CHAPTER IV – DATA ANALYSIS, DISCUSSION & INTERPRETATION

4.0 Preview

Primary data has been collected from IT companies to find the answers to research questions, to test the hypothesis and to analyze the objectives. This chapter applies the theoretical framework to the research study. The research findings are interpreted from questionnaire feedbacks and from the initial research questions established in Chapter 3. The findings in this chapter focus on Competency Based Performance Measures / Management (CBPM).

Impact of competency based performance management on an individual as well as organization as a whole is studied in this chapter. Further, managerial performance based on competency measures is analyzed against traditional human capital management. Research questions are analyzed and inferences are drawn. In the first part of this chapter Reliability and Validity check is done for collected primary data before taking it for the analysis. KS Test (Kolmogorov-Smirnov Test) is used to see normality of distribution. Further, Run Test is used to see the cases of sample orders in random fashion.

Statistical methods are used to analyze the primary data in the second part of this chapter. The hypotheses are tested using Chi-square, ANOVA Tests. Factor Analysis is used to examine the pattern of inter-correlations between the variables (competency and performance), and also to determine whether there are subsets of variables (or performance) that correlate highly with each other, but also those show low correlations with other subsets (or performance). Path analysis has been done to provide estimates of the magnitude and significance of hypothesized causal connections between CBPM and Business Performance parameters. Interpretive Structural Modeling (ISM) methodology is used to evolve the mutual relationships among Business Performance parameters.

Detailed analysis and findings are also presented in this chapter. These findings are drawn from the primary data collected by the researcher (please refer to Annexure 1- Questionnaire).
4.1 Data Validation

Before going for analyzing the primary data, the data was validated and checked for consistency. Reliability Analysis test, Kolmogorov-Smirnov Test (KS Test) and Randomness test are used to validate the data.

4.1.1 Reliability Analysis

Reliability Analysis has been used to check the internal consistency of instrument (Questionnaire) used for collection of primary data from IT companies. Cronbach’s alpha can be considered as an adequate index of the inter-item consistency & reliability of independent and dependent variables if those constructs have reliability values of 0.7 or greater. Following are the details of Reliability Analysis (scale Alpha) test applied to assess quality of the instrument (questionnaire) used for this research study. The Reliability Analysis shows that Cronbach’s Alpha = 0.934. Since this is greater than 0.7 there is internal consistency in the instrument (i.e. questionnaire). The details are given below (for total number of respondents n = 313).

### Table No. 4.1 Reliability Statistics Results

<table>
<thead>
<tr>
<th>Cronbach's Alpha value</th>
<th>N (Number of Items) = Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.934</td>
<td>48</td>
</tr>
</tbody>
</table>

### Table No.4.2 Item Total - Cronbach's Alpha Statistics

(Questionnaire question wise : Yes/No and Likert Scale Rate)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
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<tbody>
<tr>
<td>Management Level</td>
<td>139.99</td>
<td>513.307</td>
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<tr>
<td>CBPM Impact on Individual Perfor.(Q1, Y/N))</td>
<td>140.75</td>
<td>506.113</td>
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<td>0.934</td>
</tr>
<tr>
<td>CBPM Impact on Individual Perfor. (Q1, Likert Scale)</td>
<td>138.51</td>
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<td>486.162</td>
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<td>478.944</td>
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</tbody>
</table>
4.1.2 KS Test (Kolmogorov-Smirnov Test) for Normal Distribution Analysis

KS Test is used to test whether variables are distributed according to a normal distribution, a Poisson curve, a uniform or an exponential distribution. The purposes of this test is to check for distributional accuracy. Following Table (Table No.: 4.3) shows KS Test results:

Table No.: 4.3 One-Sample Kolmogorov-Smirnov Test

<table>
<thead>
<tr>
<th>Particulars</th>
<th>N</th>
<th>Normal Parameters(a,b)</th>
<th>Most Extreme Differences</th>
<th>Kolmogorov-Smirnov Z</th>
<th>Asymp Sig. (2 tailed)</th>
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<td>5.403365</td>
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<td>Type of IT Organization</td>
<td>313</td>
<td>2.8051 1.72008</td>
<td>0.1980 0.1980 -0.143</td>
<td>3.504007</td>
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<tr>
<td>CBPM Impact on Individual Perfor. (Q1, Y/N))</td>
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<td>1.0287 0.16738</td>
<td>0.5394 0.5394 -0.431</td>
<td>9.543728</td>
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<tr>
<td>CBPM Impact on Individual Perfor. (Q1, Likert Scale)</td>
<td>313</td>
<td>3.2715 1.05599</td>
<td>0.282 0.2036 -0.282</td>
<td>4.989088</td>
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<tr>
<td>CBPM Impact on Managerial Perfor. (Q2, Y/N)</td>
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<td>1.1150 0.32942</td>
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<td>CBPM Impact on Business Perfor. (Q3, Y/N)</td>
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<td>CBPM on Revenue Growth (Q4a, Financial)</td>
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<td>Process)</td>
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<td>CBPM on Project Delivery Process (Q4a, Internal Business Process)</td>
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<tr>
<td>CBPM on Customer Satisfaction (Q4d, Customer Related)</td>
<td>313</td>
<td>3.3642</td>
<td>0.97809</td>
<td>0.2362</td>
<td>0.2362</td>
</tr>
<tr>
<td>CBPM on Innovation (Q4d, Internal Business Process)</td>
<td>313</td>
<td>3.2300</td>
<td>0.93273</td>
<td>0.2235</td>
<td>0.2235</td>
</tr>
<tr>
<td>CBPM on Project Delivery Process (Q4d, Internal Business Process)</td>
<td>313</td>
<td>3.1789</td>
<td>0.90578</td>
<td>0.2556</td>
<td>0.2556</td>
</tr>
<tr>
<td>CBPM on Employee Retention (Q4d, Learning &amp; Growth)</td>
<td>313</td>
<td>3.1022</td>
<td>0.99151</td>
<td>0.2024</td>
<td>0.2024</td>
</tr>
<tr>
<td>CBPM on Employee Productivity (Q4d, Learning &amp;</td>
<td>313</td>
<td>3.1565</td>
<td>0.98925</td>
<td>0.2018</td>
<td>0.2018</td>
</tr>
<tr>
<td>CBPM on Cost Reduction (Q4e, Financial)</td>
<td>313</td>
<td>2.7252</td>
<td>0.94117</td>
<td>0.2012</td>
<td>0.2012</td>
</tr>
<tr>
<td>CBPM on Revenue Growth (Q4e, Financial)</td>
<td>313</td>
<td>3.0351</td>
<td>0.94158</td>
<td>0.2081</td>
<td>0.2081</td>
</tr>
<tr>
<td>CBPM on Market Share (Q4e, Customer Related)</td>
<td>313</td>
<td>2.7667</td>
<td>0.96737</td>
<td>0.2300</td>
<td>0.2300</td>
</tr>
<tr>
<td>CBPM on Customer Satisfaction (Q4e, Customer Related)</td>
<td>313</td>
<td>3.3322</td>
<td>0.88694</td>
<td>0.2498</td>
<td>0.2498</td>
</tr>
<tr>
<td>CBPM on Innovation (Q4e, Internal Business Process)</td>
<td>313</td>
<td>3.3482</td>
<td>0.86795</td>
<td>0.2177</td>
<td>0.2117</td>
</tr>
<tr>
<td>CBPM on Project Delivery Process (Q4e, Internal Business Process)</td>
<td>313</td>
<td>3.2555</td>
<td>0.91908</td>
<td>0.2229</td>
<td>0.2229</td>
</tr>
<tr>
<td>CBPM on Employee Retention (Q4e, Learning &amp; Growth)</td>
<td>313</td>
<td>3.1757</td>
<td>0.97292</td>
<td>0.2074</td>
<td>0.2074</td>
</tr>
<tr>
<td>CBPM on Employee Productivity (Q4e, Learning &amp; Growth)</td>
<td>313</td>
<td>3.1597</td>
<td>0.99681</td>
<td>0.1866</td>
<td>0.1866</td>
</tr>
</tbody>
</table>

**Analysis**

It is clear from the above test result that since the p-value (Asymptotic Sig (2-tailed)) is less than 0.05, data distribution is across a Normal Curve.
4.1.3 Run Test

Run Test is used to see if the cases of samples are orders in random fashion. Following table (table No. 4.4) shows the result of run test.

**Table No.4.4 Run Test**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Value(a)</td>
<td>1.03</td>
<td>3.27</td>
<td>1.12</td>
<td>2.96</td>
<td>1.06</td>
<td>3.27</td>
</tr>
<tr>
<td>Cases &lt; Test Value</td>
<td>304</td>
<td>148</td>
<td>278</td>
<td>98</td>
<td>296</td>
<td>139</td>
</tr>
<tr>
<td>Cases &gt;= Test Value</td>
<td>9</td>
<td>165</td>
<td>35</td>
<td>215</td>
<td>17</td>
<td>174</td>
</tr>
<tr>
<td>Total Cases</td>
<td>313</td>
<td>313</td>
<td>313</td>
<td>313</td>
<td>313</td>
<td>313</td>
</tr>
<tr>
<td>Number of Runs</td>
<td>19</td>
<td>157</td>
<td>58</td>
<td>137</td>
<td>31</td>
<td>153</td>
</tr>
<tr>
<td>$Z$</td>
<td>0.539</td>
<td>-0.004</td>
<td>-1.482</td>
<td>0.180</td>
<td>-1.202</td>
<td>-0.292</td>
</tr>
<tr>
<td>Asymptotic Sig. (2-tailed)</td>
<td><strong>0.590</strong></td>
<td><strong>0.997</strong></td>
<td><strong>0.138</strong></td>
<td><strong>0.857</strong></td>
<td><strong>0.229</strong></td>
<td><strong>0.771</strong></td>
</tr>
</tbody>
</table>

**Analysis**

The analysis shows impact of CBPM on Individual, Managerial and Organizational Performance, including the rating in each of these 3 (which was the subsection in the questionnaire), is in random fashion and is having significant values (i.e. Asymptotic Sig. (2 – tailed) greater than 0.05). This indicates and confirms that the samples have been randomly chosen for collecting the primary data.

4.2 Data Presentation and Analysis

4.2.1 Vertical-wise details of IT companies

Primary data was collected from IT companies in Pune region. All types of software verticals from IT sector have been considered for this study. Sample of 313 respondents are taken for study. A care has been taken to ensure that sample size represents all the
software verticals falling in IT sector for this study. Following table (Table No.: 4.5) shows types of organizations which participated in this study.

**Table No.: 4.5 Vertical-wise details of IT companies which participated in Study**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Vertical of IT sector</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Software Products</td>
<td>107</td>
</tr>
<tr>
<td>2</td>
<td>IT Engineering, Tools and R&amp;D services</td>
<td>49</td>
</tr>
<tr>
<td>3</td>
<td>ITES/BPO (IT-enabled services/BPO)</td>
<td>43</td>
</tr>
<tr>
<td>4</td>
<td>Hardware</td>
<td>42</td>
</tr>
<tr>
<td>5</td>
<td>IT services</td>
<td>58</td>
</tr>
<tr>
<td>6</td>
<td>All IT Verticals</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>313</td>
</tr>
</tbody>
</table>

CBPM Model is implemented by each vertical in the IT Industry. CBPM model leads to different results for different software verticals. Following table (table No.: 4.6) shows IT Sector vertical wise impact of CBPM on Business Performance.

**Table No.: 4.6 IT sector vertical wise impact of CBPM on Business Performance (Descriptive Statistics)**

<table>
<thead>
<tr>
<th>S No</th>
<th>Vertical of IT sector</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Software Products</td>
<td>4279</td>
<td>3.12</td>
<td>0.934</td>
<td>0.014</td>
<td>3.09</td>
<td>3.14</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>IT Eng. Tools and R&amp;D services</td>
<td>1960</td>
<td>3.09</td>
<td>1.018</td>
<td>0.023</td>
<td>3.04</td>
<td>3.13</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>ITES/BPO</td>
<td>1720</td>
<td>3.48</td>
<td>1.058</td>
<td>0.026</td>
<td>3.42</td>
<td>3.53</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Hardware</td>
<td>1680</td>
<td>2.80</td>
<td>0.715</td>
<td>0.017</td>
<td>2.77</td>
<td>2.83</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>IT Services</td>
<td>2319</td>
<td>3.01</td>
<td>0.930</td>
<td>0.019</td>
<td>2.97</td>
<td>3.05</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>All Above</td>
<td>562</td>
<td>3.35</td>
<td>0.967</td>
<td>0.041</td>
<td>3.27</td>
<td>3.43</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>12520</td>
<td>3.11</td>
<td>0.959</td>
<td>0.009</td>
<td>3.09</td>
<td>3.13</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
Following table (Table No. 4.7) shows ANOVA results of Software industry vertical wise impact of CBPM on Business Performance.

Table No.: 4.7 ANOVA Results of Software industry vertical wise impact of CBPM on Business Performance

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Between Groups</td>
<td>448.554</td>
<td>5</td>
<td>89.711</td>
<td>101.384</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>Within Groups</td>
<td>11073.096</td>
<td>12514</td>
<td>0.885</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td>11521.650</td>
<td>12519</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Above analysis shows:
1) All the software verticals agree that CBPM has an impact on Business Performance (average mean on a Likert’s Scale of 1 to 5 is 3.11).
2) Respondents from ITES and BPO verticals say that CBPM leads to more impact on Business Performance (mean is 3.48) whereas respondents from Hardware vertical indicate less impact (mean is 2.80).
3) All the verticals are not showing similar impact. (since Significance is 0.000)
So, it can be concluded all the software verticals agree that CBPM has an impact on Business Performance, but with a varying degree within the verticals.

4.2.2 Hierarchical Level of Respondents

Competency Based Performance Management (CBPM) model takes care of all levels of employees under its preview. Employees with following designation of IT organization are grouped under hierarchical levels in the table (Table No.: 4.8):
Table No.: 4.8 Hierarchical Grouping of the respondents

<table>
<thead>
<tr>
<th>Lower Level Management</th>
<th>Middle Level Management</th>
<th>Top Level Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Administrator, Network engineer, Consultant, System Administrator, Project Coordinator, Programmer Analyst, Project Associate, System Engineer</td>
<td>Manager, Project Manager, Team Lead, Principal Consultant, Project Lead, Senior Project Manager, Operation Manager, Senior Engineer, Regional Manager, Group Leader, Senior Software Developer</td>
<td>Program Manager, General Manager, Vice-President, Chairman, Managing Director, Executive Director, SBU Head, Vertical Head, Head Academic, Owner, Centre Head</td>
</tr>
</tbody>
</table>

It is seen that respondents represent all hierarchical levels. Hierarchical levels of respondents who have participated in this study are presented in following graphical format (Diagram No.:4.1)

Diagram No.:4.1 Hierarchical Level of Respondents

As is evident, CBPM Model has been implemented across the organizations. Competencies have been defined based on the work nature and role of the employees. Following table (table No.: 4.9) shows hierarchical of impact CBPM on Business Performance.
Table No.: 4.9 Hierarchical impact of CBPM on Business Performance.

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Management Level</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lower Level Mgt.</td>
<td>5999</td>
<td>3.23</td>
<td>1.027</td>
<td>0.013</td>
<td>3.20</td>
<td>3.26</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Middle Level Mgt.</td>
<td>3239</td>
<td>3.07</td>
<td>0.947</td>
<td>0.017</td>
<td>3.04</td>
<td>3.10</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Top Level Mgt.</td>
<td>3282</td>
<td>2.93</td>
<td>0.798</td>
<td>0.014</td>
<td>2.90</td>
<td>2.96</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12520</td>
<td>3.11</td>
<td>0.959</td>
<td>0.009</td>
<td>3.09</td>
<td>3.13</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Following table shows the results of ANOVA.

Table No.: 4.10 ANOVA for Hierarchical impact CBPM on Business Performance

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particulars</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Between Groups</td>
<td>196.236</td>
<td>2</td>
<td>98.118</td>
<td>108.441</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>Within Groups</td>
<td>11325.414</td>
<td>12517</td>
<td>0.905</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11521.650</td>
<td>12519</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above analysis shows:

1) CBPM model has an impact on the Business Performance as overall mean is 3.11
2) The impact of CBPM on Business performance is not similar between the hierarchical groups. This is clear from above ANOVA test. The sig. is 0.000
3) Defining CBPM model at Lower Level Management (mean 3.23) has more impact than Top Level Management (mean 2.93) on the business performance.
4) Defining CBPM model at Middle Level Management (mean 3.07) has more impact than Top Level Management (mean 2.93) on the business performance.

It can be concluded from this study that defining CBPM model for Lower and Middle Level Management is more critical than Top Level Management. It is consistent with the reality that IT sector companies – being HR centric - are highly dependent on the performance of the lower management employees (foot soldiers) - whose competent performance is critical.
4.2.3 Impact of CBPM on Individual Performance

As per literature survey, competence is in a close relationship with performance. It is needed to accomplish superior performance repeatedly in a particular context or situation. Following table (Table No.4.11) shows primary data results of impact of CBPM on individual performance. It is clear from the following study result that since 97.1% of respondents agree, CBPM overwhelmingly impacts individual performance.

Table No. : 4.11 Frequency of CBPM Impact on Individual Performance

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Valid</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>304</td>
<td>97.1</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>9</td>
<td>2.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Following is the graphical representation of above details (Diagram No.:4.2)

Diagram No. 4.2 Frequency of CBPM impact on individual performance

Following table (Table No.: 4.12) shows descriptive statistical results

Table No.:4.12 Descriptive Statistical result of CBPM Impact on Individual Performance

<table>
<thead>
<tr>
<th>Sl No</th>
<th>N</th>
<th>Valid</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>313</td>
</tr>
<tr>
<td>1</td>
<td>Mean</td>
<td></td>
<td>3.27</td>
</tr>
<tr>
<td>2</td>
<td>Std. Error of Mean</td>
<td></td>
<td>0.060</td>
</tr>
<tr>
<td>3</td>
<td>Median</td>
<td></td>
<td>4.00</td>
</tr>
<tr>
<td>4</td>
<td>Mode</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>
The extent of the impact is measured with Likert’s Scale of Rating 1 to 5 i.e. (1) Unnoticeable positive impact, (2) Nominal (small) positive Impact, (3) Average positive impact , (4) High positive impact and (5) Extremely high positive impact. Following table (Table No.:4.13) shows the results based on Likert’s Rating scale:

Table No.:4.13 Extent of CBPM Impact on Individual Performance (Likert’s scale)

<table>
<thead>
<tr>
<th>Likert Scale Value</th>
<th>Particulars</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>--</td>
<td>9</td>
<td>2.9</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>1</td>
<td>Unnoticeable Positive Impact</td>
<td>8</td>
<td>2.5</td>
<td>2.5</td>
<td>5.4</td>
</tr>
<tr>
<td>2</td>
<td>Nominal (small) Positive Impact</td>
<td>49</td>
<td>15.7</td>
<td>15.7</td>
<td>21.1</td>
</tr>
<tr>
<td>3</td>
<td>Average Positive Impact</td>
<td>82</td>
<td>26.2</td>
<td>26.2</td>
<td>47.3</td>
</tr>
<tr>
<td>4</td>
<td>High positive impact</td>
<td>152</td>
<td>48.5</td>
<td>48.5</td>
<td>95.8</td>
</tr>
<tr>
<td>5</td>
<td>Extremely High Positive Impact</td>
<td>13</td>
<td>4.2</td>
<td>4.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

These ratings are shown in following graphical format (Diagram No.: 4.3)

Diagram No.:4.3 CBPM Impact on Individual Performance (Likert’s scale)
It can be seen from the literature study and various research reports that CBPM impacts individual performance. This statement holds true for Indian IT organizations with respect to Pune region. The study shows:

a) 304 Respondents out of 313 i.e. 97% say that CBPM impacts individual performance.

b) A significant majority of respondents, i.e. a total of 52.7% says that Competency Based Performance Measures (management) have a High or Extremely High level of impact on individual performance: 48.5% say this to be to the extent of 4 out of 5, while 4.2% say this to be to the extent of 5 out of 5. Additionally, 26.2% of respondents say this to be Average positive impact i.e. 3 out of 5.

c) The average mean score is 3.27 (out of 5.00). This means that on an average Competency Based Performance Measures (management) has a high impact on individual performance to the extent of 3.27. The measurement lies in between “Average Positive Impact to High Positive Impact“

This also answers the research Objective No. 1 and Question No.1 i.e.

Objective No 1 : To study the impact of competency based performance measures on individual performance

Question No 1 : “Do you agree that competency based performance measures will lead to a positive impact on an individual’s work performance in an organization? If yes, to what extent it will have an impact on individual performance?”

The answer is “Yes” and it impacts to the extent of “Average Positive Impact to High Positive Impact (since mean is 3.27)”. This underlines the importance of Competency base in an individual’s performance.
4.2.4 Impact of CBPM on Managerial Performance (against traditional human capital measures)

Traditional performance measurement systems rely on financial accounting measures, e.g. revenue growth rate, return on investment, market share, and unit costs. Competency-based performance evaluates large sets of capabilities and knowledge which can significantly improve organizational productivity to a much greater extent than just doing a job using an existing skill set. Following table shows (Table No.: 4.14) impact of CBPM on managerial performance against traditional human capital measures.

Table No:4.14 Frequency of CBPM Impact on Managerial Performance

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Valid</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>279</td>
<td>89.1</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>34</td>
<td>10.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Following is the graphical representation of above details (Diagram No.:4.4)

Diagram No: 4.4 Frequency of CBPM Impact on Managerial Performance

Following table (Table No.: 4.12) show the descriptive statistical results

Table No.:4.15 Descriptive statistical result of CBPM Impact on Managerial Performance

<table>
<thead>
<tr>
<th>Sl No</th>
<th>N</th>
<th>Valid</th>
<th>313</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Missing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Mean</td>
<td>2.96</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Std. Error of Mean</td>
<td>0.078</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Median</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mode</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
The extent of the impact is measured with Likert’s Scale Rating of 1 to 5 as earlier.

Following table (Table No.:4.16) shows the result of Likert's Scale Rating.

**Table No.:4.16 Extent of CBPM Impact on Managerial Performance (Likert’s scale)**

<table>
<thead>
<tr>
<th>Likert Scale Value</th>
<th>Particulars</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>--</td>
<td>34</td>
<td>10.9</td>
<td>10.9</td>
<td>10.9</td>
</tr>
<tr>
<td>1</td>
<td>Unnoticeable Positive Impact</td>
<td>6</td>
<td>1.9</td>
<td>1.9</td>
<td>12.8</td>
</tr>
<tr>
<td>2</td>
<td>Nominal (small) Positive Impact</td>
<td>58</td>
<td>18.5</td>
<td>18.5</td>
<td>31.3</td>
</tr>
<tr>
<td>3</td>
<td>Average Positive Impact</td>
<td>75</td>
<td>24.0</td>
<td>24.0</td>
<td>55.3</td>
</tr>
<tr>
<td>4</td>
<td>High positive impact</td>
<td>118</td>
<td>37.7</td>
<td>37.7</td>
<td>93.0</td>
</tr>
<tr>
<td>5</td>
<td>Extremely High Positive Impact</td>
<td>22</td>
<td>7.0</td>
<td>7.0</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>313</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Following is graphical representation of rating given by respondents (Diagram No.:4.5)

**Diagram No.: 4.5 CBPM Impact on Managerial Performance (Likert’s scale)**
Above study shows the following:

a) A very significant number i.e. 89.1% of respondents (279 out of 313) say that Competency Based Performance Measures (management) have better impact on managerial performance than traditional measures.

b) A significant majority of respondents, i.e. a total of 44.7% say that Competency Based Performance Measures (management) have a High or Extremely High level of impact on managerial performance than traditional measures: 37.7% say this to be to the extent of 4 out of 5, while 7.0% say this to be to the extent of 5 out of 5. Additionally, 24.0% of respondents say this to be Average positive impact i.e. 3 out of 5.

c) The average mean is 2.96 (out of 5.00). This means that on an average Competency Based Performance Measures (management) have an impact on managerial performance than traditional measures. The impact is significant to the extent of 2.96. It can be rounded off to 3, i.e. it can be considered as “Average Positive Impact”

This also answers the research Objective No. 2 and Question No.2 i.e.

**Objective No. 2:** To investigate the impact of managerial performance based on competency as against traditional human capital measures

**Question No.2** “Do you feel that competency based performance measures (management) will have better impact on managerial performance than traditional measures [traditional measures in this study mean performance measures based on age, qualification and transaction but not competency based]. If yes, to what extent it will have an impact on managerial performance?”

Answer is “Yes”. CBPM impacts managerial performance against traditional human capital measures. The impact is “Average Positive Impact (mean is around 3)”. The study shows that CBPM model is better than traditional human capital management methods. IT companies should go for CBPM approach.
4.2.5 Impact of CBPM on Business Performance

Literature survey suggests that performance measures tend to reflect the organization’s vision and mission, which in turn guide the organizational performance. The approach of this research is to study relationship of performance measures (competency being the basis) in IT companies to their business performance. Following table (table No.:4.17) shows that most of the respondents agree that CBPM impacts business performance.

Table No: 4.17 Frequency of CBPM Impact on Business Performance

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Valid</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>297</td>
<td>94.9</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>16</td>
<td>5.1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Following is the graphical representation of above details (Diagram No.:4.5)

Diagram No. 4.6 Frequency of CBPM impact on individual performance

It can be seen that an overwhelming number of respondents i.e.94.9% have said that CBPM impacts business performance, thus underlining the criticality of CBPM.

Following table (Table No.:4.18) shows descriptive Statistical details of CBPM impact on Business Performance
Table No.: 4.18 Descriptive statistical result of CBPM Impact on Business Performance

<table>
<thead>
<tr>
<th>Sl No</th>
<th>N</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>313</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Valid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mean</td>
</tr>
<tr>
<td>2</td>
<td>Std. Error of Mean</td>
</tr>
<tr>
<td>3</td>
<td>Median</td>
</tr>
<tr>
<td>4</td>
<td>Mode</td>
</tr>
</tbody>
</table>

Mean: 3.27
Std. Error of Mean: 0.063
Median: 4.00
Mode: 4

Table No.: 4.19 Extent of CBPM Impact on Business Performance (Likert’s scale)

<table>
<thead>
<tr>
<th>Likert Scale Value</th>
<th>Particulars</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>--</td>
<td>16</td>
<td>5.1</td>
<td>5.1</td>
<td>5.1</td>
</tr>
<tr>
<td>1</td>
<td>Unnoticeable Positive Impact</td>
<td>6</td>
<td>1.9</td>
<td>1.9</td>
<td>7.0</td>
</tr>
<tr>
<td>2</td>
<td>Nominal (small) Positive Impact</td>
<td>56</td>
<td>17.9</td>
<td>17.9</td>
<td>24.9</td>
</tr>
<tr>
<td>3</td>
<td>Average Positive Impact</td>
<td>61</td>
<td>19.5</td>
<td>19.5</td>
<td>44.4</td>
</tr>
<tr>
<td>4</td>
<td>High positive impact</td>
<td>147</td>
<td>47.0</td>
<td>47.0</td>
<td>91.4</td>
</tr>
<tr>
<td>5</td>
<td>Extremely High Positive Impact</td>
<td>27</td>
<td>8.6</td>
<td>8.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Following graph (Diagram No.:4.8) shows CBPM impact on Business Performance
Literature review shows that in past few years the whole approach regarding improvement of organizational performance shifted to the endorsement of people and their competencies. This statement holds true in Indian IT companies with respect to Pune region. This can be seen with following study results:

a) A very significant number i.e. 94.9% of respondents (297 out of 313) say that Competency Based Performance Measures (management) have better impact on business performance.

b) A significant majority of respondents, i.e. a total of 55.6% says that Competency Based Performance Measures (management) have a High or Extremely High level of impact on business performance: 47.0% say this to be to the extent of 4 out of 5, while 8.6% say this to be to the extent of 5 out of 5. Additionally, 19.5% of respondents say this to be Average positive impact i.e. 3 out of 5.

c) The average mean is 3.27 (out of 5.00). This means that on an average Competency Based Performance Measures (management) has an impact on managerial performance than traditional measures. The impact is significant to the extent of 2.96. It can be rounded off to 3, i.e. it can be considered as “Average Positive Impact”
This also answers the research *Objective No.3 & 4* and *Question No.3* i.e.

**Objective No.3:** To correlate the competency based capability’s relationship to performance of an organization as strategic business unit

**Objective No.4** To investigate whether the impact of CBPM on Business Performance is significant

**Question No. 3** “Do you feel that competency based performance measures (management) will have positive impact on Business Performance of an Organization? If yes, to what extent it will have an impact in business performance?”

The answer is “Yes”. CBPM model will help the organization in better performance. It impacts to the extent of “Average Positive Impact to High Positive Impact” (the mean is 3.27). The impact is significant and hence it establishes a positive correlation between CBPM and BP.
4.3 Testing of Hypotheses

4.3.1 Testing of Hypothesis H1

*Hypothesis 1*: Competency based performance measures (management) are positively related to an individual’s performance

**Question in questionnaire**

*Question No 1*: “Do you agree that competency based performance measures will lead to a positive impact on an individual’s work performance in an organization? If yes, to what extent it will have an impact on individual performance?”

**A) General Analysis**

The outcome of first part of question is shown in the following table (Table No.:4.20)

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Valid</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>304</td>
<td>97.1</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>9</td>
<td>2.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
</tr>
</tbody>
</table>

97% (304 out of 313) respondents say that Competency Based Performance Measures (management) will lead to positive impact on individual’s performance. It can be concluded from general findings that CPBM impacts Individual performance.

*Conclusion as per General Finding – Hypothesis 1 is Accepted*

**B) Statistical Analysis**

i) Chi-square -Goodness-of-fit Test:

This test compares the frequencies of one variable against a hypothetical or known value. (No specific value is hypothesized in this study. However, anything above ‘Zero (0)’ is considered as accepted). Following table (Table No.: 4.21) shows the results for this question
Table No.:4.21 CBPM Impact on Individual Performance for Chi-Square – for Hypothesis 1

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Observation</th>
<th>Observed N</th>
<th>Expected N</th>
<th>Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>304</td>
<td>156.5</td>
<td>147.5</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>9</td>
<td>156.5</td>
<td>-147.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Following table (Table No.:4.3.3) shows the result of Chi-square Test

Table No.:4.22 Chi-Square Test Results for Hypothesis 1

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particulars</th>
<th>CBPM Impact on Individual Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chi-Square*</td>
<td>278.035</td>
</tr>
<tr>
<td>2</td>
<td>Degrees of freedom</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Asymptotic Sig.</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 156.5 (being n/2 i.e. 313/2)

“In chi-square analysis, only a few respondents (n=9) out of 313 do not agree. Since, 313-9 = 304, Hence for \( n = 304, \chi^2 \) \( (1, N = 313) = 278.035, p < 0.001 \), i.e. 0.000, indicating that there are less than 0.000 chances that this result is due by chance, indicating that CBPM impacts individual performance.

Conclusion as per Chi-Square Test – Hypothesis 1 is Accepted

ii) One sample t-test

A one sample t-test allows to test whether a sample mean significantly differs from a hypothesized value (No specific value is hypothesized in this study. However, anything above ‘Zero (0)’ is considered as accepted). Following Table (Table No.:4.23) shows the result of One Sample Statistics
Table No.: 4.23 One-Sample Statistics for Hypothesis 1

<table>
<thead>
<tr>
<th>Particulars</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBPM Impact on Individual Performance (Y/N)</td>
<td>313</td>
<td>1.03</td>
<td>0.167</td>
<td>0.009</td>
</tr>
</tbody>
</table>

Following Table (Table No.: 4.24) shows One Sample Test results

Table No.: 4.24 One-Sample t-Test for Hypothesis 1

<table>
<thead>
<tr>
<th>Particulars</th>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBPM Impact on Individual Performance (Y/N)</td>
<td>108.736</td>
<td>312</td>
<td>0.000</td>
<td>1.029</td>
<td>1.01 - 1.05</td>
</tr>
</tbody>
</table>

The mean of the variable is 1.03, which is statistically significant.

**Conclusion as per T-test - Hypothesis 1 is Accepted**

iii) Descriptive Statistical Analysis

Impact of CBPM of Individual performance is studied with help of descriptive statistics. Following table Shows (table No.: 4.3.6) Descriptive Statistical Analysis of CBPM on individual.

Table No.: 4.25 Descriptive Statistical Analysis - CBPM Impact on Individual Performance – for Hypothesis 1

<table>
<thead>
<tr>
<th>Sl No</th>
<th>N – Valid</th>
<th>N – Missing</th>
<th>313</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mean</td>
<td></td>
<td>3.27</td>
</tr>
<tr>
<td>2</td>
<td>Std. Error of Mean</td>
<td></td>
<td>0.060</td>
</tr>
<tr>
<td>3</td>
<td>Median</td>
<td></td>
<td>4.00</td>
</tr>
<tr>
<td>4</td>
<td>Mode</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Std. Deviation</td>
<td></td>
<td>1.056</td>
</tr>
<tr>
<td>6</td>
<td>Variance</td>
<td></td>
<td>1.115</td>
</tr>
</tbody>
</table>
The extent of impact of Competency Based Performance Measures (management) on individual performance is measured. Likert’s 1 to 5 rating scale is used. 1 is lowest and 5 is highest. [1) Unnoticeable positive impact, 2) Nominal (small) positive impact 3) Average positive impact, 4) High positive impact and 5) Extremely high positive impact]. Following table (Table No.:4.26) shows the results of Likert’s Rating:

Table No.:4.26 CBPM Impact on Individual Performance (Likert’s Scale) – for Hypothesis 1

<table>
<thead>
<tr>
<th>Likert Scale Value</th>
<th>Particulars</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>--</td>
<td>9</td>
<td>3.2</td>
<td>3.2</td>
<td>3.2</td>
</tr>
<tr>
<td>1</td>
<td>Unnoticeable Positive Impact</td>
<td>7</td>
<td>2.2</td>
<td>2.2</td>
<td>5.4</td>
</tr>
<tr>
<td>2</td>
<td>Nominal (small) Positive Impact</td>
<td>49</td>
<td>15.7</td>
<td>15.7</td>
<td>21.1</td>
</tr>
<tr>
<td>3</td>
<td>Average Positive Impact</td>
<td>82</td>
<td>26.2</td>
<td>26.2</td>
<td>47.3</td>
</tr>
<tr>
<td>4</td>
<td>High positive impact</td>
<td>152</td>
<td>48.6</td>
<td>48.6</td>
<td>95.8</td>
</tr>
<tr>
<td>5</td>
<td>Extremely High Positive Impact</td>
<td>13</td>
<td>4.2</td>
<td>4.2</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>313</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Following graph (Diagram No.: 4.8) shows CBPM Impact on Individual Performance

Diagram No.:4.8 CBPM impact on Individual Performance (Likert’s scale) – for Hypothesis 1
Findings:

a) The average mean is 3.27. This means that on an average Competency Based Performance Measures (management) has an impact on individual performance to the extent of 3.27. The measurement is in between “Average Positive Impact to High Positive Impact “

b) Majority of respondents i.e. 52.8% say that Competency Based Performance Measures (management) has significant impact (i.e. 48.6% say to the extent of 4 out of 5 and 4.2% say to the extent of 5 out of 5) on individual performance.

It can be therefore concurred that Competency Based Performance Measures (management) are positively related to an individual’s performance.

Conclusion as per Descriptive Statistical Analysis – Hypothesis 1 is accepted.

The general finding and all statistical analyses show that Competency Based Performance Measures (Management) are positively related to an Individual’s Performance. Therefore Hypothesis 1 is accepted.
4.3.2 Testing of Hypothesis H2

Hypothesis 2: Competency measures (management) have strong relationship with managerial performance than traditional human capital measures

Question in questionnaire

Question No. 2 “Do you feel that competency based performance measures (management) will have better impact on managerial performance than traditional measures [traditional measures in this study mean performance measures based on age, qualification and transaction but not competency based]. If yes, to what extent it will have an impact on managerial performance ?”

A) General Analysis

Following table (Table No.:4.27) shows is the results of Yes or No question.

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Valid</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>279</td>
<td>89.1</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>34</td>
<td>10.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
</tr>
</tbody>
</table>

89.1% (279 out of 313) respondents say that Competency Based Performance Measures (management) have better impact on managerial performance than traditional measures.

Conclusion as per General Finding – Hypothesis 2 is Accepted

B) Statistical Analysis

i) Chi-square -Goodness-of-fit Test:

Following table (Table No.:4.28) shows the result of this test
Table No.: 4.28 CBPM Impact on Managerial Performance for Chi-Square – for Hypothesis 2

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Observations</th>
<th>Observed N</th>
<th>Expected N</th>
<th>Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>279</td>
<td>156.5</td>
<td>122.5</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>34</td>
<td>156.5</td>
<td>-122.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Following table shows the result of Chi-Square Result

Table No.: 4.29 Chi-Square Test Results for Hypothesis 2

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particulars</th>
<th>CBPM Impact on Managerial Performance (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chi-Square*</td>
<td>191.773</td>
</tr>
<tr>
<td>2</td>
<td>Degrees of freedom</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Asymptotic Significance</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 156.5.

“In chi-square analysis, out of a total of 313, fewer respondents do not agree (n = 34). Since 313-34 = 279, Hence, for n = 279, $\chi^2$ (1, N = 313) = 191.773, $p < 0.001$ i.e 0.000, indicating that there are less than 0.000 chances that this result is due by chance, indicating that competency measures have strong relationship with managerial performance than traditional measures.

Conclusion as per Chi-Square Test – Hypothesis 2 is Accepted
ii) One sample t-test

Following table (Table No.: 4.30) shows the result of one sample statistics:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBPM Impact on Managerial Performance (Y/N)</td>
<td>313</td>
<td>1.11</td>
<td>0.312</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Following table (Table No.:4.3.12) shows result of One-Sample Test

<table>
<thead>
<tr>
<th>Particulars</th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBPM Impact on Managerial Performance (Y/N)</td>
<td>62.931</td>
<td>312</td>
<td>.000</td>
<td>1.109</td>
<td>1.07 to 1.14</td>
</tr>
</tbody>
</table>

Above analysis shows the mean of the variable is 1.11, which is statistically significant.

Conclusion as per T test – Hypothesis 2 is Accepted

iii) Descriptive Statistical Analysis

Following table (Table No.: 4.3.13) shows the results of Deceptive Statistical Analysis

<table>
<thead>
<tr>
<th>SL No</th>
<th>N – Valid</th>
<th>N – Missing</th>
<th>313</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mean</td>
<td>2.96</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Std. Error of Mean</td>
<td>0.078</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Median</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mode</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Std. Deviation</td>
<td>1.385</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Variance</td>
<td>1.919</td>
<td></td>
</tr>
</tbody>
</table>
The extent of impact of competency based performance measures (management) on managerial performance than traditional measures is measured. Likert’s 1 to 5 rating scale is used.

Table No.: 4.33 CBPM Impact on Managerial Performance (Likert’s Scale) – for Hypothesis 2

<table>
<thead>
<tr>
<th>Likert Scale Value</th>
<th>Particulars</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>--</td>
<td>34</td>
<td>11.2</td>
<td>11.2</td>
<td>11.2</td>
</tr>
<tr>
<td>1</td>
<td>Unnoticeable Positive Impact</td>
<td>5</td>
<td>1.6</td>
<td>1.6</td>
<td>12.8</td>
</tr>
<tr>
<td>2</td>
<td>Nominal (small) Positive Impact</td>
<td>58</td>
<td>18.5</td>
<td>18.5</td>
<td>31.3</td>
</tr>
<tr>
<td>3</td>
<td>Average Positive Impact</td>
<td>75</td>
<td>24.0</td>
<td>24.0</td>
<td>55.3</td>
</tr>
<tr>
<td>4</td>
<td>High positive impact</td>
<td>118</td>
<td>37.7</td>
<td>37.7</td>
<td>93.0</td>
</tr>
<tr>
<td>5</td>
<td>Extremely High Positive Impact</td>
<td>22</td>
<td>7.0</td>
<td>7.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Following graph shows (Diagram No:4.10) Likert's Scale Result

Diagram No: 4.9 CBPM impact on Managerial Performance (Likert’s scale) – for Hypothesis 2
The study shows:

a) The average mean is 2.96. This means that on an average Competency Based Performance Measures (management) has an impact on managerial performance than traditional measures to the extent of 2.96. When rounded off to 3 measurement has “Average Positive Impact”

b) Substantial number of respondents, i.e. 44.7%, say that Competency Based Performance Measures (management) has a significant impact (i.e. 37.7% say to the extent of 4 out of 5 and 7.0% say to the extent of 5 out of 5) on managerial performance than traditional measures.

**Conclusion as per Descriptive Statistical Analysis – Hypothesis 2 is accepted.**

The general finding and all statistical analyses show that Competency Based Performance Measures (Management) have strong relationship with Managerial Performance than Traditional Measures. **Therefore Hypothesis 2 is accepted.**
4.3.3 Testing of Hypothesis H3

Hypothesis 3: Competency based performance measures (management) are positively related to business performance

Question in questionnaire

Question No. 3 “Do you feel that competency based performance measures (management) will have positive impact on Business Performance of an Organization? If yes, to what extent it will have an impact in business performance?”

A) General Analysis

Following table (Table No.: 4.34) shows is the results of Yes or No question.

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Valid</th>
<th>Frequency</th>
<th>Valid Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>297</td>
<td>94.9</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>16</td>
<td>5.1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
</tr>
</tbody>
</table>

94.9% (297 out of 313) respondents say that competency based performance management has positive impact on Business performance of an Organization.

Conclusion as per General Finding – Hypothesis 3 is Accepted

B) Statistical Analysis

i) Chi-square - Goodness-of-fit (Single Sample)

Following table (Table No.: 4.35) shows the result of this Test

Table No.: 4.35 CBPM Impact on Business Performance for Chi-Square –

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particulars</th>
<th>Observed N</th>
<th>Expected N</th>
<th>Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>297</td>
<td>156.5</td>
<td>140.5</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>16</td>
<td>156.5</td>
<td>-140.5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>156.5</td>
<td></td>
</tr>
</tbody>
</table>
Following table (Table No.: 4.36) shows Chi-square Test Results

**Table No.: 4.36 Chi-Square Test Results for Hypothesis 3**

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particulars</th>
<th>CBPM Impact on Business Performance (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chi-Square*</td>
<td>252.272</td>
</tr>
<tr>
<td>2</td>
<td>Degrees of freedom</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Asymptotic Sig.</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 156.5.

*In chi-square analysis, few respondents do not agree (n = 16) out of 313.

Since 313-16 = 29. Hence for $n = 297$, $\chi^2 (1, N = 313) = 252.272$, $p < 0.001$

i.e. 0.000, indicating that there are less than 0.000 chances that this result is due by chance, indicating that competency based performance management has positive impact on Business performance of an Organization.

**Conclusion as per Chi-Square Test – Hypothesis 3 is Accepted**

**ii) One sample t-test**

Following table (Table No.:4.37) is the result of One Sample Statistics

**Table No.: 4.37 One-Sample Statistics for Hypothesis 3**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBPM Impact on Business Performance (Y/N)</td>
<td>313</td>
<td>1.05</td>
<td>0.221</td>
<td>0.012</td>
</tr>
</tbody>
</table>
Following table (Table No.: 4.38) shows the One sample test result

**Table No.: 4.38 One-Sample t-Test for Hypothesis 3**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBPM Impact on Business Performance (Y/N)</td>
<td>84.301</td>
<td>312</td>
<td>0.000</td>
<td>1.051</td>
<td>1.03 – 1.08</td>
</tr>
</tbody>
</table>

Above analysis shows that mean of the variable is 1.05, which is statistically significant.

**Conclusion as per t - Test – Hypothesis 3 is Accepted**

**iii) Descriptive Statistical Analysis**

Following table (4.39) shows the result of Descriptive Statistical Analysis

**Table No.:4.39 Descriptive Statistical Analysis - CBPM Impact on Managerial Performance – for Hypothesis 3**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>N – Valid</th>
<th>313</th>
</tr>
</thead>
<tbody>
<tr>
<td>N – Missing</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>Mean</td>
<td>3.27</td>
</tr>
<tr>
<td>2</td>
<td>Std. Error of Mean</td>
<td>.069</td>
</tr>
<tr>
<td>3</td>
<td>Median</td>
<td>4.00</td>
</tr>
<tr>
<td>4</td>
<td>Mode</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Std. Deviation</td>
<td>1.216</td>
</tr>
<tr>
<td>6</td>
<td>Variance</td>
<td>1.479</td>
</tr>
</tbody>
</table>

The extent of impact of competency based performance management on Business performance of an Organization is measured. Likert’s 1 to 5 rating scale is used. 1 is lowest and 5 is highest.
Table No.: 4.40 CBPM Impact on Managerial Performance (Likert’s Scale) – for Hypothesis 3

<table>
<thead>
<tr>
<th>Likert Scale Value</th>
<th>Particulars</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>--</td>
<td>16</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
</tr>
<tr>
<td>1</td>
<td>Unnoticeable Positive Impact</td>
<td>6</td>
<td>1.6</td>
<td>1.6</td>
<td>7.0</td>
</tr>
<tr>
<td>2</td>
<td>Nominal (small) Positive Impact</td>
<td>56</td>
<td>17.9</td>
<td>17.9</td>
<td>24.9</td>
</tr>
<tr>
<td>3</td>
<td>Average Positive Impact</td>
<td>61</td>
<td>19.5</td>
<td>19.5</td>
<td>44.4</td>
</tr>
<tr>
<td>4</td>
<td>High positive impact</td>
<td>147</td>
<td>47.0</td>
<td>47.0</td>
<td>91.4</td>
</tr>
<tr>
<td>5</td>
<td>Extremely High Positive Impact</td>
<td>27</td>
<td>8.6</td>
<td>8.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>313</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Following graph (Diagram No.: 4.10) show the results of Likert's scale rating

Diagram No.: 4.10 CBPM impact on Business Performance (Likert’s scale) – for Hypothesis 3
Above study shows:

a) The average mean is 3.27. This means that, on an average Competency Based Performance Management has an impact on Business performance of an Organization to the extent of 3.27. The measurement is in between “Average Positive Impact to High Positive Impact“

b) Majority of respondents i.e. 55.6% say that Competency Based Performance Measures (management) has significant impact (i.e. 47.0% say to the extent of 4 out of 5 and 7.6% say to the extent of 5 out of 5) on business performance.

**Conclusion as per Descriptive Statistical Analysis – Hypothesis 3 is accepted.**

The general finding and all statistical analyses show that Competency Based Performance Measures (Management) are positively related to Business Performance. **Therefore Hypothesis 3 is accepted.**
4.3.4 Testing of Hypothesis H4

Hypothesis 4: The impact of each element of CBPM (i.e. defining competencies; recruitment and selection; training and development; performance appraisal and employee reward) is equal on Business Performance.

Question No 4: Please refer to Annexure 1 wherein the Question No 4 in the Annexure attempts to find the relationship of each element (as mentioned in the Hypothesis 4) of independent variable (CBPM) with dependent variable (BP).

Statistical Analyses

a) Descriptive Test: Following table show descriptive test results of rates by CBPM elements.

Table No. 4.41 Descriptive test of Total Rates by CBPM Elements – for Hypothesis 4

<table>
<thead>
<tr>
<th>Sl No</th>
<th>CBPM Elements</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Defining Competencies of an Individual</td>
<td>2504</td>
<td>3.11</td>
<td>0.963</td>
<td>0.019</td>
<td>3.08 to 3.15</td>
</tr>
<tr>
<td>2</td>
<td>Competency Based Employee Recruitment &amp; Selection</td>
<td>2504</td>
<td>3.12</td>
<td>0.955</td>
<td>0.019</td>
<td>3.08 to 3.16</td>
</tr>
<tr>
<td>3</td>
<td>Competency Based Training &amp; Development</td>
<td>2504</td>
<td>3.12</td>
<td>0.935</td>
<td>0.019</td>
<td>3.08 to 3.16</td>
</tr>
<tr>
<td>4</td>
<td>Competency Based Performance Appraisal</td>
<td>2504</td>
<td>3.09</td>
<td>0.980</td>
<td>0.020</td>
<td>3.06 to 3.13</td>
</tr>
<tr>
<td>5</td>
<td>Competency Based Employee Rewards</td>
<td>2504</td>
<td>3.10</td>
<td>0.963</td>
<td>0.019</td>
<td>3.06 to 3.14</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12520</td>
<td>3.11</td>
<td>0.959</td>
<td>0.009</td>
<td>3.09 to 3.13</td>
</tr>
</tbody>
</table>
Analysis:

a) The mean value of each group is more than 3.00. This shows the impact is significant.

b) The means between the groups are varying from 3.09 to 3.12. (i.e. between 0.09 to 0.12). The difference is minimal. This shows each group has more or less similar or equal impact on Business Performance.

test of Homogeneity of Variances:

Following table shows Test of Homogeneity of Variances

Table No. 4.42 Test of Homogeneity of Variances for Hypothesis 4

<table>
<thead>
<tr>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.727</td>
<td>4</td>
<td>12515</td>
<td>0.573</td>
</tr>
</tbody>
</table>

Analysis:

In Homogeneity of Variances significance value is 0.573. This is significantly higher than 0.05. This shows each CBPM element has more or less similar or equal impact on Business Performance.

c) ANOVA

Following table (Table No.: 4.43) show the results of ANOVA test.

Table No. 4.43 ANOVA Result for Hypothesis 4

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particulars</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Between Groups</td>
<td>1.550</td>
<td>4</td>
<td>0.388</td>
<td>0.421</td>
<td>0.794</td>
</tr>
<tr>
<td>2</td>
<td>Within Groups</td>
<td>11520.100</td>
<td>12515</td>
<td>0.921</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td>11521.650</td>
<td>12519</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis: ANOVA shows significance is 0.794 which is higher than 0.05. This shows each CBPM element has more or less similar or equal impact on Business Performance.

d) Robust Tests of Equality of Means

Following table (Table No.: 4.44) shows the Robust Test of equality of means.
Table No. 4.44 Robust Tests of Equality of Means for Hypothesis 4

<table>
<thead>
<tr>
<th>statistic (F distributed asymptotically)</th>
<th>df1</th>
<th>df2</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welch</td>
<td>0.418</td>
<td>4</td>
<td>6257.136</td>
</tr>
</tbody>
</table>

Analysis:

Equality of means shows significance is 0.796 which is higher than 0.05. This shows each CBPM element has more or less similar or equal impact on Business Performance.

e) Post Hoc Tests

Scheffe Test is used assuming Equal variance and Tamhane Test is used assuming there is no Equal variance. Both the tests show that no significance is identified in this analysis. This shows that each group has more or less similar or equal impact on BP.

f) Homogeneous Subsets

Following table (Table No.:4.45) shows Homogeneous Subsets Results

**Table No. 4.45 Homogeneous Subsets for Hypothesis 4**

<table>
<thead>
<tr>
<th>Elements of CBPM</th>
<th>N</th>
<th>Subset for alpha = 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tukey HSD*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competency-based performance appraisal</td>
<td>2504</td>
<td>3.09</td>
</tr>
<tr>
<td>Competency Based Employee Rewards</td>
<td>2504</td>
<td>3.10</td>
</tr>
<tr>
<td>Defining Competencies of an Individual</td>
<td>2504</td>
<td>3.11</td>
</tr>
<tr>
<td>Competency Based Employee Recruitment &amp; Selection</td>
<td>2504</td>
<td>3.12</td>
</tr>
<tr>
<td>Competency Based Training &amp; Development</td>
<td>2504</td>
<td>3.12</td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td>0.848</td>
</tr>
<tr>
<td>Scheffe *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Competency-based performance appraisal</td>
<td>2504</td>
<td>3.09</td>
</tr>
<tr>
<td>5. Competency Based Employee Rewards</td>
<td>2504</td>
<td>3.10</td>
</tr>
<tr>
<td>1. Defining Competencies of an Individual</td>
<td>2504</td>
<td>3.11</td>
</tr>
<tr>
<td>2. Competency Based Employee Recruitment &amp; Selection</td>
<td>2504</td>
<td>3.12</td>
</tr>
<tr>
<td>3. Competency Based Training &amp; Development</td>
<td>2504</td>
<td>3.12</td>
</tr>
</tbody>
</table>

Sig. 0.905
Means for groups in homogeneous subsets are displayed. * Uses Harmonic Mean Sample Size = 2504.000.

**Analysis:**
Homogeneous Subsets show significance is 0.848 and 0.905 which is higher than 0.05. This shows that each group has more or less similar or equal impact on Business Performance.

**Conclusion:**
One of the objective (objective no. 5) of this study is to investigate whether each element of CBPM (i.e. defining competencies; recruitment and selection; training and development; performance appraisal and employee reward) will have similar impact on Business Performance. The answer for this research objective is yes.

From the above analysis it can be concluded that the impact of CBPM on Business Performance is significant. The impact is more or less similar (equal) by each elements (i.e. defining competencies; recruitment and selection; training and development; performance appraisal and employee reward) on Business Performance. Therefore, Hypothesis 4 is accepted.
4.3.5 Testing of Hypothesis H5

Hypothesis 5: The impact of CBPM on each Business Performance parameters (i.e. Cost reduction, Revenue Growth, Market share, Customer satisfaction, Innovation, Project Delivery Process, Employee retention and Employee productivity) is equal.

Question No 4: Please refer to Annexure 1 wherein the Question No 4 in the Annexure attempts to find the relationship of independent variable (CBPM) with each parameter of (as mentioned in Hypothesis 5) dependent variable (BP).

Statistical Analyses
a) Descriptive Statistics
Following table (Table No. 4.46) show descriptive statistical results of CBPM on Business Performance by Business performance parameters.

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Business Performance Parameters</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cost Reduction</td>
<td>1565</td>
<td>2.81</td>
<td>0.920</td>
<td>0.023</td>
<td>2.76 to 2.85</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Revenue Growth</td>
<td>1565</td>
<td>3.03</td>
<td>0.938</td>
<td>0.024</td>
<td>2.98 to 3.08</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Market Share</td>
<td>1565</td>
<td>2.80</td>
<td>0.980</td>
<td>0.025</td>
<td>2.75 to 2.85</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Customer Satisfaction</td>
<td>1565</td>
<td>3.42</td>
<td>0.900</td>
<td>0.023</td>
<td>3.37 to 3.46</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Innovation</td>
<td>1565</td>
<td>3.32</td>
<td>0.890</td>
<td>0.022</td>
<td>3.27 to 3.36</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Project Delivery Process</td>
<td>1565</td>
<td>3.24</td>
<td>0.911</td>
<td>0.023</td>
<td>3.20 to 3.29</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Employee Retention</td>
<td>1565</td>
<td>3.09</td>
<td>0.962</td>
<td>0.024</td>
<td>3.04 to 3.13</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Employee productivity</td>
<td>1565</td>
<td>3.17</td>
<td>0.985</td>
<td>0.025</td>
<td>3.12 to 3.22</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12520</td>
<td>3.11</td>
<td>0.959</td>
<td>0.009</td>
<td>3.09 to 3.13</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Analysis
The mean between the groups are varying from 2.80 to 3.42. This shows that impact of CBPM on each business performance parameters is not similar.
b) Test of Homogeneity of Variances

Following table (Tale No. 4.47) shows test result of Homogeneity of Variance

Table No.: 4.47 Test of Homogeneity of Variances for CBPM Impact on BP for Hypothesis 5

<table>
<thead>
<tr>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.592</td>
<td>7</td>
<td>12512</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Analysis:
Significance value is 0.000 which is less than 0.005, hence the impact is not similar

c) ANOVA Test

Following table (Table No.: 4.48) shows the result of ANOVA

Table No.: 4.48 ANOVA Result of CBPM Impact on BP for Hypothesis 5

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particulars</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Between Groups</td>
<td>550.907</td>
<td>7</td>
<td>78.701</td>
<td>89.758</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>Within Groups</td>
<td>10970.742</td>
<td>12512</td>
<td>0.877</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total</td>
<td>11521.650</td>
<td>12519</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis: Since the significance is less than 0.05 the impact is not similar.

d) Robust Test of Equality of Means

Following table shows the results for Robust Rests of Equality of Means

Table No.: 4.49 Robust Tests of Equality of Means of CBPM Impact on BP for Hypothesis 5

<table>
<thead>
<tr>
<th>Statistic*</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welch</td>
<td>91.605</td>
<td>7</td>
<td>5361.711</td>
</tr>
</tbody>
</table>

*Asymptotically F distributed.

Analysis: Since the significance is less than 0.05 the impact is not similar.
e) Multiple Comparisons

Assuming equal variance the Scheffe Test is used and when equal variance is not assumed the Tamhane test is used, wherein Dependent Variable is BP and Independent variable is CBPM.

**Analysis:** Both the tests show that there is significance. This shows that impact of CBPM on each parameter of BP is not similar.

f) Mean Plots

Following graph (Diagram No.4.11) shows mean plots for various BP parameters:

![Diagram No.4.11 Mean Plots for BP parameters for Hypothesis 5](image)

**Analysis:** The mean is varying between 2.8 to 3.5. The diagram shows clearly that the impact of CBPM on BP is not equal.
Conclusion:
Objective no. 6 of this study is to investigate whether impact of CBPM on each parameter of Business Performance (i.e. Cost reduction, Revenue Growth, Market share, Customer satisfaction, Innovation, Project Delivery Process, Employee retention and Employee productivity) is equal. The study shows that the impact of CBPM on each parameter of BP is not equal.

From the above analysis it can be conclude that impact of CBPM on each Business Performance parameters (i.e. Cost reduction, Revenue Growth, Market share, Customer satisfaction, Innovation, Project Delivery Process, Employee retention and Employee productivity) is ‘not’ equal. Therefore, Hypothesis 5 is Rejected.
4.4 Path Analysis

It is clear from the foregoing discussion that Competency Based Performance Measures impact Business Performance. Path Analysis has been done to provide estimates of the magnitude and significance of hypothesized causal connections between CBPM and BP parameters. To construct a path diagram the names of the performance parameters (variables) are written in vertices and drawn an arrow from each variable to any other variable (parameter) that it affects. Path analysis highlights the more important (and significant) paths. Each business performance parameter is numbered from a to h for identification purpose. The Performance factors are ranked based on impact (on mean).

Table No. 4.50 CBPM impact on Business Performance for Path Analysis

<table>
<thead>
<tr>
<th>Rank (as per Likert scale)</th>
<th>Business Performance Parameters</th>
<th>Path Arrows</th>
<th>N (samples)</th>
<th>Sum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CBPM on Customer Satisfaction</td>
<td>a</td>
<td>1565</td>
<td>5345</td>
<td>3.42</td>
<td>0.900</td>
</tr>
<tr>
<td>2</td>
<td>CBPM on Innovation</td>
<td>b</td>
<td>1564</td>
<td>5191</td>
<td>3.32</td>
<td>0.890</td>
</tr>
<tr>
<td>3</td>
<td>CBPM on Project Delivery</td>
<td>c</td>
<td>1565</td>
<td>5077</td>
<td>3.24</td>
<td>0.911</td>
</tr>
<tr>
<td>4</td>
<td>CBPM on Employee Productivity</td>
<td>d</td>
<td>1565</td>
<td>4963</td>
<td>3.17</td>
<td>0.985</td>
</tr>
<tr>
<td>5</td>
<td>CBPM on Employee Retention</td>
<td>e</td>
<td>1564</td>
<td>4828</td>
<td>3.09</td>
<td>0.962</td>
</tr>
<tr>
<td>6</td>
<td>CBPM on Revenue Growth</td>
<td>f</td>
<td>1565</td>
<td>4744</td>
<td>3.03</td>
<td>0.938</td>
</tr>
<tr>
<td>7</td>
<td>CBPM on Cost Reduction</td>
<td>g</td>
<td>1565</td>
<td>4394</td>
<td>2.81</td>
<td>0.920</td>
</tr>
<tr>
<td>8</td>
<td>CBPM on Market Share</td>
<td>h</td>
<td>1565</td>
<td>4384</td>
<td>2.80</td>
<td>0.980</td>
</tr>
</tbody>
</table>
The following path diagram represents the causal connections and statistical analysis. Each path is numbered (e.g. a1, a2, and a3) to facilitate in statistical analysis and boxes are numbered as a,b,c,e,f etc.

Diagram No.: 4.12 Paths of Causal Relationships Among Variables i.e. Performance Parameters

Based on the above path diagram, path coefficient has been calculated which is a standardized regression coefficient (beta weight). The following table (Table No: 4.4.2) shows the R Square (Model Summary), Sig. (ANOVA) p (<=) and Beta (Coefficients) β. To obtain the path coefficients, calculations were done by regression analyses for each path (arrow) with the help of SPSS software. The betas are then taken from the output and then inserted into the table.
Table No. 4.51 Path Coefficient of CSFs (R Square (Model Summary), Sig. (ANOVA) p (<=) and Beta (Coefficients) β)

<table>
<thead>
<tr>
<th>Path Direction</th>
<th>Line/Arrow</th>
<th>R Square (Model Summary) (R²)</th>
<th>Sig. (ANOVA) p (&lt;=)</th>
<th>Beta (Coefficients) B</th>
</tr>
</thead>
<tbody>
<tr>
<td>a→ e</td>
<td>A1</td>
<td>0.104</td>
<td>0.000</td>
<td>0.323</td>
</tr>
<tr>
<td>a→ h</td>
<td>A2</td>
<td>0.128</td>
<td>0.000</td>
<td>0.358</td>
</tr>
<tr>
<td>b→ g</td>
<td>B1</td>
<td>0.039</td>
<td>0.000</td>
<td>0.197</td>
</tr>
<tr>
<td>b→ d</td>
<td>B2</td>
<td>0.122</td>
<td>0.000</td>
<td>0.349</td>
</tr>
<tr>
<td>c→ f</td>
<td>C1</td>
<td>0.128</td>
<td>0.000</td>
<td>0.375</td>
</tr>
<tr>
<td>c→ g</td>
<td>C2</td>
<td>0.059</td>
<td>0.000</td>
<td>0.244</td>
</tr>
<tr>
<td>c→ a</td>
<td>C3</td>
<td>0.214</td>
<td>0.000</td>
<td>0.463</td>
</tr>
<tr>
<td>d→ a</td>
<td>D1</td>
<td>0.174</td>
<td>0.000</td>
<td>0.417</td>
</tr>
<tr>
<td>d→ e</td>
<td>D2</td>
<td>0.240</td>
<td>0.000</td>
<td>0.490</td>
</tr>
<tr>
<td>d→ f</td>
<td>D3</td>
<td>0.148</td>
<td>0.000</td>
<td>0.384</td>
</tr>
<tr>
<td>d→ g</td>
<td>D4</td>
<td>0.077</td>
<td>0.000</td>
<td>0.277</td>
</tr>
<tr>
<td>e→ c</td>
<td>E1</td>
<td>0.168</td>
<td>0.000</td>
<td>0.409</td>
</tr>
<tr>
<td>e→ f</td>
<td>E2</td>
<td>0.177</td>
<td>0.000</td>
<td>0.343</td>
</tr>
<tr>
<td>e→ g</td>
<td>E3</td>
<td>0.075</td>
<td>0.000</td>
<td>0.274</td>
</tr>
<tr>
<td>f→ b</td>
<td>F1</td>
<td>0.066</td>
<td>0.000</td>
<td>0.257</td>
</tr>
<tr>
<td>g→ f</td>
<td>G1</td>
<td>0.167</td>
<td>0.000</td>
<td>0.409</td>
</tr>
<tr>
<td>h→ f</td>
<td>H1</td>
<td>0.211</td>
<td>0.000</td>
<td>0.460</td>
</tr>
</tbody>
</table>

It is important to note that there are no negative relationships.

Structural Equations are drawn to estimate the direct and indirect effects. The overall impact of one variable on another parameter has been calculated. This has done by simply adding the direct effect of one and adding the indirect effects to it. The indirect effects are calculated by multiplying the coefficients for each path from one to another parameter e.g. a → h → f is $0.358 \times 0.406 = 0.1453$

Equation 1 – Impact of Customer Satisfaction (a) on Revenue Growth (f)

a) a→ f [a1 to f path). Direct impact is 0.375

b) a→ h → f [a2 to h1 to f path). Indirect impact is $0.358 \times 0.460 = 0.16468$
The analysis shows that the total indirect impact is positive and small whereas the direct impact is quite large and positive. The total impact (Direct + Indirect) is 
\[(0.375+0.16468) = 0.53968\]

**Equation 2** – Impact of customer Satisfaction (a) on Market Share (h)

a) $a \rightarrow h$ [a2 to h path]. Direct impact is 0.358

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is quite large and positive. The total impact is 0.358

**Equation 3** – Impact of Innovation (b) on Cost Reduction (g)

a) $b \rightarrow g$ [b1 to g path]. Direct impact is 0.197

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is quite small, but positive. The total impact is 0.197

**Equation 4** – Impact of Innovation (b) on Employee Productivity (d)

a) $b \rightarrow d$ [b2 to d path]. Direct impact is 0.349

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is quite large and positive. The total impact is 0.349

**Equation 5** – Project Delivery (c) on Revenue Growth (f)

a) $c \rightarrow f$ [c1 to f path]. Direct impact is 0.375

b) $c \rightarrow a \rightarrow f$ [c3 to a1 to f path]. Indirect impact is $0.463 \times 0.323 = 0.1495$
The analysis shows that the total indirect impact is positive and small whereas the direct impact is quite large and positive. The total impact of (Direct + Indirect) is 

\[(0.375+0.1495 = 0.5245)\]

**Equation 6** – Project Delivery (c) on Cost Reduction (g)

a) \(c \rightarrow g\) [c2 to g path]. Direct impact is 0.244

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is large and positive. The total impact is 0.244

**Equation 7** – Project Delivery (c) on Customer Satisfaction (a)

a) \(c \rightarrow a\) [c3 to a path]. Direct impact is 0.463

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is quite large and positive. The total impact is 0.463

**Equation 8** – Impact of Employee Productivity (d) on Customer Satisfaction (a)

a) \(d \rightarrow a\) [d1 to a path]. Direct impact is 0.417

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is quite large and positive. The total impact is 0.417

**Equation 9** – Impact of Employee Productivity (d) on Project Delivery (c)

a) \(d \rightarrow c\) [d2 to c path]. Direct impact is 0.490

b) No Indirect impact.
The analysis shows that there is no indirect impact whereas the direct impact is quite large and positive. The total impact is 0.490

**Equation 10** – Impact of Employee Productivity (d) on Revenue Growth (f)

a) \( d \rightarrow f \) [d3 to f path). Direct impact is 0.384

b) \( d \rightarrow a \rightarrow f \) [d1 to a1 to f path). Indirect impact is \( 0.417 \times 0.323 = 0.1346 \)

c) \( d \rightarrow c \rightarrow f \) [d2 to c1 to f path). Indirect impact is \( 0.490 \times 0.375 = 0.1837 \)

d) \( d \rightarrow g \rightarrow f \) [d4 to g1 to f path). Indirect impact is \( 0.277 \times 0.409 = 0.1132 \)

Indirect impact is \( (0.1346 + 0.1837 + 0.1132) = 0.4315 \).

The direct impact is large and positive. The total indirect impact is positive and quite large. The total impact of (Direct + Indirect) is \( (0.4315 + 0.384) = 0.8155 \). The total impact of CBPM is very large here.

**Equation 11** – Impact of Employee Productivity (d) on Cost Reduction (g)

a) \( d \rightarrow g \) [d4 to g path). Direct impact is 0.277

b) \( d \rightarrow c \rightarrow g \) [d2 to c2 to g path). Indirect impact is \( 0.490 \times 0.244 = 0.1195 \)

c) \( d \rightarrow f \rightarrow b \rightarrow g \) [d3 to f1 to b1to g path). Indirect impact is \( 0.463 \times 0.275 \times 0.197 = 0.0250 \)

The analysis shows that the total indirect impact is positive and small. Indirect impact is \( 0.1195 + 0.0250 = 0.1445 \). The direct impact is large and positive. The total impact is (Direct + Indirect) is \( (0.4315 + 0.384) = 0.4215 \).

**Equation 12** - Impact of Employee Retention (e) on Project Delivery (c)

a) \( e \rightarrow c \) [e1 to c path). Direct impact is 0.409

b) No Indirect impact.
The analysis shows that there is no indirect impact whereas the direct impact is quite large and positive. The direct impact is 0.409

Equation 13: Impact of Employee Retention (e) on Revenue Growth

a) $e \rightarrow f$ [e2 to f path]. Direct impact is 0.343

b) $e \rightarrow c \rightarrow f$ [e1 to c1 to f path]. Indirect impact is $0.409 \times 0.375 = 0.1533$

c) $e \rightarrow g \rightarrow f$ [e3 to g1 to f path]. Indirect impact is $0.274 \times 0.409 = 0.1120$

The analysis shows that the total indirect impact is positive and small whereas the direct impact is large and positive. The total impact of (Direct + Indirect) is $(0.343 + 0.1533 + 0.11200 = 0.6103$. The total impact of CBPM is more here.

Equation 14: Impact of Employee Retention (e) on Cost Reduction

a) $e \rightarrow g$ [e3 to g path]. Direct impact is 0.274

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is also relatively small but positive. The total impact is 0.274

Equation 15: Impact of revenue Growth (f) on Innovation (b)

a) $f \rightarrow b$ [f1 to b path]. Direct impact is 0.275

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is also relatively small but positive. The total impact is 0.275

Equation 16: Impact of Cost Reduction (g) on revenue Growth (f)

a) $g \rightarrow f$ [g1 to f path]. Direct impact is 0.409

b) No Indirect impact.
The analysis shows that there is no indirect impact whereas the direct impact is quite large and positive. The total impact is 0.409

**Equation 17:** Impact of Market Share \( (h) \) on Revenue Growth \( (f) \)

a) \( h \rightarrow f \) \([h1 \ to \ f \ path]\). Direct impact is 0.460

b) No Indirect impact.

The analysis shows that there is no indirect impact whereas the direct impact is quite large and positive. The direct impact is 0.460

**Interpretation:**

Following are the results of the equations. There are total seventeen paths. Following are top five paths which have highest impact:

| 1) Equation 10 – Impact of Employee Productivity \( (d) \) on Revenue Growth \( (f) \) | 0.8155 |
| 2) Equation 13 - Impact of Employee Retention \( (e) \) on Revenue Growth | 0.6103 |
| 3) Equation 1 – Impact of Customer Satisfaction \( (a) \) on Revenue Growth \( (f) \) | 0.5396 |
| 4) Equation 5 – Project Delivery \( (c) \) on Revenue Growth \( (f) \) | 0.5245 |
| 5) Equation 11 – Impact of Employee Productivity \( (d) \) on Cost Reduction \( (g) \) | 0.4215 |

The highest impacting path is CBPM \=> Employee Productivity \=> Revenue Growth. In this case the impact is 0.8155. The least impacting path is CBPM \=> Innovation \=> Cost Reduction. CBPM has more impact on employee productivity and is consistent with the logic that employees would be motivated to work productively if their performance is going to be judged and rewarded accordingly. The end result of CBPM is Revenue Growth. In summary, the defining path is:

**CBPM \=> Employee Productivity \=> Revenue Growth**

It can be concluded the CBPM has high impact on Business Performance.
4.5 Interpretive Structural Modeling (ISM)

The Interpretive Structural Modeling (ISM) methodology is used to study the mutual relationships among Business Performance parameters. ISM enables the structuring of ‘elements’ vis-à-vis any transitive relationship. ISM is used to evolve following relationships among business performance parameters such as:

- Whether and how the Business Performance parameters are related.
- Transitive relationship between CBPM and BP parameters
- Driving and Dependent power of BP parameters
- Direct and indirect relationships among the BP parameters

In this study, the correlation matrix for Business Performance parameters is obtained from the questionnaire. Business Performance parameters impacted by CBPM are presented in the following table (Table No.: 4.52). Together with the experts’ opinion, mutual relationships among BP parameters are defined. This relationship matrix is used as an input towards the development of ISM-based model for the Business Performance parameters.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Business Performance Parameters</th>
<th>N</th>
<th>Sum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CBPM on Customer Satisfaction</td>
<td>1565</td>
<td>5345</td>
<td>3.42</td>
<td>0.900</td>
</tr>
<tr>
<td>2</td>
<td>CBPM on Innovation</td>
<td>1565</td>
<td>5191</td>
<td>3.32</td>
<td>0.890</td>
</tr>
<tr>
<td>3</td>
<td>CBPM on Project Delivery</td>
<td>1565</td>
<td>5077</td>
<td>3.24</td>
<td>0.911</td>
</tr>
<tr>
<td>4</td>
<td>CBPM on Employee Productivity</td>
<td>1565</td>
<td>4963</td>
<td>3.17</td>
<td>0.985</td>
</tr>
<tr>
<td>5</td>
<td>CBPM on Employee Retention</td>
<td>1565</td>
<td>4828</td>
<td>3.09</td>
<td>0.962</td>
</tr>
<tr>
<td>6</td>
<td>CBPM on Revenue Growth</td>
<td>1565</td>
<td>4744</td>
<td>3.03</td>
<td>0.938</td>
</tr>
<tr>
<td>7</td>
<td>CBPM on Cost Reduction</td>
<td>1565</td>
<td>4394</td>
<td>2.81</td>
<td>0.920</td>
</tr>
<tr>
<td>8</td>
<td>CBPM on Market Share</td>
<td>1565</td>
<td>4384</td>
<td>2.80</td>
<td>0.980</td>
</tr>
</tbody>
</table>
Note:
1) Total N=1565 i.e. 313 samples for 5 groups
2) Business Performance Parameters are ranked based on the total rate i.e. mean

4.5.1 Correlation Coefficients of Business Performance Parameters

The relevant descriptive statistics are shown in the following table (Table No. 4.5.2). Pearson’s bi-variate two-tailed correlation test was also conducted to find out correlations among the performance parameters using SPSS (Version 13.00) software. The correlation matrix is presented in following table:
Table No. 4.53 Correlation Coefficients of Business Performance Parameters,

<table>
<thead>
<tr>
<th>Parameter Particulars</th>
<th>Statistic</th>
<th>CBP M on Cost Reduction</th>
<th>CBPM on Revenue Growth</th>
<th>CBPM on Market Share</th>
<th>CBPM on Cust. Satisfaction</th>
<th>CBPM on Innovation</th>
<th>CBPM on Project Delivery</th>
<th>CBPM on Employee Retention</th>
<th>CBPM on Empl. Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBPM on Cost Reduction</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>0.409*</td>
<td>0.357*</td>
<td>0.222*</td>
<td>0.197*</td>
<td>0.244*</td>
<td>0.274*</td>
<td>0.277*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>CBPM on Revenue Growth</td>
<td>Pearson Correlation</td>
<td>0.409*</td>
<td>1</td>
<td>0.460*</td>
<td>0.403*</td>
<td>0.257*</td>
<td>0.357*</td>
<td>0.343*</td>
<td>0.384*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>CBPM on Market Share</td>
<td>Pearson Correlation</td>
<td>0.357*</td>
<td>0.460*</td>
<td>1</td>
<td>0.358*</td>
<td>0.228*</td>
<td>0.337*</td>
<td>0.382*</td>
<td>0.332*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>CBPM on Customer Satisfaction</td>
<td>Pearson Correlation</td>
<td>0.222*</td>
<td>0.403*</td>
<td>0.358*</td>
<td>1</td>
<td>0.438*</td>
<td>0.463*</td>
<td>0.323*</td>
<td>0.417*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>CBPM on Innovation</td>
<td>Pearson Correlation</td>
<td>0.197*</td>
<td>0.257*</td>
<td>0.228*</td>
<td>0.438*</td>
<td>1</td>
<td>0.448*</td>
<td>0.336*</td>
<td>0.349*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>CBPM on Project Delivery</td>
<td>Pearson Correlation</td>
<td>0.244*</td>
<td>0.357*</td>
<td>0.337*</td>
<td>0.463*</td>
<td>0.448*</td>
<td>1</td>
<td>0.409*</td>
<td>0.490*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>CBPM on Employee Retention</td>
<td>Pearson Correlation</td>
<td>0.274*</td>
<td>0.343*</td>
<td>0.382*</td>
<td>0.323*</td>
<td>0.336*</td>
<td>0.409*</td>
<td>1</td>
<td>0.567*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>CBPM on Employee Productivity</td>
<td>Pearson Correlation</td>
<td>0.277*</td>
<td>0.384*</td>
<td>0.332*</td>
<td>0.417*</td>
<td>0.349*</td>
<td>0.490*</td>
<td>0.567*</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>N</td>
<td>1565</td>
<td>1565</td>
<td>1565</td>
<td>1565</td>
<td>1565</td>
<td>1565</td>
<td>1565</td>
<td>1565</td>
<td>1565</td>
</tr>
</tbody>
</table>

wherein * denotes that Correlation is significant at the 0.01 level (2-tailed)
4.5.2 Structural Self-Interaction Matrix (SSIM)

Two experts, one from the industry and other from the academic field were consulted in identifying the nature of contextual relationships among the business performance parameters. Though ISM methodology suggests the use of expert opinions alone (based on management techniques such as brain storming, nominal group technique etc) in developing the contextual relationship, the correlation coefficients as obtained from the questionnaire survey have also been used to help facilitate the experts in identifying the nature of these relationships. For analyzing the impact on business performance parameters in developing SSIM, the following four symbols have been used to denote the direction of relationship between factor i and j such that i > j:

V = Performance Parameter i will help achieve Performance Parameter j;
A = Performance Parameter j will be achieved by Performance Parameter i;
X = Performance Parameter i and j will help achieve each other; and
O = Performance Parameter i and j are unrelated.

The following statements explain the use of symbols V, A, X and O in SSIM:

“Customer Satisfaction” helps achieve “Market Share” (V);
“Project Delivery” will be achieved by “Employee Retention” (A),
“Cost Reduction” and “Project Delivery” (X) help achieve each others.
“Customer Satisfaction” and “Cost Reduction” are unrelated (O)

Based on contextual relationships, SSIM is developed in the following table
### Table No.: 4.54 Structural Self-Interaction Matrix (SSIM)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Business Performance Parameters</th>
<th>Rank 1</th>
<th>Rank 2</th>
<th>Rank 3</th>
<th>Rank 4</th>
<th>Rank 5</th>
<th>Rank 6</th>
<th>Rank 7</th>
<th>Rank 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CBPM on Customer Satisfaction</td>
<td>•</td>
<td>A</td>
<td>A</td>
<td>O</td>
<td>O</td>
<td>V</td>
<td>O</td>
<td>V</td>
</tr>
<tr>
<td>2</td>
<td>CBPM on Innovation</td>
<td>V</td>
<td>•</td>
<td>O</td>
<td>V</td>
<td>O</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>3</td>
<td>CBPM on Project Delivery</td>
<td>V</td>
<td>O</td>
<td>•</td>
<td>A</td>
<td>A</td>
<td>V</td>
<td>X</td>
<td>V</td>
</tr>
<tr>
<td>4</td>
<td>CBPM on Employee Productivity</td>
<td>O</td>
<td>O</td>
<td>V</td>
<td>•</td>
<td>O</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>5</td>
<td>CBPM on Employee Retention</td>
<td>O</td>
<td>O</td>
<td>V</td>
<td>O</td>
<td>•</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>6</td>
<td>CBPM on Revenue Growth</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>•</td>
<td>A</td>
<td>V</td>
</tr>
<tr>
<td>7</td>
<td>CBPM on Cost Reduction</td>
<td>O</td>
<td>A</td>
<td>X</td>
<td>A</td>
<td>A</td>
<td>V</td>
<td>•</td>
<td>V</td>
</tr>
<tr>
<td>8</td>
<td>CBPM on Market Share</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>•</td>
</tr>
</tbody>
</table>

**Notes:**

Here for i, j;

V: Factor i leads to Factor j;

A: Factor j leads to Factor i;

X: Factor i and j lead to each other;

O: No relationship between i and j

### 4.5.3 Reachability matrix

The SSIM has been converted into a binary matrix, called the initial reachability matrix by substituting V, A, X and O by 1 and 0 as per the case. The substitution of 1s and 0s are as per the following rules:

- If the (i, j) entry in the SSIM is V, the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry becomes 0.
- If the (i, j) entry in the SSIM is A, the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry becomes 1.
- If the \((i, j)\) entry in the SSIM is \(X\), the \((i, j)\) entry in the reachability matrix becomes 1 and the \((j, i)\) entry also becomes 1.
- If the \((i, j)\) entry in the SSIM is 0, the \((i, j)\) entry in the reachability matrix becomes 0 and the \((j, i)\) entry also becomes 0.

Following these rules, the initial reachability matrix for the factor is shown below.

**Table No.: 4.55 Initial Reachability Matrix**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Business Performance Parameters</th>
<th>Rank 1</th>
<th>Rank 2</th>
<th>Rank 3</th>
<th>Rank 4</th>
<th>Rank 5</th>
<th>Rank 6</th>
<th>Rank 7</th>
<th>Rank 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CBPM on Customer Satisfaction</td>
<td>•</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CBPM on Innovation</td>
<td>1</td>
<td>•</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>CBPM on Project Delivery</td>
<td>1</td>
<td>0</td>
<td>•</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>CBPM on Employee Productivity</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>•</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>CBPM on Employee Retention</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>•</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>CBPM on Revenue Growth</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>•</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>CBPM on Cost Reduction</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>•</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>CBPM on Market Share</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>•</td>
</tr>
</tbody>
</table>

After incorporating the transitivity in the ISM methodology, the final reachability matrix is shown in Table 4.56. In the Table 4.57 the driving power and dependence of each factor are also shown. Driving power for each factor is the total number of factors (including itself), which may help to achieve it. On the other hand, dependence is the total number of factors (including itself), on which it may depend to achieve it. These driving power and dependencies will be later used in the classification of variables into the four groups of autonomous, dependent, linkage and independent (driver) variables.
From the final reachability matrix, the reachability and antecedent set for each factor are found. The reachability set consists of the element itself and other elements, which it may help achieve, whereas the antecedent set consists of the element itself and the other elements, which may help achieve it. Then the intersection of these sets is derived for all elements. The element for which the reachability and intersection sets are the same is the top-level element in the ISM hierarchy. The top-level element of the hierarchy would not help achieve any other element above their own level. Once the top-level element is identified, it is separated out from the other elements. Then, the same process finds the next level of element. This process continues till the levels of each element are found. These identified levels help in building the digraph and final model. The results of iterations are summarized below.
Following are the levels found for performance parameters from the above analysis:

- **Level 1** - Customer Satisfaction. Thus, it will be positioned at the top of the ISM model.
- **Level 2** - Innovation.
- **Level 3** - Project Delivery and Cost Reduction.
- **Level 4** - Employee Productivity.
- **Level 5** - Employee Retention.
- **Level 6** - Revenue Growth.
- **Level 7** - Market Share.

### 4.5.5 Classification of Performance Parameters

Based on the driving power and the dependence, these business performance parameters have been classified into four categories:

(I) Autonomous

(II) Dependent

(III) Linkage and

(IV) Independent factors (variables)

The driving power and dependence of each of these BP parameters is shown in the Table No. 4.57 which is derived from Table 4.56. Thereafter, the driving power-dependence diagram is shown in Diagram No. 4.13. To illustrate this diagram, it is observed from the Table 4.57 that the performance parameter one is having a driving power of three and dependence of three, therefore in Diagram 4.13 it is positioned at a place which corresponds to driver power of three and dependency of three. The objective behind the classification of the performance parameter is to analyze the driving power and dependency of the variables.

- The first cluster includes “autonomous parameters” that have weak driving power and weak dependence.
- The second cluster consists of the “Dependent Variables” that have weak driving power but strong dependence.
- The third cluster has the Linkage Variables that have strong driving power and dependence. Any action on these variables will have an effect on the others and also a feedback effect on themselves.
- The fourth cluster includes “Independent Variables” with strong driving power and weak dependence.

Table No. 4.57 Driving Power and Dependence of each Variable

<table>
<thead>
<tr>
<th>Rank</th>
<th>Business Performance Parameters</th>
<th>Driving Power</th>
<th>Dependencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CBPM on Customer Satisfaction</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>CBPM on Innovation</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>CBPM on Project Delivery</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>CBPM on Employee Productivity</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>CBPM on Employee Retention</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>CBPM on Revenue Growth</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>CBPM on Cost Reduction</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>CBPM on Market Share</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

Diagram No.4.13 Driving Power and Dependency Quadrants
a) The Cluster no. I (Autonomous Variable i.e. performance parameters): Following performance parameters falling under Autonomous category:
   - Customer Satisfaction (Rank 1)
   *This variable has weak driving power and weak dependence. This variable is relatively disconnected from the system.*

b) The Cluster no. II (Dependent Variable i.e. performance parameters): Following variables are falling under dependent category:
   - Revenue Growth (Rank 6)
   - Cost Reduction (Rank 7)
   - Market Share (Rank 8)
   *These factors have weak driving power but strong dependence on each other*

c) The Cluster no. III (Linkage Variables). No variables are falling under this category.

d) The Cluster no. IV (Independent Variables i.e. performance parameters): Following performance parameters are falling under this category:
   - Innovation (Rank 2)
   - Project Delivery (Rank 3)
   - Employee Productivity (Rank 4)
   - Employee Retention (Rank 5)
   *These factors have strong driving power and weak dependence on each other*

### 4.5.6 Formation of ISM-based model

From the Final Reachability Matrix (Table 4.56), the structural model is generated by means of vertices or nodes and lines of edges. If there is a relationship between the variables j, and i this is shown by an arrow which points from i to j. This graph is called a directed graph or digraph. After removing the transitivity as described in ISM methodology, the digraph is finally converted into ISM as shown below.
Diagram No. 4.14 ISM-Based model for Performance Parameters
4.5.7 Discussion & Observations of ISM model

The major objective of this study was to identify the performance variables that are significantly affected by CBPM. The following table (table no. 4.58) shows summary of each of these variables based on the ISM analysis.

Table No. 4.58 Summary of each variable based on the ISM analysis

<table>
<thead>
<tr>
<th>Rank</th>
<th>Business Performance Parameters</th>
<th>Survey Ranks</th>
<th>Driving Power</th>
<th>Dependences</th>
<th>Classification of variables</th>
<th>ISM Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CBPM on Customer Satisfaction</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>Autonomous</td>
<td>Mid Level</td>
</tr>
<tr>
<td>2</td>
<td>CBPM on Innovation</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>Independent</td>
<td>Lower Level</td>
</tr>
<tr>
<td>3</td>
<td>CBPM on Project Delivery</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>Independent</td>
<td>Lower Level</td>
</tr>
<tr>
<td>4</td>
<td>CBPM on Employee Productivity</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>Independent</td>
<td>Lower Level</td>
</tr>
<tr>
<td>5</td>
<td>CBPM on Employee Retention</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>Independent</td>
<td>Lower Level</td>
</tr>
<tr>
<td>6</td>
<td>CBPM on Revenue Growth</td>
<td>6</td>
<td>2</td>
<td>7</td>
<td>Dependent</td>
<td>Top Level</td>
</tr>
<tr>
<td>7</td>
<td>CBPM on Cost Reduction</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>Dependent</td>
<td>Mid Level</td>
</tr>
<tr>
<td>8</td>
<td>CBPM on Market Share</td>
<td>8</td>
<td>1</td>
<td>8</td>
<td>Dependent</td>
<td>Top Level</td>
</tr>
</tbody>
</table>

Following are the observation of ISM-based model:

- The results of the survey indicated that Revenue Growth and Market Share are among the top-level variables (i.e. business performance factors). This confirms the established fact that business performance is most dependent on revenue growth and market share.

- Customer Satisfaction and Cost reduction are the middle level variables (i.e. business performance factors). These results were reflected in the model and can be again considered as confirming the established fact that business performance is further aided with better customer satisfaction and cost reduction.
- Project Delivery, Employee Productivity and Employee Retention are at a lower level in the model, however with a greater driving power. This indicates an indirect but stronger impacting contribution of these factors to business performance.

- While Innovation is at the lowest level in the model, however, ISM model suggests that it has a very high driving power. With reference to Innovation, which has emerged as second highest-level in the survey, it is observed that, it finds a low level in the hierarchy of the ISM model. It could be attributed that CBPM leads to innovation, which in turn improves the processes and products, which finally influence business performance. This might be the reason why most respondents regarded it as the most significant variable.

The driving power dependence diagram gives some valuable insights about the relative importance and interdependencies of business performance parameters. The impacts of CBPM on performance emerging from this study are:

- It is observed that 3 BP parameters viz. Revenue Growth, Cost Reduction and Market Share are weak drivers but strongly dependent on the other variables. These three factors are at the top of the ISM hierarchy, therefore considered as the important variables. Senior management of IT companies should therefore, accord high priority in tackling these variables. Besides tackling these variables, management should also understand the dependence of these variables on lower level variables. Changing of CBPM model will have great impact on these.

- It is further observed that four BP parameters viz. Innovation, Project Delivery, Employee Productivity and Employee Retention have strong driving power and are less dependent on other variables. Therefore, these strong parameters may be treated as the root cause of all other variables by Senior management of IT companies as CBPM impact them and it leads to improved Business Performance.
4.6 Suggestions for Future Research

In this research, through various analyses and ISM, a relationship model among the variables has been developed. This model has been developed on the basis of the input from two sources:

(1) Discussion with the experts from industry and academia; and

(2) Results of a questionnaire survey.

Future research may be done considering other measures of competency based performance management which may emerge based on experiences in different geography (other than Pune) and culture (Indian). Other parameters of business performance may be also considered for a study.

4.7 Conclusion

This chapter presented the analysis of the primary data. The findings were derived from feeding the research questions into the developed theoretical framework. The impact of CBPM on the individual, managerial and business performance has been studied. It is found from the literature that CBPM impacts the business performance and statement holds true as well in Indian IT companies with respect to Pune region as per the current research study.