper clearly mentions that there is a clear connection between education and overall productivity measure. Let us say, to be specific, that educated workers are essentially like extra quantities of uneducated workers. From the interpretation of our empirical data, we found that if government increases the public spending by 1 % than total factor productivity will increase by 0.19. Similarly, if illiteracy is reduced by 1 % than TFP will be increased by 1.5.

In short, education shows up directly in aggregate productivity, and its effects are large. The question is

how to deliver high quality education on a large scale is the major policy to government. Public spending on education is essential. We can think of education as investment in people, or what economists call "human capital." There is lots of evidence, at the levels of both countries and individual level that education is associated with productivity. As a rule, countries that invest the most in education also tend to be the richest and have the highest rates of growth of per capita output..

Education has clear benefits to individuals, too. Highly educated workers are better paid. Public spending on education also carries the connotation of, *Scientific research* which is very important for the economic growth. The conclusion is such that one method of boosting productivity is to invest in the education of people, which has payoffs to both the individuals and the economy as a whole.

Secondly it is also important to note that technological innovation is considered one of the leading factors in increasing productivity of any economy. This issue remains extremely important for companies, governments and many other technology supporting organizations. The inter-firm relationship or firm and government relationship to generate technology is often restricted by certain underlying structure. These underlying structure consists of institutional and non-institutional barriers.

Foreign direct investment is helping in transferring technology but it is important that such technology is localized. To build an effective techno-governance structure is very difficult but government can play very important leading role in with both government and private companies making full use of institutional arrangement and innovation networks through associations, national research institutes and research consortia with government subsidies. Companies can also generate their own micro-level innovation networks.

Achieving productivity is not something with one simple answer, it is a complex combination of many factors. Productivity has become buzz word in the study of Macro economics. There are also many empirical studies which suggests that openness in trade also leads to higher productivity. Openness is also one way of learning technology of leading countries cheaply in domestic country. While there are several policies leading to higher productivity, the cornerstone of every study is higher technological growth leads to higher productivity. domestic innovation and localization of the technology is important and that becomes feasible and cheaper resulting higher growth in the economy.

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