Impacts of Various Aspects on Industrial Performance Enhancing Productivity

Dr.T.B.Pankhania, V.K.Modi

Abstract—The study was carried out at Vitthal Udyognagar in Anand district of Gujarat India, where more than 1000 industries are working. The majority units are in small scale. The estate is surrounded by two educational townships considered as hubs of educations. The statistical analysis was conducted to uncover the factors which describe the scenarios and suggest means and measures to evaluate industrial performance of the industries of the estate. A structured questionnaire was used with 13 closed ended questions. The Likert scale was used to know the level of agreement of the employees’ about the effects of various aspects on industrial performance which contribute to higher industrial productivity.

Index Terms- Estate, Productivity, Questionnaire, Scenario.

I. INTRODUCTION

The technology has been playing a dominant role for the growth and prosperity of human race. The twentieth century witnessed the phenomenal growth in physical sciences spawning huge industrial activities. New technologies reflect the fact that these are at the very core of the new technological paradigm. Developments in microelectronics and information technology have fundamentally changed industrial and service scenario and directly affected almost everybody’s life and work. The developing world must understand the huge prospects of these emerging technologies so as to derive maximum benefits and thereby develop the quality of life of common masses by improving industrial performance and higher productivity to enhanced living standard.

II. OBJECTIVES OF THE STUDY

The primary objective of this research was to know the status of the existing situations and to assess the effects of various aspects on industrial performance which are responsible to enhance industrial productivity in the context of the changing industrial scenario of the industrial units of estate under consideration for this research study.

III. RESEARCH METHODOLOGY

The present study was conducted in industrial estate of Anand district of Gujarat India. The estate was established some times in 1965. At present 1000 odd units are working and more than 25000 jobs are created at different levels. The units were selected from the members’ directory published by Vitthal Udyognagar Industries Association (VUIA). 250 Questionnaires were distributed / posted. The questionnaires were checked for incompleteness, inconsistent, and ambiguous responses. The questionnaires were discarded with unsatisfactory responses, 94 questionnaires were not included in the sample. Of 250 questionnaires 156 found usable for analysis and have resulted in final sample size. The data were cleaned by identifying out-of-range and logically inconsistent. The responses were considered from usable questionnaires and responses 62.40% which are considered acceptable for the research study and analysis. The data was collected using five point Likert scale from highly dissatisfaction (1) to highly satisfactory (5). These data were analyzed using SPSS 17.0 software for the various statistical analysis to draw an appropriate conclusion.

IV. STATISTICAL ANALYSIS

SPSS software was used to carry out various statistical analyses to evaluate the various aspects which are influencing industrial performance. Frequency distribution was carried out to know the demographic details. In research survey, there may be a large number of variables, most of which are correlated and which must be reduced to a manageable level. Relationships among sets of many interrelated variables are examined and represented in terms of a few underlying factors. Factor analysis allows us to look at groups of variables that tend to be correlated to each other and identify underlying dimension that explain the correlations. For these features, factor analysis was performed in this study. One of the most widely used interdependency techniques for data reduction and to uncover underlying factors is factor analysis. Prior to this questionnaire was checked for reliability and for that Cronbach’s alpha measure 0.775 is calculated and it is found acceptable, hence questionnaire is reliable for further analysis statistical analysis[1-6].

V. DEMOGRAPHIC CHARACTERISTICS

The respondents: The number of male respondents in the survey were 150(96.20%) and 6(3.80%) were female respondents.

Respondents’ work experience: The highest work experience 39.70% between 10-20 years, 23.70% between 21-30 years, 23.10% less than 10 years, 12.20% of respondents were above 30 years of experience and only 1.30% respondents were of age group more than 40 years have participated in this study.

Category of the company: As mentioned earlier majority units are in small scale. In this survey 70.51% (110) are in small scale, 19.23% (30) in medium scale and only 10.26% (16) large scale units have participated and provided relevant data for this research study.
Sector of the company: Out of 100% respondents (156 units sample size), 89.20% of units in private sector, 5.10% of public sector, only 0.60% government units, while 5.10% were others have participated and supplied data for the analysis.

Classification of the industry: Estate under study was dominated by 68.30% (105) engineering units, the other classified units were very few in the dedicated sample: 3.80% electrical/electronics, 5.80% paints, varnishes and 3.20% chemicals industries. Remaining miscellaneous units amount 19.90% of the total, have participated in research study.

ISO Certificate: The 25% of respondent industries having ISO Certificates. 75.00% of industries were without ISO Certificates have participated in this study.

Man Power: Out of 156 representative industries and total employee 12092, 97.59% male employees and only 2.41% female employees in the industries of the sample considered.

Technical collaboration: 82.70% of industries do not have any technical collaboration with third party either nationally or internationally, only 17.30% industries do have technical collaboration and have responded to the questionnaire.

VI. AN INDEX OF RELIABILITY
Reliability comes to the forefront when variables developed from summated scales are used as predictor components in objective models. Since summated scales are an assembly of interrelated items designed to measure underlying constructs, it is very important to know whether the same set of items would bring out the same responses if the same questions are recast and re-administered to the same respondents. Variables derived from test instruments are declared to be reliable only when they provide stable and reliable responses over a repeated administration of the test. An effective tool for measuring reliability is Cronbach’s alpha, which is a numerical coefficient of reliability. Alpha coefficient ranges in value from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous and/or multi-point formatted questionnaires or scales (i.e., rating scale: 1 = poor, 5 = excellent). The higher the score, the more reliable the generated scale, alpha value 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. If the scale shows poor reliability, then individual items within the scale must be re-examined and modified or completely changed as needed [19].

VII. AN INDEX OF CORRELATION
The degree of correlation is measured by the coefficients of correlation. It is a measure or index, which speaks the magnitude of relationship between two variables. At the same time correlation coefficient also provides information about the direction of the relationship (whether it is negative or positive). It varies between −1 and +1 keeping 0 in the centre. The broad categories in which this can be classified are given below. Correlation matrix shows the relationship among the attributes which contribute to higher industrial productivity. The degree of correlation is measured by the coefficients of correlation [18].

VIII. MODEL FITNESS MEASURE
Model fitness: Correlation matrix, Reproduced correlations and Residuals are known with the help of SPSS and it is observed that there are 17(21%) non redundant residuals with absolute values greater than 0.05. Lower the percentage of ‘the non-responder residuals with absolute values greater than 0.05’, higher is the acceptability of the model fit. Here 21% is low percentage, so the model is considered as a good fit and acceptable. The data explain the substantially because the number of ‘the non-redundant residuals with absolute values greater than 0.05 is less than 50 percent [3].
The results of factor analysis shows grouping of variables in to four extracted factors. The variables that are retained with communalities greater than 0.50. The means and standard deviations give useful interpretations about the perceptions of the respondents and its deviations. Further table gives the variance explained = 79.169% which is more than 60%. The KMO value = 0.792 which is greater than 0.50 allows us to carry out statistical analysis as it shows sample adequacy for statistical tests [Table III].

![Scree Plot](image_url)

Fig.1 Scree plot is also used to find the number of factors. The scree plot confirms four factors at the scree of the plot [Fig.1].
Statistical analysis shows correlations between variables. For example there is no correlation between training and development (V10) and positive feedback (V6). There is positive high correlation (0.88) between immediate supervisor’s feedback (V2) and T&D (V12) and positive feedback (V6). This measures show variables closeness and their contribution to higher industrial performance and productivity [Table IV].

**TABLE V. ANOVA**

<table>
<thead>
<tr>
<th>Sources of Variation</th>
<th>Sum of Squares</th>
<th>DF: Degree of Freedom</th>
<th>Mean Square</th>
<th>F Ratio</th>
<th>F Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between People</td>
<td>543.489</td>
<td>155</td>
<td>3.506</td>
<td>49.238</td>
<td>0.000</td>
</tr>
<tr>
<td>Within People</td>
<td>465.284</td>
<td>12</td>
<td>38.774</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>1464.716</td>
<td>1860</td>
<td>0.787</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1930.000</td>
<td>1872</td>
<td>1.031</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Mean</td>
<td>2473.489</td>
<td>2027</td>
<td>1.220</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ANOVA shows F(49.238) and from the statistical tables we see that for 155 and 12 degrees of freedom, the critical value of F is 2.40 for α = 0.05. Because the calculated value of F is greater than the critical value, we reject null hypothesis. As the associated probability is less than the significance level of 0.05, the null hypothesis for equal means is rejected [Table V].

**TABLE VI. TEST STATISTICS**

<table>
<thead>
<tr>
<th>Chi-Sq.</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.86</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>68.17</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>69.58</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>80.99</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>107.53</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>100.41</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>410.15</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>316.97</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>336.51</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>249.58</td>
<td>3</td>
<td>0.000</td>
</tr>
<tr>
<td>363.19</td>
<td>3</td>
<td>0.000</td>
</tr>
<tr>
<td>56.64</td>
<td>3</td>
<td>0.000</td>
</tr>
<tr>
<td>67.91</td>
<td>4</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The Chi-square statistic is used to test statistical significance of the observed association. It assists us in determining whether a systematic association exists between two variables or not. The null hypothesis shows that there is no association between the variables [Table VI].

**TABLE VII. Extracted Factors and Their Names**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Factor Name</th>
<th>Factor Description</th>
<th>Variables associated with factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coaching</td>
<td>T&amp;D boosts</td>
<td>The employees’ involvement in decision making help to improve efficiency,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Performance</td>
<td>T&amp;D. Programme arranged in organization helps improve employees’ productivity,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T &amp; D helps to improve industrial performance,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T &amp; D helps to improve effectiveness and efficiency of the organization,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T &amp; D. is essential for betterment of present and future job performance</td>
</tr>
<tr>
<td>2</td>
<td>Strategy</td>
<td>Strategic decision</td>
<td>The strategic directions from management help to improve performance,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>boosts Productivity</td>
<td>Immediate supervisor’s feedback that helps to improve my performance, Coaching and</td>
</tr>
</tbody>
</table>
IX. LIMITATIONS OF THE STUDY

The limitations in data collection were many like:

- Non-availability of some secondary data.
- Responses with reservation caused limited co-operation from some of the respondents. Top level, middle level and lower-level officials, employees responded differently and might have added little or more bias.
- The postponements of the responses were time consuming and tiresome due to busy schedule or unwillingness to disclose certain information by the respondents.
- The investigator was thought to be an industry - agent or a government authority in spite of avowal was given, so extracting information was difficult initially, too much time was consumed in convincing them for the purpose of the research study.
- The time factors and poor awareness of some respondents were other limitations.
- The supervisors and technicians were scared about the disclosing problems they are facing at workplace.

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REFERENCES


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171