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Productivity Differences Inside and Outside Industrial Estates of Leading Manufacturing Industries in Nepal

Pradip Kumar Mainali[1]

Abstract

This paper reveals the performance differences of same kind of industries inside and outside industrial estates based on efficiency measures such as input as percentage of output, input efficiency, labor productivity and capital productivity. T-test is performed to find the difference of means and variance is calculated to explore how largely the values are dispersed. Efficiency measures disclosed the fact that capital intensive nature industries and the industries which require more electricity such as grain mill products, textile, plastic, cement concrete lime and plaster, animal feed, casting & manufacturing of iron & steel, and structural metal industries have higher performance inside the industrial estates; contrary tocarpet, saw milling and ceramic industries. Consequently, it is recommended to have the right of entry inside industrial estates to only those manufacturing which are capital intensive in nature and consume more electricity. Mean and variance test depicts that the performance indicators are less scattered inside industrial estates which assures less riskiness of industries inside the industrial estates. Almost all the indicators ascertain the importance of industrial estates.

JEL Classification: C1, C2, L6, O4

Introduction

An industrial estate is a specific area that is separated from urban and densely populated areas, and zoned specifically for the location of industrial facilities such as roads, power, water supply, and other utility services to all facilities located within the well-defined parameters of the estate (World Bank, 2015). Bredo (1963) views industrial estate as a tract of land which is sub-divided and developed according to a comprehensive plan for the use of a community of industrial enterprises. Alexander (1963) considers industrial estate a group of factories, constructed on an economic scale in suitable sites with facilities of water, transport, electricity, steam, bank, post office, canteen, watch and ward and first-aid, and provided with special arrangements for technical guidance and common service facilities. The main objectives of industrial estates are: provide infrastructural facilities in one place; centralized scattered industries in one place; decentralized industries in proper place of different regions especially remote area; develop entrepreneurship by creating a congenial climate; encourage ancillarisation in surroundings of major industrial units so that its development will enhanced. Shrestha (2013) observes that industrial estates bring regional balance by promoting industrial development in priority areas where infrastructure is not

1 Dr. Mainali is Director General of Bright Institute for Research and Development, Nepal.
E-mail: bbpradip@yahoo.com

sufficient; it reduce cost reduction; industrial clusters generate growth of auxiliary and ancillary industries along with a lot of small peripheral business and service units; etc. that ultimately increase efficiency and productivity of industries.

The concept of industrial estates was developed in Britain when Manchester's Trafford Park was established in 1896. But the government owned industrial state was first established in 1936. But this concept was adopted in Nepal at 1962 when Balaju industrial state was established with joint effort of Nepal government and USAID (Shrestha, 2013). There are eleven industrial estates up to now, however only ten of them are functioning except Dharan industrial state. The younger industrial state is Rajbiraj launched in 1987 (Kandel, 2012). IDML (Industrial Development Management Limited) are providing land, buildings, road, electricity, water, drain, and security inside industrial estates on low rent respecting outside. But,in Nepalese context, no research has been carried out regarding the importance of industrial estates. The main and universal measurement of manufacturing industries is output per input which is known as productivity. Diewert writes:

> Productivity of a firm, industry or group of industries is defined as the real output produced by the firm or industry over a period of time divided by the real input used by the same set of production units over the same time period (Diewert, 1976. P. 223).

Productivity also affects competitive position: the more productive, the better ability would be to compete. Henceforth, this study is an attempt to find the importance of industrial estates relying upon productivity measures. Other forms of manufacturing performance related with productivity can be analyzed mainly observing the differences on manufacturing output, value added, material input, capital, employment, wage, etc. Hence, it is solely based on primary data.

Data and Methodology

Definition of Data

To limit the study area of the study, only top five industries that they fall on each census from 1982 census to 2012 census, were taken as consideration. The reason behind to observe the top five industries from 1982 to 2012 is that; 1982 is the first census year that recorded data with industrial classification code and 2012 is the last census. There are 14 top five industries in terms of output and 10 industries in terms of employment. There were 17 different industries in joint combination of output and employment category. ,

The name lists of industries inside the industrial estates are taken from Smarica, Silver Jubilee Souvenir, 2013. Altogether 140 industries were noticed inside the industrial estates on the barrier of above definition. However, there were not any sugar industries and manufacturing of jute and jute products inside the industrial estates. At the time of field visit eleven industries were found closed and 9 industries were found less than ten employments. Consequently, only 120 industries fell under specified categories. There was only tobacco industry inside industrial state at Hetauda but no data were retrieved though tentatively requested.

In the cement, concrete, lime and plaster category, the data are retrieved only from concrete since there are not any cement and lime factories inside industrial estates. From clay and ceramic category, the data are taken only from ceramic industries seeing as there are not any clay industries inside industrial estates. As there were variation on the plastic production and the similar variation as that of inside estates were not found outsides; only scrap pipe,

HDP pipe, plastic tank and gallon production are taken under study. Out of 120 industries under categorization only 52 questionnaires were retrieved though the questionnaires were provided to all of them. Manufacturing of wearing apparel; furniture, carpentry & joinery; non-machinery fabricated metal; and vegetable & oils & fat are left since there were 2, 1, 2, 1 industries respectively and data were not available from them. Consequently, only ten categorized remained under study.

In view of the fact that the study is related to compare productivity differences inside and outside industrial estates, the same numbers of industries with similarity in nature and same topographical location have been purposively selected even in outside industrial estates. In the case of Kathmandu valley, all the industries inside valley are taken as same topographical location to compare with the industries of Balaju, Patan, and Bhaktapur industrial estates. In the case of vicinity of Hetauda industrial estate, industries outside are considered from Chitwan district too, since it is nearby. The industries outside industrial estates are purposively selected from Directory of National Census of Manufacturing Establishment-2013 (CBS, 2013).

Methodology

Hypothesis on Efficiencies Differences inside and outside Industrial Estates

As industrial estates are facilitated with 10 hours of electricity supply, low rent, with other facilitation like water, road, sanitation etc, it is expected that efficiency is higher inside industrial estates. It is also expected that the variances on various forms of measurement is less inside industrial estates signifying that the industries insides are less risky than outside. Hence, the following hypothesis formulated.

Two tail test

Null hypothesis: $\mu_1 - \mu_2 = 0$

There is no significance difference between inside and outside mean value.

Alternative hypothesis: $\mu_1 - \mu_2 \neq 0$

There is significant difference between inside and outside mean value.

One tail test

Right tailed alternative hypothesis: $\mu_1 - \mu_2 > 0$

The mean value of inside is significantly greater than the mean value of outside

Left tailed alternative hypothesis: $\mu_1 - \mu_2 < 0$

The mean value of inside is not significantly greater than the mean value of outside

t-test for difference of means

Sample happened to be atypical difference between two groups. In such situation statistical significance determine by the size of the difference between the group averages, the sample size, and the standard deviations of the groups. Statistical significance suggests that the two larger populations from which we sample are actually different. The t-test's describes the magnitude of the difference complements, whether or not the difference is statistically significant (Greene, 2012).

If samples from two different population let $X_1, X_2 \ldots\ldots X_n$ and $Y_1, Y_2, \ldots Y_n$ are taken from normal population, mean difference is calculated as:

$$t = \frac{\overline{X} - \overline{Y}}{\sqrt{S^2(\frac{1}{n_1} + \frac{1}{n_2})}}$$

and, $S^2 = \frac{1}{n_1+n_2-2}\left[\sum(X - \overline{X})^2 + (Y - \overline{Y})^2\right]$

Where; $\overline{X}$ and $\overline{Y}$ are mean of sample X and Y respectively, n_1 and n_2 are number of observations.

Decision criterion: If calculated t-statistics is greater than tabulate t-values than the null hypothesis is rejected signifying difference between two sample means.

Coefficient of Variance

Coefficient of variance detects how largely the values are dispersed. Generally, efficiency measurements inside industrial estates are expected less scattered than that of outside. Coefficient of variance is calculated as:

$$m = \frac{\sum X}{n}$$

$$\sigma = \sqrt{\frac{\sum(x-m)^2}{n-1}}$$

$$CV = \frac{\sigma}{m}$$

Where: m = mean value, x = observation, n = number of observation, σ = standard deviation, and CV = coefficient of variation.

Decision making: If the CV of industrial estates is smaller than that of outside than industrial estates are more importance.

Specification of Variables and Measurements

Specification of Variables

Variables are defined as per definition of Census of Manufacturing Establishments Nepal (CBS, 2012). They are presented below.

$$\boldsymbol{Input} = TCm + TCf + Ve + Isc + Vs + +Nisc$$

Where: TCm= total cost of materials, and supplies purchased, TCf = total cost of fuels purchased, Ve= cost of electricity purchased, Isc= cost of industrial and other services, Vs= change in value of stocks of materials and fuels, $Nisc$= non industrial services cost. Non-industrial services cost is the cost of rent, advertisement, water, communication, transportation expenses, patent right, legal advice, agent commission, travel and daily allowances and miscellaneous.

$$\boldsymbol{Output} = Vs + Rios + Cow + Cvs + Inis$$

Where: Vs = total value of shipments (including own consumption), $Rios$ = total receipts from industrial and other services, Cow = total cost of work done on own account, Cvs = change in value of the stocks of finished goods, semi finished goods and goods sold in the same condition as purchased, $Inis$ = income from non-industrial services. Income from non-industrial services is receipt from rent, transportation, agency commission and miscellaneous.

$$\boldsymbol{Capital} = L + B + Me + Te + Ff + Ot$$

Where: L value of land, B = Value of buildings, Me = Value of machinery & equipment, Te = Value of transport equipment, Ff = Value of furniture and fixtures and Ot = others, at the given year.

$$\boldsymbol{Wage} = Dw + Iw$$

Where: Dw = Direct wages, salaries and facilities (cash remuneration of current work performed) and Iw = remuneration for time not worked (direct cash payment in respect of public holidays, annual vacations and other leave facilities).

$$\boldsymbol{Value\ Added} = Output - Input$$

Efficiency and Productivity Measurement

Efficiency Measurement

Input as Percentage of Output

$$\text{Input as \% of Output} = \frac{Input}{Output} * 100$$

Input as percentage of output illustrates the input per 100 outputs. It means how much inputs were used to produce 100 outputs. Hence, higher value of indicator depicts lower performance and vice versa.

Material Efficiency

Material Efficiency is the ratio of value added and output calculated as:

$$\text{Material Efficiency} = \frac{Value\ Added}{Output}$$

Value added output ratio measures the efficiency of the use of materials inputs or the profit margin without tax deduction. It is more stable and robust estimation in comparison with the absolute value of output and input.

Productivity Measurement

Labour Productivity

Value added per employee is measure of labour productivity in manufacturing which indicates the average amount of value added produced by an employee.

$$\text{Labour Productivity} = \frac{Value\ Added}{Employment}$$

If more capital is used by a labour or when a labour is more skilled, will result more value added. Labour productivity therefore presents a mixed measure of labour skills and

capital intensity. For consistency checks of the survey results, it is quite common to compute the average value added per person engaged.

Capital Productivity

Capital productivity is the ratio of value added and value of fixed asset at given year.

$$\text{Capital Productivity} = \frac{Value\ Added}{Value\ of Fixed\ Asset}$$

Capital productivity measures the efficiency and effectiveness of fixed. Higher value of indicator indicates the efficient use of capital and vice versa.

Scenario of Industries Inside and Outside Industrial Estates

The average capital utilization inside the industrial estates is 55 which is 52 percent more than the average capital utilization outside. Since the capital utilization is not measured by the differences of production capacity of the plant and the production that they have, it cannot be readily say that this calculation is exact. However, it cannot be even avoided since it is speculated with the reply of investors themselves. Capital utilization estimation assures the importance of industrial estates. But it is relevant to expect that where there is higher capital utilization, are better functioning too. Higher capacity utilization inside the industrial estates means manufacturing are better functioning inside industrial estatesrespecting the same kind of industries outside. The higher capital utilization inside the industrial estates might have because of at least 10 hours of electricity supply that the industries outside don't have.

Material input, gross output, value added, and capital are observed higher in industrial estates by 79, 84, 120, and 43 percent respectively. The difference is noticed due to sampling observation. It is almost impossible to find each and every industry with same size in any respect. It simply denotes how big observation was carried out inside and outside industrial estates but do not concern with efficiency, and productivity measure. Gross output per employment is the simplest form of labor productivity measurement. Since it is the ratio of gross output and employment, shows only how much contribution is on production by a person ignoring the contribution of other factors of production like, capital and material inputs. But, the notion of gross out per employment is still wide spread since it is simple to understand, easy for calculation. It is observed that per labour gross output inside industrial estates is 3613 thousand which is 30 percent higher than that of outside. Output per employee measurement shows the better situation of industries inside the industrial estates.

Table 1: Scenario of Industries inside and Outside Industrial Estates, 2014

S.N.	Description	Inside Industrial Estates	Outside Industrial Estates	% Difference Inside and outside	Total Average
1	No. of Industries	52	52	-	-
2	Average Capital Utilization	55	36	53	46
3	Material Input ('000)	5055897	2830337	79	3943117
4	Gross Output ('000)	5889034	3208376	84	4548705
5	Value Added ('000)	833137	378039	120	605588
6	Capital ('000)	1807879	1262599	43	1535239
7	Gross Output per Employment ('000)	3617	2785	30	3201
8	Gross Output per Capital ('000)	3.26	2.54	28	2.90
9	Output Wage ratio	21.19	17.06	24	19.12

Note: Data expressed in S. No. 4 to 11 are in monetary value NRs.
Source: Author's calculation from Sample Survey, 2014.

Output per wage is another form of productivity measurement. It is mainly looked upon from the side of investors in the sense that they expect more output in terms of wage and salaries that they have paid to employee rather than the number of persons employed. The output wage ratio inside the industrial state is 21.19 which is 24 percent times higher than that of industries outside. Thus, it approves the direct association wage and output. It means higher the wage is higher the productivity will be or vice versa. Output wage ratio also guarantees the importance of industrial estates. But, productivity measured in terms of value added is more justifiable for analysis because gross output ignores the profit side which is the sole aim of private investors. Hence, a rigorous analysis based upon value added is described below.

Productivity and Efficiency Differences Inside and OutsideIndustrial Estates

Labour productivity measured in terms of value added per employee indicates the average amount of value added (i.e. difference of gross output and gross inputs other than wage/salaries) produced by an employee. The finding from primary survey assures the importance of industrial estates in the logic of higher labour productivity since it is 511 inside and 328 outside. Definitely, higher labour productivity is noticed because of labours efficiency owing to continuous electricity supply and other facilities that paved way for friendly working environment.

Since value added per unit of capital i.e., capital productivity; measures the efficiency and effectiveness of fixed assets in the generation of output, higher values of indicator denotes the efficient capital utilization and vice versa. But, if new productions/firms are recently launched the contribution of capital cannot be resulted for few years. Similarly, if new plant is borrowed or new technology is adopted, its output may not be resulted immediately. Likewise, if the firms are more capital intensive than definitely those firm that are labour intensive will result higher capital productivity. For an example, a saw mill simply requires a bend saw and an open space in most of the cases can provide big sum of output simply by sizing wood. However, a plastic industry requires high cost imported plant and a fixed building, is costly capital. Our case might have resulted from last reason that the higher capital requirement firms are taken in this study.

Table 2: Productivity and Efficiency Differences Inside and Outside Industrial Estates

Efficiency Measures	Inside Industrial Estates	Outside Industrial Estates	% Difference Inside & Outside Industrial Estates	Average Inside Outside
Labour Productivity	511.75	328.16	55.95	420
Capital Productivity	0.46	0.30	53.91	0.38
Input as % of Output	85.85	88.22	-2.68	87
Material Efficiency	0.14	0.12	20.07	0.13

(Note: Results on parenthesis denotes the percentage difference noticed between inside and outside industrial estates.)

Sources: Author's calculation from Sample Survey, 2014, and National Level Calculation is Based on CBS Data.

Capital productivity is 0.46 inside the industrial estates that is 53.91 percenthigher respecting capital productivity 0.30 noticed in outsides. Since, the heterogeneous production related firms were taken inside and outsides, the capital efficiency difference definitely might not have resulted because of operating capital rather it might have noticed from the effect of

fixed capital like land and buildings which are cheaper inside. Now, it can be ascertain the implication of industrial estates in terms of capital efficiency too.

Average input as percentage of output 87 demonstrates that there is 2.68 percentage of difference of output input ratio inside and outside industrial estates though the negligible difference. But, it is also to be noticed that the difference also occur due to difference of inclusion of newly adopted costly technology, differences of use of expensive raw materials etc. For an example, a brick factory simply use clay as raw material which is low cost raw material but a manufacturing of suspension bridge need iron and steel which is costly material input. Definitely, leading industries that are observed in this study mainly use costly raw material, hence, the difference might have resulted. The negligible difference might have occurred because of homogeneous nature of industries taken in to survey. Input as percentage of output measure of efficiency further clarifies better performance of industries inside estates, nonetheless the meager difference is observed.

The more stable and robust estimation in comparison is value added output ratio that measures the efficiency of the use of materials inputs. It is indicated that materials are efficiently used inside industrial estates by 20 percent more than outside since its value is 0.14 inside and 0.12 outside. It implies the little higher level of profit from the same level of output. Or, it can be said that the earning is more from the industries inside theestates with the same amount of output. This result further more ascertains the importance of industrial estates.

General Scenario of Categorical Industries inside and Outside Industrial Estates

Labour output is noticed highest on animal feed following grain mill, casting & manufacturing of iron and still production both inside and outside industrial estates. Animal feed production uses some chemical and maximum portion of grain. Because of costly chemical use and high technology, animal feed production is expensive. Consequently, labour output of animal feed production is very large. In grain mill category, rice mill is only taken which is a solely concern with pealing out husk. Raw material of casting & manufacturing of iron and still production is very high. Hence, the labour productivity might have observed highest on those products.

It is observed that non-refectory clay and ceramic production has lowest output per employment following carpet & rugs, concrete production and others. It doesn't mean that labours of those sectors are less productive; rather, they are the items of different nature from various reasons. One, they are labour intensive; the other, they use cheap material input; and further, the produced goods have lower market price due to labour intensive production and cheaper material inputs. The other remarkable gesture perceived in ceramic output is lower by three percent inside industrial estates and on carpet production it is meagerly less. Observed carpet industries are hand loom, which do not consume electricity. Similarly, ceramic productions under this study use electricity only for hydraulic pressure which is less than ten percent work in the course of total production activities, as explained by producers. The other unexpected result is noticed on saw milling in which output per employment is lower by one percent inside estates. As it is said by the respondents of saw milling, they simply stay inside estates for lower rent and long contract. But, in terms of public contact for the demand of their production they are less visited. So, the lesser productivity might have occurred because of lower demand via decreased efficiency of labour. It means those industries which do not or rarely use electricity has higher labour output. Concrete production though it uses cheaper material and labour intensive, labour output is 20 percent

high inside industrial estates. But the final production process of concrete production is possible only in the presence of electricity. So, electricity might have reason behind to have higher productivity inside the industrial estates. Though the more rigorous aspect of production from the side of investor is profit, output measure also cannot be negate since the government looks from output side for the consideration of employment generation, collection of tax from transaction of output, contribution on GDP etc.

Output wage is another important measure looked upon from investor's view that they expect higher output with minimum wage possible. Grain mill, spinning, weaving & finishing of textile, animal feed, cement, concrete, lime & plaster, and plastic production have higher output wage ratio inside the industrial estates. However, it is contrary on carpet & rugs with clay & ceramic production. It is remarkably true that those industries that have higher per labour output and more capital intensive are better paid respective with labour intensive and per labour lower output industries. This situation is noticed in the case of industries inside and outside industrial estate seven thought the industries are similar. So, it can be concluded that 'higher the capital intensive industries are higher the output will be, higher the output will be higher the wage will be paid' but wage paid don't increase as there is increase in output and vice versa.

Table 3: Wage, Output and Employment Scenario of Categorical Industries

Types of Industries	Inside Industrial Estates		Outside Industrial Estates		Total Average	
	Output per Emp. ('000) NRs.	Output Wage Ratio	Output per Emp. ('000) NRs.	Output Wage Ratio	Output per Emp. ('000) NRs.	Output Wage Ratio
Grain Mill Products	5115 (27)	38.79 (22.2)	4012	31.75	4564	35
Spinning, Weaving, & Finishing of Textiles	1810 (23)	12.59 (15)	1475	10.95	1643	12
Carpet and Rugs	349 (-3)	3.57 (-2.5)	358	3.66	354	4
Saw Milling and Planning of Wood	2192 (-1)	14.45 (6.1)	2219	13.62	2206	14
Manuf. Of Plastic Product	2806 (1)	17.48 (4)	2769	16.80	2788	17
Non-refectory Clay & Ceramic Product	315 (0)	2.99 (-1)	316	3.02	316	3
Cement, Concrete, Lime & Plaster	777 (20)	5.26 (6.5)	646	4.94	712	5
Casting & Manuf. Of Iron & Steel	4907 (3)	24.79 (0.0)	4770	24.79	4839	25
Structural Metal Products	2042 (2)	9.34 (1.7)	2008	9.18	2025	9
Animal Feeds	11315 (10)	58.65 (9.5)	10247	53.54	10781	56

Note: Results on parenthesis denotes the percent difference noticed inside industrial estates w.r.t outside industrial estates

Sources: Author's calculation from Sample Survey, 2014.

Productivity Differences of Categorical Industries inside and Outside Industrial Estates

Labour productivity is observed highest on grain mill following animal feed, textile, plastic, structural metal production, casting &manufacturing of iron & steel, saw milling and subsequently on others. The highest labour productivity does not necessarily signify the contribution alone but it is simply the share of labour on output. Labour productivity may higher due to other cost of production mainly material input. Hence, the above mentioned ranking is due to the nature of different production that they have different cost of material input and different even in the capital that they use in production. The main concern of labour productivity is to observe its contribution differences on same nature of production. The importance of capital productivity is also related to find what sorts of manufacturing require more capital and which requires less. It is noticed that ceramic industries requires the very low capital and cement, concrete lime & plaster requires the most. Animal feed, plastic, casting & manufacturing of iron & steel, structural metal, textile, grain mills, and saw milling products require the subsequent capital in terms of value added.

Higher difference on labour and capital productivity is observed on clay & ceramic product in which labour productivity is 155.28 and capital productivity is 1.55. Similar condition is also noticed on saw milling that labour productivity is 259 and capital productivity is 1.22. Carpet and rugs production also have higher difference since labour productivity is 134.21 though the capital productivity is 0.44. Productions like animal feed, plastic production, structural metal production, textile production etc. have higher labour productivity while the capital productivity is lower. It notifies that labour intensive industries have lower value added per labour but higher value added in terms capital.

Labour productivity is observed higher inside industrial estates on structural metal, animal feeds, plastic, textile, cement concrete lime & plaster, casting & manufacturing of iron & steel, and grain mill products conversely lesser on carpets, saw milling and clay products. It is crystal clear that those industries that require electricity have higher labour productivity inside industrial estates in comparison to outside. This finding suggests the importance of electricity. Capital productivity is higher inside industrial estates on all products. The higher capital productivity inside the industrial estates definitely caused by reasonable value of land and physical infrastructural provided by the industrial estates. Capital productivity measure further assures the implication of industrial estates.

There is not any difference on input as percentage of output on grain mill production inside and outside in spite of labour and capital productivity. The higher labour productivity inside definitely signifies larger efficiency respecting outside. Larger capital productivity inside surely because of low rent and value of land in comparison to outside.

Input as percentage of output is higher inside the industrial estates on carpet, ceramic and saw signifying lower efficiency. The reason behind to have lower efficiency inside the estates might have been caused by so many reasons by the nature of production itself. For example carpet industry doesn't need electricity and it can be opened at any place for the convenience of low rent, availability of low cost labour etc. Similarly, ceramic production is more convenient at the place where there is availability of mud which reduces transportation cost. However, the saw milling case is somehow different; it requires market vicinity so that the demand increases. Higher demand invites higher level production which increases production efficiency.

Animal feed; casting & manufacturing of iron & steel; grain mill; saw milling; plastic; textile; and structural metal production have 93.96, 91.79, 86.40, 89.79, 77.45, 74.74, and 73.73 respective inputs as percentage of output. It means they require respective input to produce 100 outputs. Labour productivity is seen higher inside the industrial estates on seven different industries out of ten studied. Nonetheless, three industries; carpet, ceramic, and saw milling industries have lesser labour productivity inside the industrial estates. Productivity measure calculated on value added terms reassures that other than carpet, ceramic, and saw milling production, industrial estates are highly consequential. Higher, labour productivity inside the industrial might have discerned because of continuously working environment caused by regular electricity supply and many others like efficiency increased due to regular work, division of labour, chain effect of wage output i.e. higher the wage paid higher the eager will be for production up to a level of point (Barrow, R. J., & Sala-i-Martin X. 2004).

Higher difference in input as percentage of output is found on structural metal, following textile, plastic, cement concrete lime & plaster, animal feed, and casting & on casting & manufacturing of iron & steel production. Those industries that are more labour intensive and require less electricity are found better input efficiency outside industrial estates and vice versa. The more scrupulous efficiency can be viewed from value added ratio which comprises from profit aspects too. Nonetheless, from this analysis too, it can be said that power based industries are efficiently working inside industrial estates.

Input efficiency measured in value added terms is painstaking since value added contains difference in value of input and output. It is stable and robust in the sense of material input efficiently. Structural metal, plastic, animal feed, textile, and cement concrete lime & plaster production have higher material efficiency inside the industrial contrary to saw milling, carpet, and ceramic production have lesser. This result shows that the efficiency in the use of material input is higher inside the industrial estates to all those industries which have higher labour productivity. Only grain mill production shows no differences on input efficiency measures. Capital productivity is noticed higher on all kinds of production assuring that industrial estates are very striking for the efficient use of capital. Material input efficiency measure furthermore guarantees the implication of industrial estates. It means, Nepal should enlarge the area of industrial estates mainly with electricity facilitation to develop manufacturing industries.

Measurement of Efficiency differences inside and outside Industrial Estates.

Statistical significance of mean and variances show that there are strong evidences of differences on labour and capital productivity since the coefficients are significant at one percent level. The average labour productivity inside is 504.93 is and 293.79 at outside. Similarly, there is also significant difference on capital productivity at one percent level. The average capital productivity inside and outside industrial estate are 0.83 and 0.47 respectively. Higher labour and capital productivity inside the industrial estates might have been observed because of efficient working environment and various facilitations provided.

Table 4: Performance and Productivity Measures of Categorized Industries, 2014

Types of Industries	Inside Industrial Estates				Outside Industrial Estates				Total Average			
	L. Prod. ('000)	Cap. Prod. ('000)	Input as % of Output	Input Effi.	L. rod. ('000)	Cap. Prod. ('000)	Input as % of Output	Input Effi.	L. rod. ('000)	Cap. Prod. ('000)	Input as % of Output	Input Effi.
Grain Mill Products	695.73 (21.46)	1.22 (40.23)	86.40 (0.00)	0.14 (0.00)	572.82	0.87	85.72	0.14	634.28	1.05	86.06	0.14
Spinning, Weaving, & Finishing of Textiles	655.03 (60.73)	0.75 (78.57)	63.80 (-11.8)	0.36 (28.57)	407.53	0.42	72.37	0.28	531.28	0.59	68.09	0.32
Carpet and Rugs	129.29 (-7.07)	0.46 (9.52)	62.96 (3.03)	0.37 (-5.13)	139.13	0.42	61.11	0.39	134.21	0.44	62.04	0.38
Saw Milling and Planning of Wood	223.76 (-23.96)	1.25 (5.04)	89.79 (3.52)	0.10 (-23.08)	294.26	1.19	86.74	0.13	259.01	1.22	88.27	0.12
Manuf. Of Plastic Product	632.84 (74.60)	0.50 (92.31)	77.45 (-10.9)	0.23 (76.92)	362.46	0.26	86.91	0.13	497.65	0.38	82.18	0.18
Non-refectory Clay & Ceramic Product	153.48 (-2.29)	1.85 (49.19)	51.34 (2.19)	0.49 (-2.00)	157.07	1.24	50.24	0.50	155.28	1.55	50.79	0.50
Cement, Concrete, Lime & Plaster	208.86 (39.61)	0.25 (8.70)	73.13 (-4.84)	0.27 (17.39)	149.60	0.23	76.85	0.23	179.23	0.24	74.99	0.25
Casting & Manuf. Of Iron & Steel	402.97 (23.41)	0.37 (42.31)	91.79 (-1.47)	0.08 (14.29)	326.53	0.26	93.16	0.07	364.75	0.32	92.48	0.08
Structural Metal Products	515.89 (91.77)	0.46 (31.43)	74.74 (-13.7)	0.25 (92.31)	269.02	0.35	86.60	0.13	392.46	0.41	80.67	0.19
Animal Feeds	683.23 (78.39)	0.30 (57.89)	93.96 (-2.39)	0.06 (50.00)	383.00	0.19	96.26	0.04	533.12	0.25	95.11	0.05

Note: Results on parenthesis denotes the percent difference noticed inside industrial estatesw.r.t outside industrial estates
Sources: Author's calculation from Sample Survey, 2014.

The hypothesis input as percentage of output is smaller inside industrial estates is also proved by statistical significance at five percent level. Since lesser the value signify higher the efficiency, industrial estates are meaningful in terms of input output gap too. Input as percentage of output inside industrial estates is 76.18; however, it is 82.56 at outside. It means 76.18 inputs are used to produce 100 outputs inside industrial estates but at outside 82.56 inputs are used to produce the same level of output. Similarly, material efficiency (i.e. value added output ratio) is 0.24 inside and it is 0.17 outside which is assured by statistical significance too. It means, materials inputs are efficiently used inside industrial estates respecting with outside.

Table 5: Mean and Variance difference inside and outside Industrial Estates, 2014

Variables	Mean Inside (2-tail)	Mean Outside (2-tail)	Coefficient of Variation Inside	Coefficient of Variation Outside	Difference Between Mean test(1-tail)	Difference Between Mean test (1-tail)
Labour Productivity	504.93 (10.43***)	293.79 (10.21***)	0.69	0.71	3.73***	2.83***
Capital Productivity	0.83 (8.17***)	0.47 (6.95***)	0.88	1.04	2.92***	3.16***
Input as % of Output	76.18 (33.36***)	82.56 (39.80***)	0.18	0.22	-2.07**	1.79**
Material Efficiency	0.24 (10.44***)	0.17 (8.41***)	0.69	0.86	2.07**	1.79**
Value Added	7269.98 (5.67***)	1621.87 (3.53**)	1.27	2.5	2.50**	1.88**

Note: * Significant at ten percent level, ** Significant at five percent level, ***significant at one percent level (Results on parentheses are t-statistics of coefficients. Since, probability of one tail test is half of probability of two tail test all the coefficients of mean difference and variance difference are significant at less than 5 % probability.)

Sources: Authors estimation from Sample Survey, 2014

It was hypothesized that there is less variability on indicators like labour productivity, capital productivity and so forth on the industries inside industrial estates. As per expectation, it is statistically proven that the various forms of measurement indicators are less scattered inside industrial estates respecting outside. It guarantees that industries inside industrial estate are less risky than industries residing outside.

Conclusion

A better situation of industries has been observed inside industrial estates as evidenced by higher capital utilization, higher output per capital, higher output per employment and higher output wage ratio.

Grain mill, spinning, weaving & finishing of textile, animal feed, cement, concrete, lime & plaster, and plastic production comprise higher output wage ratio inside the industrial estates though it is contrary on carpet & rugs with clay & ceramic production. It is observed that higher the capital intensive industries are, higher the output will be and higher the wage will be paid. Carpet, saw milling and ceramic industries have no importance of industrial estates because carpet industry doesn't need electricity and it can be opened at any place for the convenience of low rent, availability of low cost labour etc; ceramic production is more convenient at the place where there is availability of mud which reduces transportation cost; saw milling requires market vicinity so that the demand increases. But, Grain mill products,

textile, plastic, cement concrete lime and plaster, animal feed, casting & manufacturing of iron & steel, and structural metal industries have importance in view of the fact that those industries are found higher output per employment, higher output per capital, higher labour productivity and higher capital productivity inside the industrial estates. Higher efficiencies inside the industrial estates are noticed on those industries which cannot be operated in the absence of electricity. Hence, it is primarily suggested to have the right of entry to only those manufacturing which are capital intensive in nature and consume more electricity.

Higher capital utilization inside the estates may because of continuous electricity supply. Larger capital efficiency inside the estates might not have resulted because of operating capital rather due to the effect of fixed capital like land and buildings which are expensive outside. Low difference in input as percentage of output might have happened because of costly materials that are under selection of this study. Industries inside the industrial estates are less risky compared to industries outside as it is depicted by less scattered mean and variance. Since, almost all the indicators ascertain the importance of industrial estates, it is suggested to enlarge and develop the industrial estates at least with existing amenities.

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