ESTIMATING AVAILABILITY OF MIDDLE LEVEL SKILLED MANPOWER

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ABSTRACT
The economic reform policies are being introduced in India in phases since 1990. It demands for competent middle level skilled manpower in country. By keeping this in mind, National Council for Education, Research and Training (NCERT), New Delhi, India introduces a revised policy in 1992 and promotes vocational education. Today, several institutions are offering vocational education in almost all parts of India. In this paper we have used multiple regression technique to estimate availability of middle level skilled manpower in certain part of India. This estimation is useful to Government agencies and Industries.

Key Words: Vocational Education; Regression Technique; Statistical Technique.

INTRODUCTION

Vocationalisation of education implies an organized way of developing job related skills. It aims at laying foundations for the world of work. UNESCO associates Vocational Education (VE) with the upper secondary stage of education and defines as education designed to prepare skilled personnel at lower level of qualifications for one or group of occupations, traders or jobs [1]. The National Policy on Education of India [2] made revolutionary changes in education system.

1. The education structure is reorganized into 10+2+3 pattern.
2. Promotion of vocational education at +2 stage.

In pursuance to this, NCERT gave a scheme for introduction of vocational education. It was first introduced at higher secondary level in 1976-77. A Centrally Sponsored Scheme (CSS 1988) was introduced in 1988. This policy was further revised by NCERT in 1992, keeping in mind growing need of skilled manpower. Today, the economy of India is growing at the rate of 8% and because of 'Globalisation' several industries are opening up, even in rural part of India.

Regression analysis is a statistical technique primarily used for prediction of a value of variable. It can be used to analyze the relationship between single dependent variable and several independent variables. It can be used in Educational Science as well [3]. The availability of middle level skilled manpower can be estimated by using this technique. For this purpose, we have considered a case study of five districts of Marathwada region, Maharashtra State, India.

DATABASE

The estimated middle level skilled manpower are those students who are appearing for their final course of vocational education. A data of five districts of Marathwada, viz. Aurangabad (1), Beed (2), Parbhani (3), Jalna (4), and Hingoli (5) is collected. The data contains number of students studying vocational course, total number of students studying at +2 stage, and number of institutions offering education at +2 stage.

Dependent variable: Number of students studying vocational course (X_1).
Independent variables: Total number of students studying at +2 stage (X_2) and number of institutions offering +2 education (X_3).

The data collected shows the status of March 2005 [4]. Table 1 shows the database.

District Code	X_1	X_2	X_3
1	1824	30743	126
2	1573	27721	133
3	342	9494	65
4	209	12311	52
5	277	4408	28

Table 1: Database

SETTING A BASELINE: PREDICTION WITHOUT AN INDEPENDENT VARIABLE
Baseline prediction can be done by computing mean of the dependent variable. The regression equation can written as:

Predicted middle level skilled manpower = Average of X_1.

Table 2 shows the baseline prediction.

District Code	X_1	Baseline Prediction	Prediction Error	Prediction Error Squared
1	1824	845	979	958441
2	1573	845	728	529984
3	342	845	-503	253009
4	209	845	-636	404496
5	277	845	-568	322624
Total	4225		0	2468554

Table 2: Baseline Prediction

From the table 2 we observe that sum of squared errors is 2468554. This error can be minimised by simple and multiple regression.

SIMPLE REGRESSION
The prediction can be further improved by considering any independent variable. For this, we have to select 'best' independent variable among the two independent variables. Table 3 shows the correlation matrix between X_1, X_2 and X_3.

Variable	X_1	X_2	X_3
X_1	1.00		
X_2	0.962663	1.00	
X_3	0.948690	0.971592	1.00

Table 3: Correlation Matrix

From Table 3, we observe that, variable X_2 has highest correlation to dependent variable X_1. Therefore, simple regression equation can be set as:

$$X_1 = b_0 + b_1X_2$$

In this regression equation b_0 is intercept and b_1 is slope. They can be find out by using mathematical procedure known as least squares [5]. By using 'MS Excel' program they are computed as:

$b_0 = -256.598000$ $\quad$ $b_1 = 0.065047$

$$X_1 = -256.598+0.065047X_2$$

Table 4 shows the simple regression results.

District code	X_1	X_2	Simple Regression Prediction	Prediction Error	Prediction Error Squared
1	1824	30743	1743.14400	80.85639	6537.7570
2	1573	27721	1546.57100	26.42857	698.4693
3	342	9494	360.95890	-18.95890	359.4401
4	209	12311	544.19640	-335.19600	112356.7000
5	277	4408	30.12962	246.87040	60944.9800
Total				2.27E-13	180897.3

Table 4 : Simple Regression Results

Observe that compared to baseline prediction, sum of squared error decreases to 180897.3. The strength of relationship can be given by R^2. The value of R^2 is:

$$R^2 = 0.926719$$

This indicates that 92% of variation in dependent variable is explained by independent variable X_2. Figure 1 shows simple regression along with trend line.

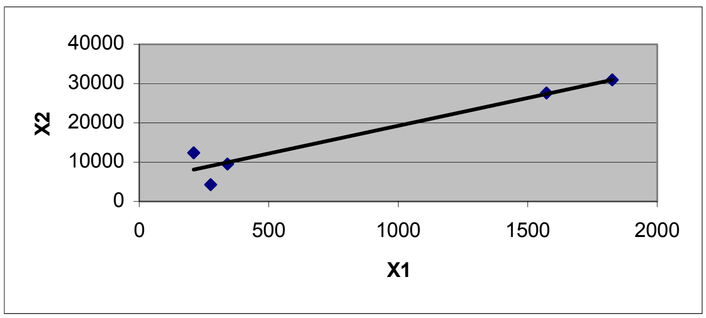

Figure 1: Simple regression

MULTIPLE REGRESSION

Prediction can be further improved by using another variable X_3. The equation for multiple regression can be written as:

$$X_1 = b_0 + b_1 X_2 + b_2 X_3$$

The values of b_0, b_1 and b_2 can be found out by using least squares method [5]. In 'MS Excel', they are compured as:

$b_0 = -317.378$ $b_1 = 0.04937$ $b_2 = 4.037619$

$$X_1 = -317.378 + 0.04937 X_2 + 4.037619 X_3$$

Table 5 shows results of multiple regression.

District code	X_1	X_2	X_3	Multiple Regression Prediction	Prediction Error	Prediction Error Squared
1	1824	30743	126	1709.18	114.8199	13183.62
2	1573	27721	133	1588.248	-15.2476	232.4888
3	342	9494	65	413.8245	-71.8245	5158.763
4	209	12311	52	500.4105	-291.41	84920.06
5	277	4408	28	13.33737	263.6626	69517.98
Total					-192.725	173012.9

Table 5: Results of Multiple Regression

Observe that sum of squared error is reduced to 173012.9. The variable X_3 is much similar to that of X_2, hence prediction is little improved.

CONCLUSIONS

By using multiple regression technique it is possible to predict the availability of middle level skilled man power. Such type of work is useful for Government for planning of vocational education. When an industry goes to open a plant in certain region of the country, it can estimate for availability of skilled manpower.

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