

**PRODUCTIVITY MEASUREMENT
AND
LABOUR PRODUCTIVITY
AT
NATIONAL, SECTORAL AND INDUSTRY GROUP LEVELS**

1. Productivity

1.1 Origin and Meaning of the Word “Productivity”

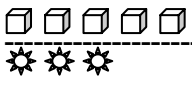


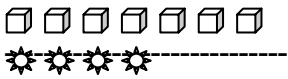
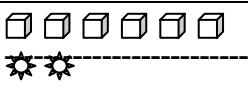



- In a formal sense, probably, the first time when the word "productivity" was mentioned was in an article by Quesnay in the year 1766.
- After more than a century later in 1883, Littré defined productivity as the "faculty to produce," that is, the desire to produce.
- In 1950, the Organization for European Cooperation & Development (OECD) offered a more formal definition of productivity as the quotient obtained by dividing output by one of the factors of production.

And productivity is defined as:

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

- A new element namely “effectiveness” was added while defining productivity. Effectiveness is the degree of accomplishment of objectives. In other words, how well a set of results is accomplished reflects the effectiveness, whereas how well the resources are utilized to accomplish the results refers to the efficiency. Productivity is a combination of both effectiveness and efficiency, since effectiveness is related to performance while efficiency is related to resource utilization.

1.2 Ways of Improving Productivity

Ways	Input/Output		Direction of Change	Productivity
	In Figure	In Units		
Initial		$\frac{5}{3}$		1.67
I		$\frac{6}{3}$	↑ ↔	2.00
II		$\frac{5}{2}$	↔ ↓	2.50
III		$\frac{7}{4}$	↑ ↑	1.75
IV		$\frac{6}{2}$	↑ ↓	3.00
V		$\frac{4}{2}$	↓ ↓	2.00
Note:  One unit of Input  One unit of Output				

1.3 Types of Productivity:

- Partial Productivity
- Total-Factor Productivity
- Total Productivity

1.4 Levels of Productivity.

Levels	Types	Partial Productivity	Total Factor Productivity	Total Productivity
Macro Level:				
National Level Productivity				
Sectoral Level Productivity				
Industry Level Productivity				
Micro Level:				
Enterprise Level Productivity				
Group/Unit Level Productivity				
Individual Level				

The shaded type and levels of partial productivity as indicated above, are measured and analyzed in this article.

2. Productivity Measurement

2.1 National Level Labour Productivity

To calculate labour productivity at national level total value added at constant price (VA) is taken as output while total economically active population (EAP) is taken as labour input. For the, purpose value added (VA) at current prices are deflated by implicit value added deflators taken from national account statistics. These VA at constant prices are then divided by EAP of these years to obtain national labour productivity levels. The source of secondary data and information for measurement and analysis of labour productivity at macro levels is the Central Bureau of Statistics, HMG and the sources of data for the productivity levels at national and sectoral levels are the Gross Domestic Product by Industrial Origin at Constant Prices presented as Table No. 1 and Employment Status of Economically Active Population of Ten Years of Age and Over by Major Industry Group in the Last Three Census Period given as Table No. 2.

2.2 Sectoral Level

A. As NSIC

As per the NSIC, sectors contributing value addition to the economy are:

- 1) Agriculture, Fisheries and Forestry
- 2) Mining Quarrying
- 3) Manufacturing
- 4) Electricity, Gas and Water
- 5) Construction
- 6) Trade, Restaurant and Hotel
- 7) Transport, Communication and Storage
- 8) Finance and Real Estate
- 9) Community and Social Services

Table No 1: Gross Domestic Product by Industrial Origin at Constant Prices (1994/95=100)

Description	1984/ 85	1987 /88	1990/ 91	1994/ 95	1995/ 96	1996/ 97	1997/ 98	1998/ 99	1999/ 00	2000/ 01	2001/ 02	2002/ 03 R	2003/ 04 P
Agriculture, Fisheries & Forestry	64940	70829	81320	85569	88830	92706	93496	96183	100856	106380	108752	111471	115629
Mining & Quarrying	655	785	922	1117	1262	1348	1365	1416	1480	1547	1571	1601	1641
Manufacturing	8142	10142	12179	19555	21322	22826	23607	24856	26646	27649	24892	25384	26014
Electricity Gas & Water	989	1520	2481	2862	3414	3475	3331	3520	4025	4413	4976	5348	5757
Construction	12542	15382	18285	23093	24733	26372	26953	28786	31544	31823	32180	32724	32812
Trade, Restaurant & Hotel	13606	16264	18701	24326	25424	26458	27981	29069	31036	31507	28329	29484	31187
Transport, Communication & Storage	6800	7815	9910	13995	14759	15902	17186	18355	19644	20860	21201	22021	23250
Finance & Real Estate	11775	13322	16647	20534	22096	23136	24494	25719	27026	27491	28402	29206	30017
Community & Social Services	9918	12346	14464	18924	20090	20817	22403	23885	25216	28080	28545	29241	30152
Total GDP at factor cost	129367	148405	174909	209975	221930	233040	240816	251789	267473	279750	278848	286480	296459
Agriculture GDP at Factor Cost	64940	70829	81320	85569	88830	92706	93496	96183	100856	106380	108752	111471	115629
Non-Agriculture GDP at Factor Cost	64427	77576	93589	124406	133100	140334	147320	155606	166617	173370	170096	175009	180830

P: Preliminary Estimates

R: Revised Estimates

Table No. 2 : Employment Status of Economically Active Population of Ten Years of Age and Over by Major Industry Group

Industry Groups	<i>1980/ 81</i>	<i>1985/ 86</i>	<i>1990/ 91</i>	<i>1995/ 96</i>	<i>1997/ 98</i>	<i>1999/ 2000</i>	<i>2000/ 01</i>	<i>2001 02</i>	<i>2002/ 03</i>	<i>2003/ 04</i>
Agriculture, Fisheries & Forestry	<i>6362488</i>	<i>6200543</i>	<i>6042721</i>	<i>6254928</i>	<i>6341883</i>	<i>6430047</i>	<i>6474587</i>	<i>6519436</i>	<i>6564596</i>	<i>6610068</i>
Mining & Quarrying	<i>989</i>	<i>1539</i>	<i>2393</i>	<i>5689</i>	<i>8045</i>	<i>11375</i>	<i>13526</i>	<i>16084</i>	<i>19126</i>	<i>22742</i>
Manufa-cturing	<i>33654</i>	<i>71544</i>	<i>152094</i>	<i>336780</i>	<i>462849</i>	<i>636111</i>	<i>745726</i>	<i>874231</i>	<i>1024880</i>	<i>1201489</i>
Electricity Gas & Water	<i>3070</i>	<i>6043</i>	<i>11893</i>	<i>37476</i>	<i>59310</i>	<i>93865</i>	<i>118085</i>	<i>148554</i>	<i>186885</i>	<i>235106</i>
Construction	<i>2060</i>	<i>8629</i>	<i>36142</i>	<i>92702</i>	<i>135121</i>	<i>196948</i>	<i>237776</i>	<i>287067</i>	<i>346576</i>	<i>418422</i>
Trade, Restaurant & Hotel	<i>111518</i>	<i>170110</i>	<i>259487</i>	<i>476237</i>	<i>607163</i>	<i>774084</i>	<i>874036</i>	<i>986894</i>	<i>1114325</i>	<i>1258210</i>
Transport, Communication & Storage	<i>7565</i>	<i>19737</i>	<i>51498</i>	<i>86703</i>	<i>106790</i>	<i>131531</i>	<i>145974</i>	<i>162004</i>	<i>179794</i>	<i>199537</i>
Finance & Real Estate	<i>10036</i>	<i>14563</i>	<i>21130</i>	<i>38002</i>	<i>48059</i>	<i>60777</i>	<i>68348</i>	<i>76861</i>	<i>86435</i>	<i>97201</i>
Community & Social Services	<i>319506</i>	<i>493494</i>	<i>762228</i>	<i>791912</i>	<i>804108</i>	<i>816490</i>	<i>822753</i>	<i>829064</i>	<i>835423</i>	<i>841831</i>
Total:*	<i>6850886</i>	<i>7091027</i>	<i>7339586</i>	<i>8409106</i>	<i>8879349</i>	<i>9375889</i>	<i>9634476</i>	<i>9900195</i>	<i>10173243</i>	<i>10453821</i>
Non-Agriculture	<i>488398</i>	<i>795856</i>	<i>1296865</i>	<i>2004657</i>	<i>2386152</i>	<i>2840247</i>	<i>3098740</i>	<i>3380759</i>	<i>3688444</i>	<i>4024132</i>

Source: NPEDC (Interpolated and extrapolated from CBS data)

Table No. 5: Census Value Addition and Average Annual Growth Rate of Major Manufacturing Industrial Groups.

NSIC NAME		<i>1996/97</i>	1997/98	1998/99	1999/2000	2000/01	<i>2001/02</i>	2002/03	2003/04	Avg. Growth
15	Food Products and Beverages	4965190.0	5731607.5	6616327.8	7637611.8	8816539.4	10177444.0	11748415.3	13561878.9	15.4
16	Tobacco Products	2624063.0	2892458.8	3188306.7	3514414.8	3873878.0	4270108.0	4706865.4	5188295.5	10.2
17	Textiles	5672960.0	5298353.3	4948483.3	4621716.5	4316527.4	4031491.0	3765276.6	3516641.4	-6.6
18	Wearing Apparel; Dressing and Dyeing of Fur	1376123.0	1537350.9	1717468.5	1918688.8	2143484.3	2394617.0	2675172.7	2988598.6	11.7
19	Leather and Leather products	287774.0	307115.4	327756.8	349785.5	373294.7	398384.0	425159.6	453734.7	6.7
20	Wood and Wood Products	309178.0	299177.9	289501.2	280137.6	271076.7	262309.0	253824.8	245615.1	-3.2
21	Paper and Paper Products	369750.0	386726.6	404482.7	423054.1	442478.1	462794.0	484042.6	506266.9	4.6
22	Publishing and Printing	286059.0	339648.6	403277.6	478826.8	568529.1	675036.0	801495.7	951646.1	18.7
24	Chemicals and Chemical Products	1284968.0	1548953.8	1867173.2	2250768.1	2713169.4	3270567.0	3942477.3	4752425.8	20.5
25	Rubber and Plastics Products	648570.0	741395.2	847505.8	968803.2	1107461.0	1265964.0	1447152.4	1654272.9	14.3
26	Other Non Metallic Mineral Products	1568265.0	1653914.6	1744241.9	1839502.3	1939965.3	2045915.0	2157651.1	2275489.5	5.5
27	Basic Metals	386047.0	437056.7	494806.4	560186.9	634206.2	718006.0	812878.5	920286.9	13.2
28	Fabricated Metal Products	1093632.0	1189487.4	1293744.3	1407139.3	1530473.1	1664617.0	1810518.4	1969207.9	8.8
29	Machinery and Equipment N.E.C	9044.0	10925.8	13199.0	15945.3	19263.0	23271.0	28112.9	33962.3	20.8
31	Electrical machinery and Apparatus N.E.C	482110.0	459552.4	438050.2	417554.1	398017.0	379394.0	361642.4	344721.4	-4.7
32	Radio, Television and Communication Equipment and Apparatus	59431.0	68497.2	78946.4	90989.7	104870.1	120868.0	139306.4	160557.5	15.3
34	Motor Vehicles, Trailers and Semi-Trailers	3172.0	4736.8	7073.6	10563.2	15774.2	23556.0	35176.7	52530.2	49.3
36	Furniture, Manufacture NEC	201038.0	215123.0	230194.8	246322.5	263580.2	282047.0	301807.6	322952.6	7.0
	Total*	21875315.0	23692955.8	25661626.0	27793875.0	30103294.6	32604606.0	35313753.8	38248007.2	8.3

Source: NPEDC (Compiled from manufacturing census 1996/97 and 2001/2002) Note: * includes additional industrial groups in addition to above stated industrial groups

Table No. 6: Number of Employees and Average Annual Growth Rate of Major Manufacturing Industrial Groups

NSIC NAME		1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	Avg. Growth
15	Food Products and Beverages	22161.0	23509.7	24940.5	26458.4	28068.7	29777.0	31589.2	33511.8	6.1
16	Tobacco Products	3142.0	3080.2	3019.7	2960.3	2902.1	2845.0	2789.1	2734.2	-2.0
26	Other Non Metallic Mineral Products	42591.0	44138.7	45742.7	47405.0	49127.7	50913.0	52763.2	54680.6	3.6
27	Basic Metals	1178.0	1390.1	1640.5	1935.9	2284.6	2696.0	3181.5	3754.5	18.0
31	Electrical machinery and Apparatus N.E.C	1492.0	1564.8	1641.0	1721.1	1805.0	1893.0	1985.3	2082.1	4.9
32	Radio, Television and Comm. Equipment and Apparatus	266.0	285.5	306.5	329.0	353.1	379.0	406.8	436.7	7.3
36	Furniture, Manufacture NEC	4475.0	4440.9	4407.0	4373.4	4340.1	4307.0	4274.2	4241.6	-0.8
	Total	186481.0	184403.4	182349.0	180317.4	178308.5	176322.0	174357.6	172415.1	-1.1

Source: NPEDC (Compiled from manufacturing census 1996/97 and 2001/2002)

Table No. 7: Labour Productivity at National Level

Description	1984/85	1986/87	1988/89	1990/91	1992/93	1994/95	1996/97	1998/99	2000/01	2001/02	2002/03	2003/04	Avg. Growth (84/85-90/91)	Avg. Growth (90/91-96/97)	Avg. Growth (97/98-03/04)	Total Growth (84/85-03/04)
Value Added (in million Rs.) (1994/95 = 100)	129367	138342	156478	174909	188782	209975	233040	251789	279750	278471	285061	296459	5.2	4.9	3.5	4.5
Economically Active Population	7042335	7140056	7239134	7339586	7750021	8183407	8641029	9124242	9634476	9900195	10173243	10453821	0.7	2.8	2.8	2.1
Labour Productivity Level (In Rs.)	18370	19375	21616	23831	24359	25659	26969	27596	29036	28128	28021	28359	4.4	2.1	0.7	2.3
Labour Productivity Index	72	76	84	93	95	100	105	108	113	110	109	111	4.4	2.1	0.7	2.3

Source: NPEDC

Table No. 8: Labour Productivity Level by Sectors

In Rs. at 1994/95 Constant Prices

Sectors	1984/85	1986/87	1988/89	1990/91	1992/93	1994/95	1996/97	1998/99	2000/01	2001/02	2002/03	2003/04	Avg. growth (84/85-90/91)	Avg. growth (90/91-96/97)	Avg. growth (97/98-03/04)
Agriculture, Fisheries & Forestry	10419	10724	12307	13458	12997	13775	14719	15062	16430	16681	16919	17493	4.4	1.5	2.9
Mining & Quarrying	464989	418253	446261	385282	300851	233460	199253	148025	114372	97177	84128	72156	-3.1	-10.4	-13.3
Manufacturing	132331	115323	83797	80075	81687	68070	57815	45808	37077	28473	24383	21651	-8.0	-5.3	-13.3
Electricity Gas & Water	187409	202488	157640	208605	127825	96075	73708	47177	37371	30198	26771	24487	1.8	-15.9	-12.9
Construction	1935560	1195141	859438	505920	388650	300750	235634	176459	133836	112716	95633	78418	-20.0	-12.0	-14.4
Trade, Restaurant & Hotel	87032	84122	75132	72069	63871	57675	49203	42402	36048	28593	25686	24787	-3.1	-6.2	-9.8
Transport, Communication & Storage	417373	315052	225618	192436	182835	179139	165261	154873	142902	131157	122262	116520	-12.1	-2.5	-5.2
Finance & Real Estate	871070	813034	779815	787837	693144	607637	541370	475878	402223	369628	340800	308814	-1.7	-6.1	-8.0
Community & Social Services	21923	20241	21066	18976	21873	24080	26087	29478	34129	34430	34934	35817	-2.4	5.4	4.3

Table No.9: Productivity Indices by Sectors

Sectors	1984/85	1986/87	1988/89	1990/91	1992/93	1994/95	1996/97	2000/01	2001/02	2002/03	2003/04	Avg. growth (84/85-90/91)	Avg. growth (90/91-96/97)	Avg. growth (97/98-03/04)
Agriculture, Fisheries & Forestry	76	78	89	98	94	100	107	119	121	123	127	4.36	1.50	2.89
Mining & Quarrying	199	179	191	165	129	100	85	49	42	36	31	-3.09	-11.91	-13.28
Manufacturing	194	169	123	118	120	100	85	54	42	36	32	-8.03	-9.43	-13.31
Electricity Gas & Water	195	211	164	217	133	100	77	39	31	28	25	1.80	-15.73	-12.92
Construction	644	397	286	168	129	100	78	45	37	32	26	-20.04	-12.96	-14.41
Trade, Restaurant & Hotel	151	146	130	125	111	100	85	63	50	45	43	-3.10	-8.24	-9.82
Transport, Communication & Storage	233	176	126	107	102	100	92	80	73	68	65	-12.11	-3.71	-5.24
Finance & Real Estate	143	134	128	130	114	100	89	66	61	56	51	-1.66	-6.75	-8.01
Community & Social Services	91	84	87	79	91	100	108	142	143	145	149	-2.38	5.22	4.28

Figure No. 1: Labour Productivity at National Level

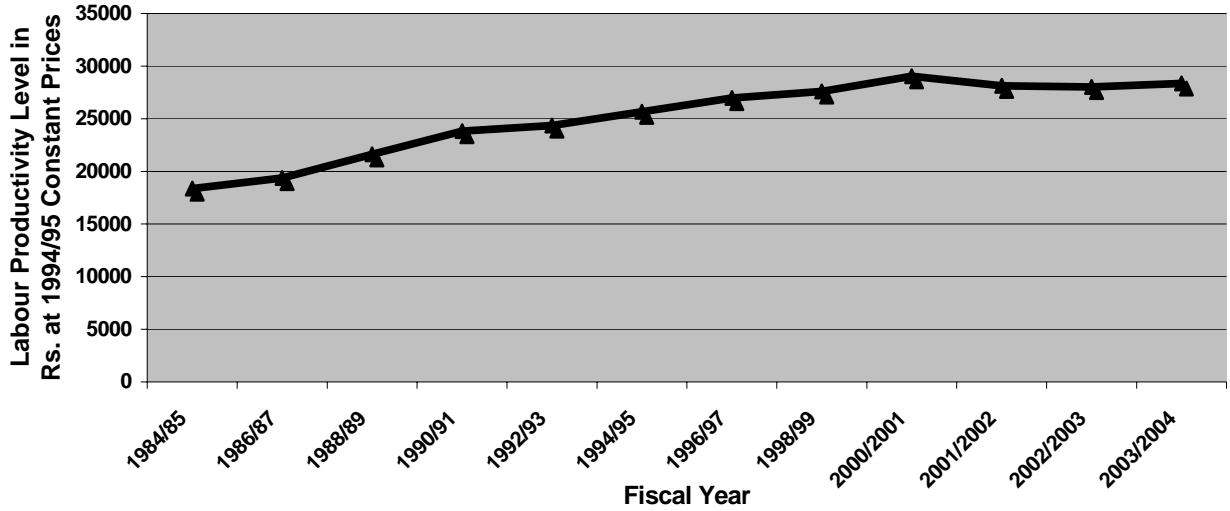


Figure No. 2: Labour Productivity at Sectoral Level

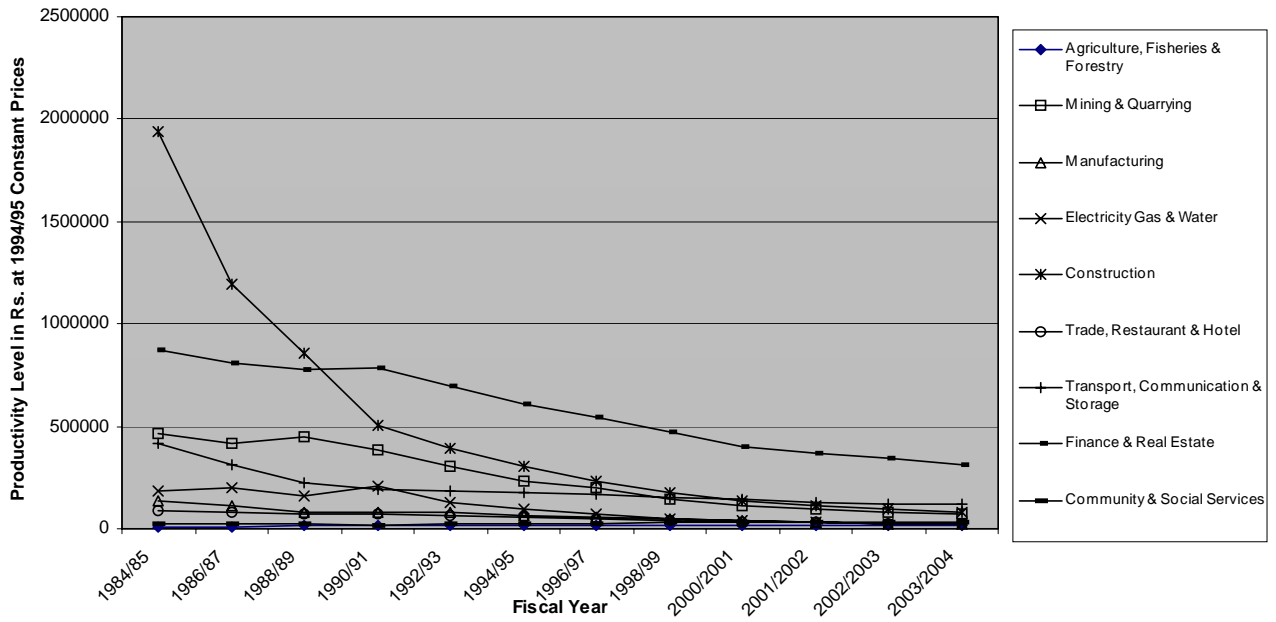
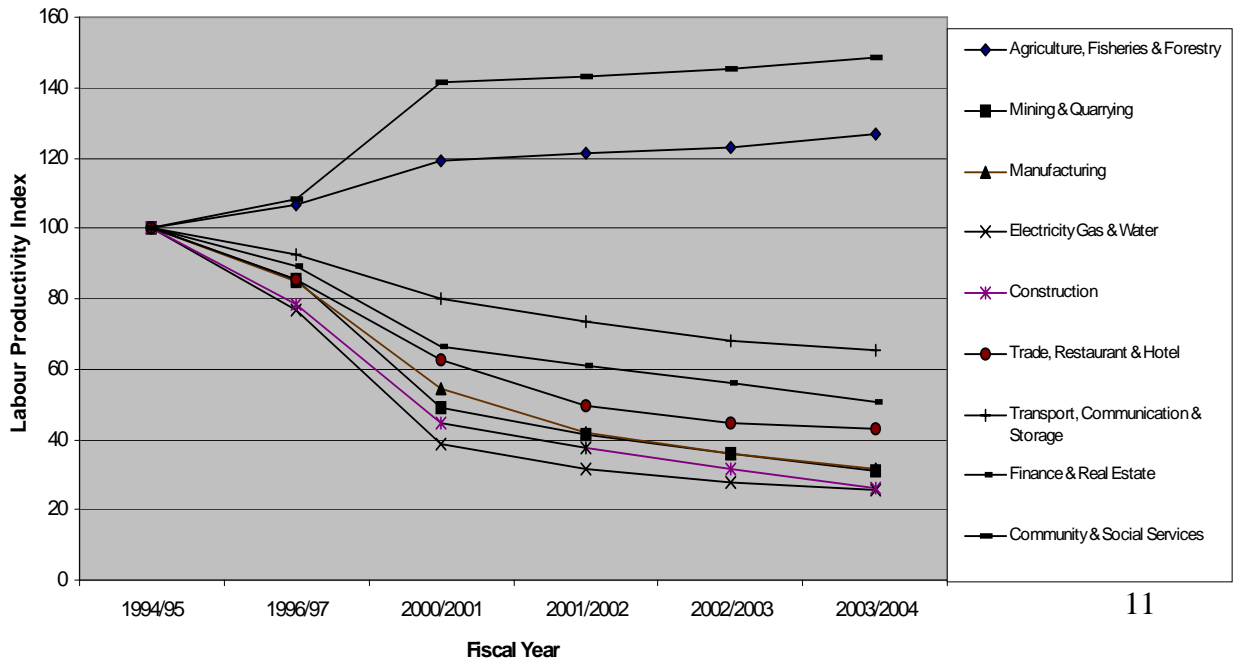


Figure No. 3: Sectoral Labour Productivity Indices



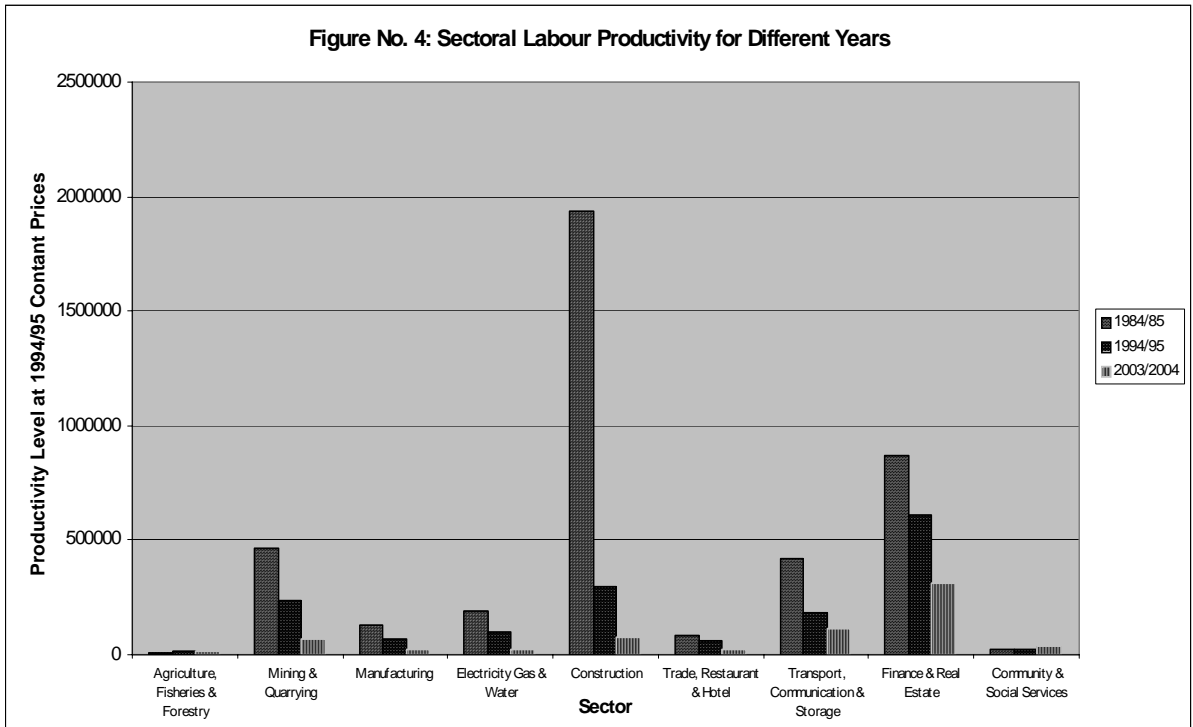


Figure No. 5 : Productivity Level of Agriculture and Non Agriculture Sectors

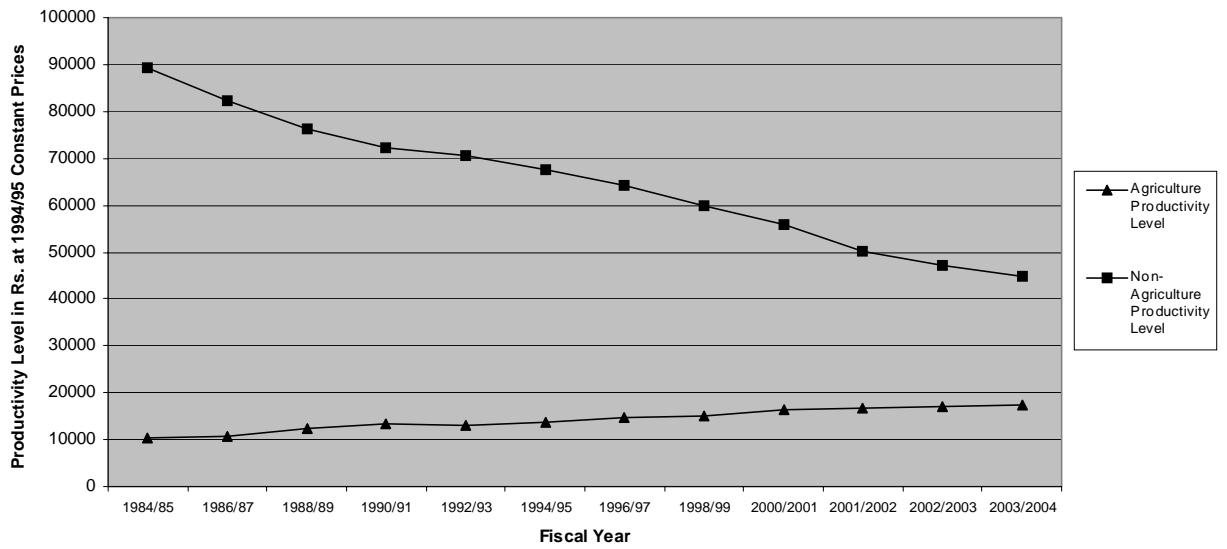


Figure No. 6: Comparative Productivity Levels of Agriculture and Non-Agriculture Sectors in Selected Years

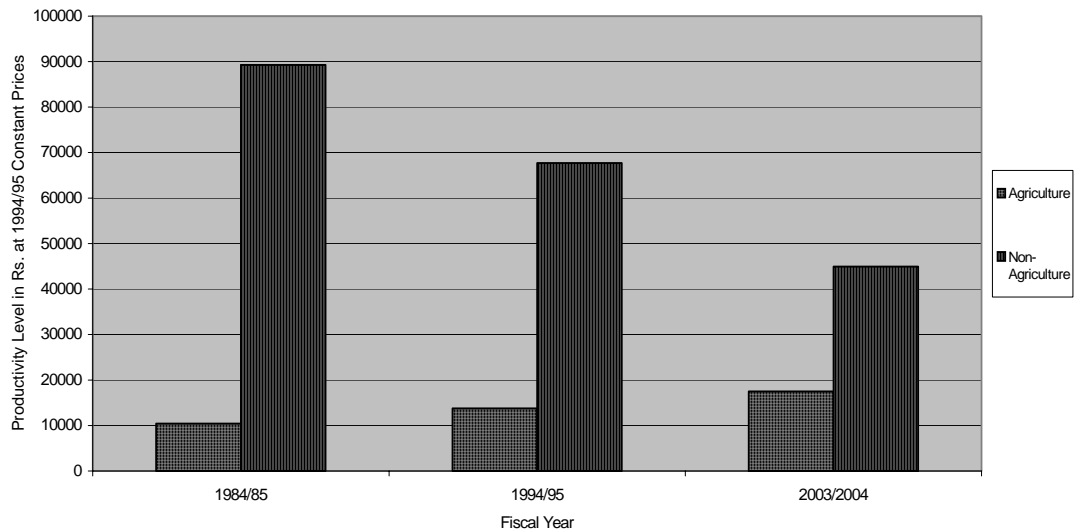


Figure No. 8: Labour Productivity Indices of Agriculture and Non-Agriculture Sectors

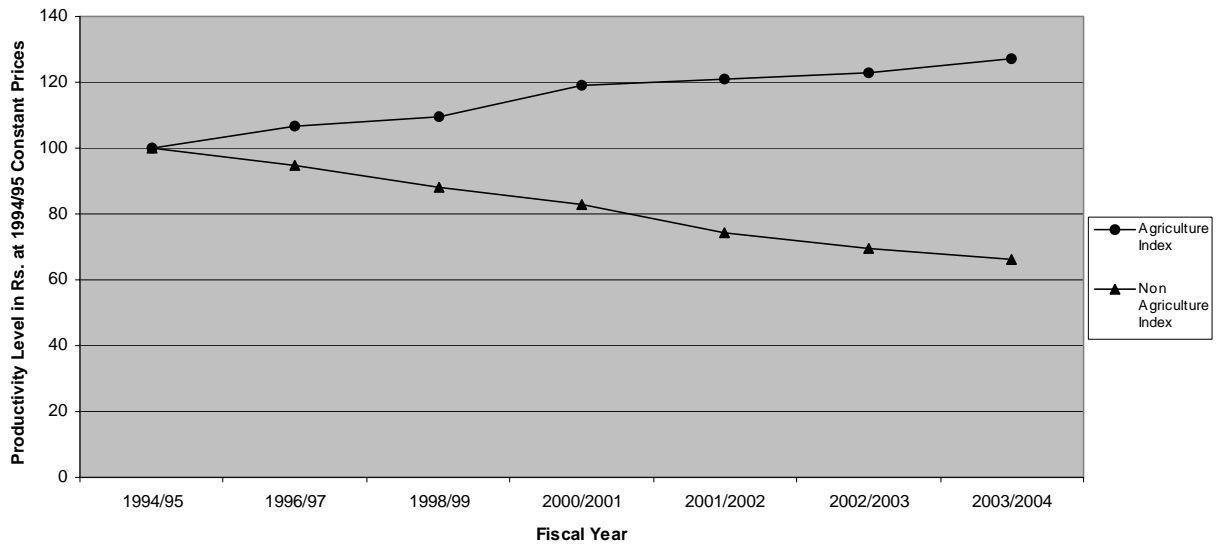


Figure No. 9: Labour Productivity Levels of Nine Selected Manufacturing Groups

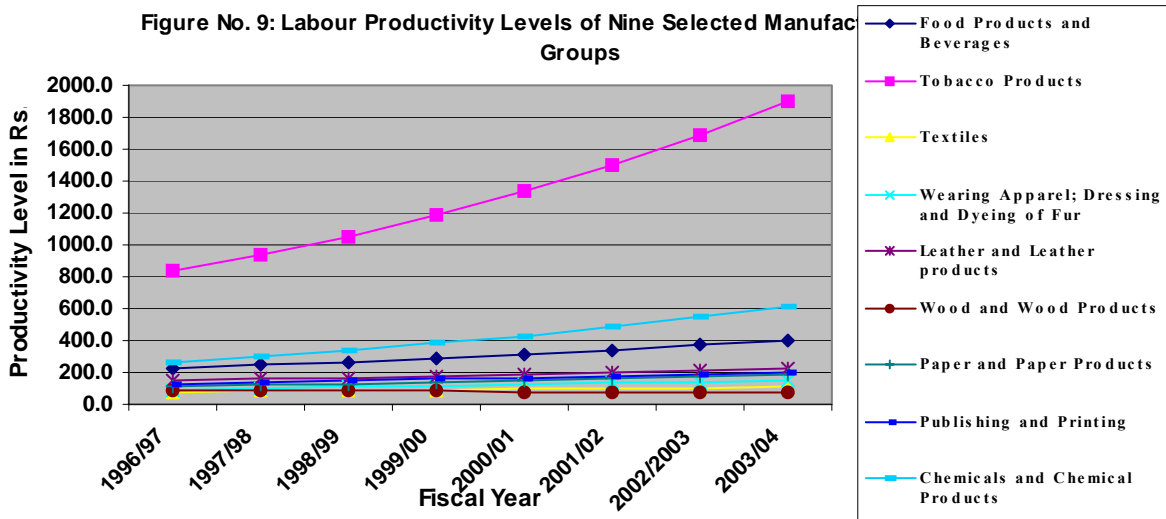
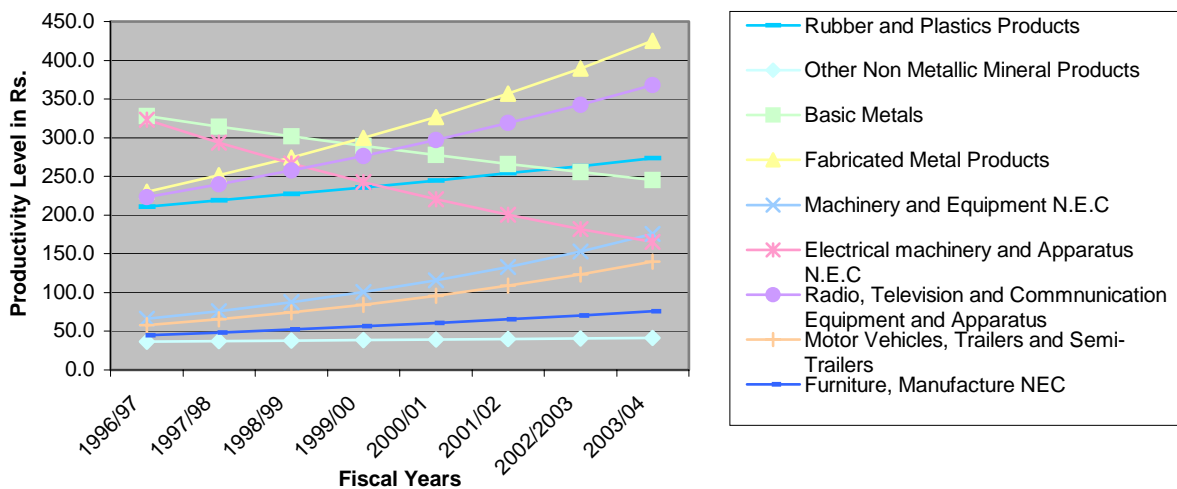


Figure No. 10: Labour Productivity Levels of Nine Selected Manufacturing Industry Groups



B. As Agriculture and Non-agriculture Sectors

Table No. 10: Labour Productivity Level and Indices by Agriculture and Non-agriculture Sectors															
Description	1984/85	1986/87	1988/89	1990/91	1992/93	1994/95	1996/97	1998/99	2000/01	2001/02	2002/03	2003/04	Avg. growth (84/85-90/91)	Avg. growth (90/91-96/97)	Avg. growth (97/98-03/04)
Agriculture Sector:	64940	66155	75137	81320	79631	85569	92706	96183	106380	108752	111069	115629	3.82	2.21	3.6
Value added	6232599	6168652	6105362	6042721	6126726	6211898	6298255	6385812	6474587	6519436	6564596	6610068	-0.51	0.29	0.7
Economically Active Population (EAP)	10419	10724	12307	13458	12997	13775	14719	15062	16430	16681	16919	17493	4.36	2.73	2.9
Labour Productivity Level (in Rs.)	76	78	89	98	94	100	107	109	119	121	123	127	4.36	2.73	2.9
Agriculture Index															
Non-Agriculture Sector	64427	72187	81341	93589	109151	124406	140334	155606	173370	169719	173992	180830	6.42	5.67	3.5
Value added	721809	877499	1066770	1296865	1543665	1837431	2187102	2603317	3098740	3380759	3688444	4024132	10.26	9.49	9.1
Economically Active Population (EAP)	89258	82264	76250	72166	70709	67706	64164	59772	55949	50201	47172	44936	-3.48	-3.48	-5.2
Labour Productivity Level (in Rs.)	132	122	113	107	104	100	95	88	83	74	70	66	-3.48	-3.48	-5.2
Non Agriculture Index	64940	66155	75137	81320	79631	85569	92706	96183	106380	108752	111069	115629	3.82	2.21	3.6

Source: NPEDC (Compiled from CBS Data)

3.3 Industry Group Level

Table No. 11: Industrial (Manufacturing) Productivity Level										
NSIC	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	Avg. Growth	
15	Food Products and Beverages	224.1	243.8	265.3	288.7	314.1	341.8	371.9	404.7	8.8
16	Tobacco Products	835.2	939.0	1055.9	1187.2	1334.9	1500.9	1687.6	1897.5	12.4
17	Textiles	78.2	81.9	85.7	89.8	94.0	98.5	103.1	108.0	4.7
18	Wearing Apparel; Dressing and Dyeing of Fur	92.7	99.5	106.8	114.6	123.0	132.1	141.7	152.1	7.3
19	Leather and Leather products	146.5	156.4	166.9	178.2	190.1	202.9	216.6	231.2	6.7
20	Wood and Wood Products	92.0	88.9	85.9	83.0	80.2	77.5	74.8	72.3	-3.4
21	Paper and Paper Products	113.1	121.7	131.0	141.1	151.8	163.4	175.9	189.3	7.6
22	Publishing and Printing	130.9	139.4	148.5	158.1	168.3	179.2	190.9	203.2	6.5
24	Chemicals and Chemical Products	266.3	300.2	338.3	381.3	429.8	484.4	545.9	615.3	12.7
25	Rubber and Plastics Products	210.8	218.8	227.1	235.7	244.7	254.0	263.6	273.6	3.8
26	Other Non Metallic Mineral Products	36.8	37.5	38.1	38.8	39.5	40.2	40.9	41.6	1.8
27	Basic Metals	327.7	314.4	301.6	289.4	277.6	266.3	255.5	245.1	-4.1
28	Fabricated Metal Products	230.2	251.3	274.3	299.4	326.9	356.8	389.5	425.2	9.2
29	Machinery and Equipment N.E.C	66.0	75.9	87.4	100.5	115.6	133.0	153.0	176.0	15.0
31	Electrical machinery and Apparatus N.E.C	323.1	293.7	266.9	242.6	220.5	200.4	182.2	165.6	-9.1
32	Radio, Television & Communications Equipment and Apparatus	223.4	239.9	257.6	276.6	297.0	318.9	342.4	367.7	7.4
34	Motor Vehicles, Trailers and Semi-Trailers	57.7	65.4	74.3	84.3	95.7	108.6	123.2	139.8	13.5
36	Furniture, Manufacture NEC	44.9	48.4	52.2	56.3	60.7	65.5	70.6	76.1	7.8
	Total	117.3	128.5	140.7	154.1	168.8	184.9	202.5	221.8	9.5

Figure No. 11 : Labour Productivity Level of Manufacturing Industry Groups in FY 1996/97

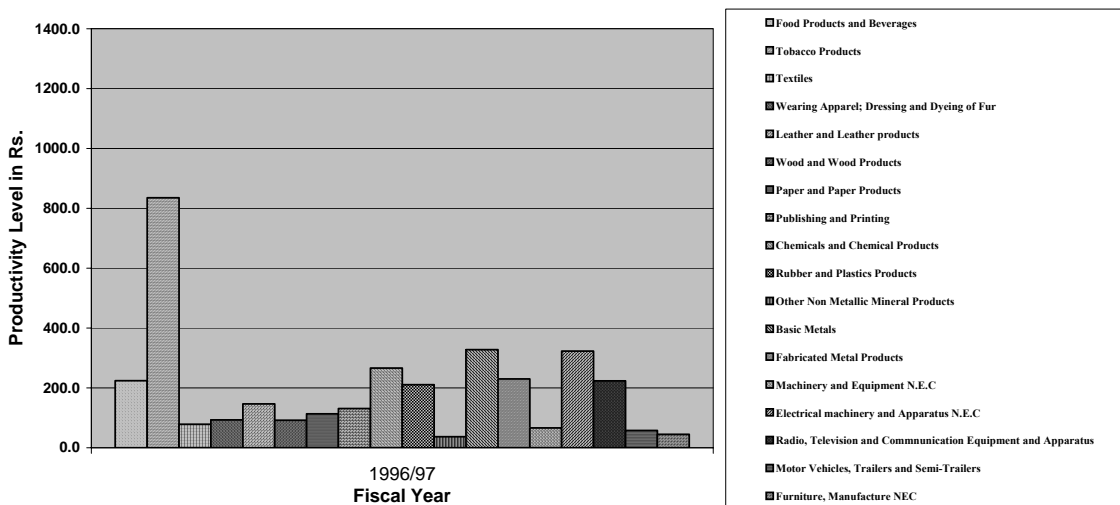


Figure No. 12 : Labour Productivity Level of Manufacturing Industry Groups in FY 2003/04

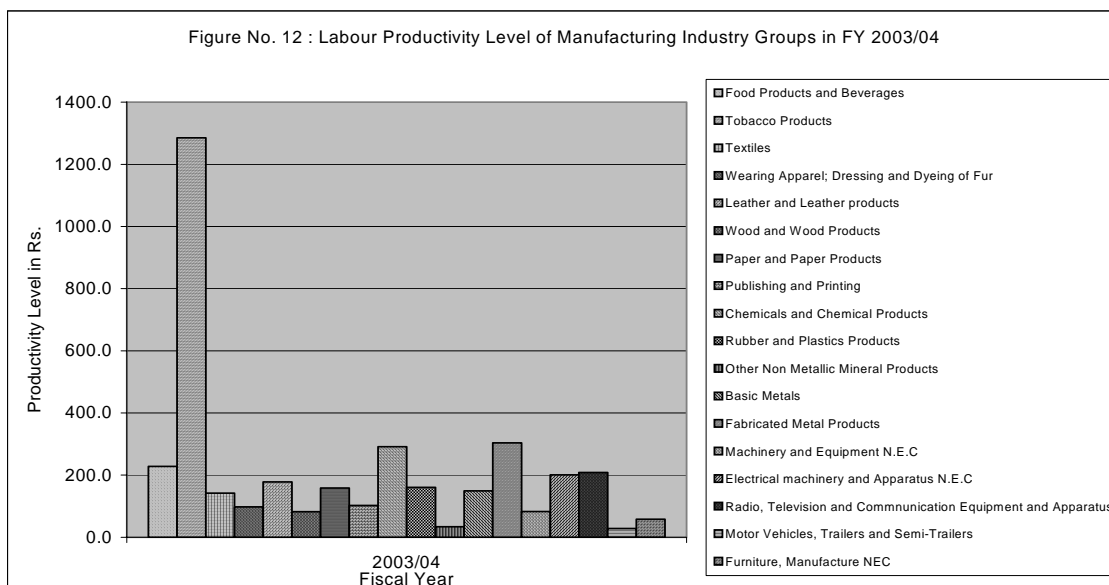
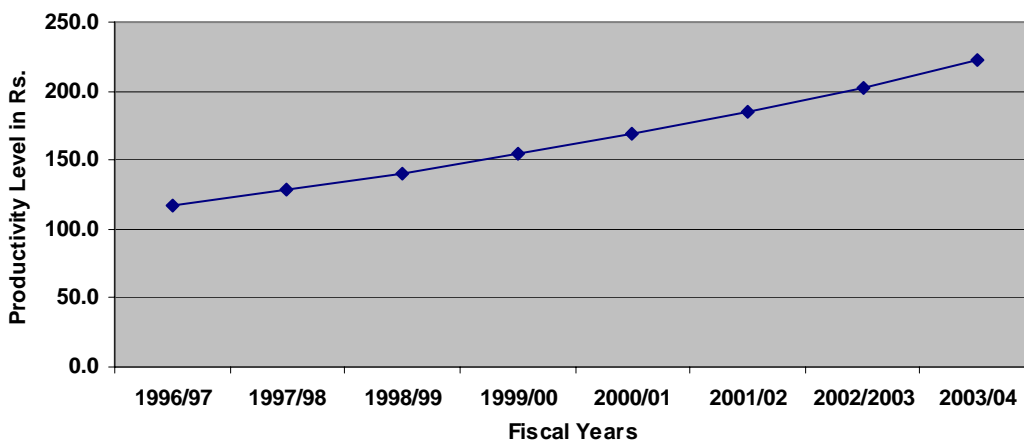


Figure No. 13: Total Labour Productivity Levels of Manufacturing Industry Groups



4. Summary and Conclusion

- **Productivity is a relatively simple notion but understanding and practicing it is crucial.**
- **There are few widely accepted measures of productivity. The most easily understood a measure of these is labour productivity and another commonly known productivity is the capital productivity and total factor productivity,**
- **Generally, good measures and data are those, which are simple, valid, reliable, understandable, meaningful and consistent. While deriving productivity statistics for development of productivity data base, it has been felt that, in many occasions, the work is being hampered by the present weak database.**
- **Productivity measurement in many developing countries, including Nepal, is still at infant stage, which might be due to unawareness of productivity utilities by its stakeholders. Productivity measures are still not properly utilized by them in making policy and corporate decisions and, as a consequence, performance growth is sub-optimal.**
- **There is a strong need for awareness and co-operation among productivity stakeholders to increase utilization of productivity measurement dramatically and to measure different type of productivity at different levels.**