CHAPTER V:
RESULTS AND INTERPRETATIONS

“O Gentle one, of all physical elements, beginning from the sky down to the earth, all the inferior and superior qualities is due only to the final touch glance of the supreme personality of God head.”

- Swami Prabhupada, Shrimad Bhagavatam (224, pp. 224)

The Chapter IV of Data Collection and Analysis has provided the empirical investigation for several hypotheses. This chapter presents the result and interpretations of empirical findings. The comparison of findings of this research with past literature and empirical studies are also mentioned in this chapter.

5.1 Relationship between Quality Practices and Performance Measures

Table 4.17 of previous chapter (Chapter IV) presented the summary of two regression models for SMEs and Large enterprises. The analysis provided the initial comparison between quality practices and performance measures of two firms. The findings of table, are clear and indicative that QA winning large firms shows very high correlation factor (R= 0.98) comparing to SMEs (R= 0.80). The Model shrinkage defined by Adjusted R^2 value; also found more for large enterprise (0.95>0.62) to indicate that QA winning firms are having much better and significant relationship with performance measures in comparison with SMEs.

The Regression Analysis for SMEs (N=189) was presented in Table 4.18. Table provides the preliminary investigation for relationship between quality practices and performance measures. It was indicative from the analysis at 95% of confidence interval three practices, Planning (X2); Customer focus (X3); and Process management (X6) were statically significant (p≤0.05) to performance measures. The correlation coefficient (R =0.80) and model shrinkage (Adjusted R^2 = 0.62) also represented that, there is significant relationship between quality practices and performance.

The results for first three hypotheses (H1-1 to H1-3) were presented in Table 4.20. The analysis for ISO certified SMEs (N=129) indicates that the process management (X6) of ISO certified firm is positive and significant to performance. On other hand two practices of strategic planning (X2) and customer focus (X3) of TQM
practicing SMEs (N=60) were positive and significant to performance. Table 4.20 also provides the outcomes for QA winning firms (N=40). The analysis projects that six quality practices of leadership (X1), planning (X2), customer satisfaction (X3), people management (X5), process management (X6), and supplier relationship (X7) were highly significant (P< 0.05) with performance. The section 5.1.1, 5.1.2 and 5.1.3 describes these results in more detail.

5.1.1 ISO certification and Performance (H1-1)

It was observed from the Table 4.20, that the relationship between the Performance Measures (Y) and the various dimension (X1…… X8) of quality practices are statistically insignificant at 95% confidence level (p≤0.05). $R^2$ is a statistic that will give some information about the goodness of fit of a model. In regression, the $R^2$ coefficient of determination is a statistical measure of how well the regression line approximates the real data points. An $R^2$ of 1.0 indicates that the regression line perfectly fits the data. Adjusted $R^2$ (Adj. $R^2$) is a modification of $R^2$ that adjusts for the number of explanatory terms in a model. Unlike $R^2$, the adjusted $R^2$ increases only if the new term improves the model more than would be expected by chance. The use of an adjusted $R^2$ is an attempt to take account of the phenomenon of statistical shrinkage. The Adj.$R^2$ value of Regression model is 0.529 which indicates that the relationship is statistically insignificant. Only one dimension, Process Management (X6) has shown statically significant (p≤0.05) relationship with performance. Six dimensions, Leadership (X1), Planning (X2), Information analysis (X4), People Management (X5), Supplier Management (X7), and Employee Involvement (X8) are not statistically significant (P≤0.05), indicating further improvement in these dimensions. One dimension, Customer Satisfaction(X3) has infect indicated negative and statically insignificant relationship with performance (p ≤ 0.05) indicating that ISO certification is negatively associated with performance, and furthermore improvement is needed in this dimension.
5.1.2 TQM practices and Performance (H1-2)

Table 4.20 shows more or less similar results like ISO certification, for the relationship between the Performance Measures (Y) and the various dimensions of (X1…… X8) TQM practices. At 95% confidence level (p≤0.05), only two dimensions, Planning (X2), and Customer focus (X3) indicated statically significant (p≤0.05) relationship with performance. The adjusted $R^2$ value is 0.545, which also indicates that the relationship is statistically insignificant. Remaining six dimensions, Leadership (X1), Information analysis (X4), People Management (X5), Process Management (X6), Supplier Management (X7), and Employee Involvement (X8) are not statistically significant (P≤0.05), indicating further improvement in these dimensions. However, it is quite indicative that Customer Focus (X3) dimension has the greatest influence on Performance followed by Strategic Planning (X2).

5.1.3 Quality Awards and Performance (H1-3)

In contrast to SMEs, Table 4.20 has represented more or less similar results between the Performance Measures (Y) and the various dimensions of (X1…… X8) quality practices. At 95% confidence level, six dimensions, Leadership (X1), Planning (X2), Customer focus (X3), People Management (X5), Process Management (X6), and Supplier Management (X7) indicated statically significant (p≤0.05) relationship with performance. Also, the adjusted $R^2$ value is 0.954 (more than 0.60) which, also indicates that the relationship is highly positive and statistically significant. It is further indicative that Customer Focus (X3) dimension has the greatest influence on Performance followed by Supplier Management (X7), Planning (X2), People Management (X5), and Process Management (X6). Only two dimensions, Information Analysis (X4), and Employee involvement (X8) indicated negative and statically insignificant relationship (p≤0.05) with performance measures to suggest further improvement in these dimensions. Figure 5.1 illustrates the relationship between quality practices and performance measures of SMEs and QA winning firms.
5.2 Length of time with quality adoption and impact on Manufacturing Practices and Performance (H2-1 & H2-2)

Given the spread of time in the ISO certification and the implementation of TQM programmes, the impact of length of TQM and ISO 9000 was analysed with respect to the eight manufacturing practices and performance measures in industries. The composite score of TQM practicing SMEs (N=60) was used to test the hypothesis (H2-1) along with the year of implementation with ISO certification and TQM programmes.

Table 4.21, has presented the Bivariate correlation between the length of time with quality adoption (year with ISO certification & TQM programmes) in TQM practicing SME, to provide the impact on manufacturing practices and performance measures.

The result indicates that the length of a TQM programme has significant impact on some of manufacturing practices as well as performance measures. The Pearson correlation coefficient measures the linear association between two scale variables. The correlation was specifically significant (R= 0.76, p ≤ 0.01) for performance measures. It was observed that practices information analysis, people management and supplier...
relationship is not significantly correlated with length of TQM programme at a level of 0.01 and 0.05.

On the other hand the length of ISO certification has shown lesser impact on performance measures (R= 0.47, p ≤ 0.01). It was observed that six practices of customer focus, information analysis, people management, process management, supplier relationship, and employee involvement is not significantly correlated with length of ISO certification at 0.01 and 0.05 significance level.

Finally, The result of Multiple Regression Analysis (MRA) presented in Table 4.22, indicates that length of time using TQM programmes significantly enhances the strength of relationship between quality practices among TQM firms. The performance of TQM firms (accounting year with TQM implementation) has shown significant value (Adj. $R^2$ =0.73, F=80.946, P≤ 0.01) over the standardised performance of TQM firms (Adj. $R^2$ =0.54, F =8.21, P≤ 0.01).

Apart from ISO certified and TQM practising units, this study attempted to provide the relationship between TQM implementation year and impact on manufacturing practices and performance of QA winning large firms. The Bi-variate analysis was used to test hypothesis (H2-2). Table 4.23 has indicated that except information analysis and employee involvement, all other six quality practices were significant ($r \geq 0.6$) with performance measures at 0.01 and 0.05 level. This finding has shown the similar outcomes of regression analysis. The further investigations also represented that information analysis was not significant ($r \leq 0.6$) with leadership, planning, people management, process management, supplier relationship, and employee involvement. The other dimension of employee involvement also represented the similar type of correlation ($r \leq 0.6$) with all other manufacturing practices and also shown negative correlation ($r =-0.014$ at $P>0.05$) with process management.

To test (H2-2), the another Bi-variate analysis as presented in Table 4.24, provides the result that length of time with Quality award guidelines was positive and significantly correlated ($r \geq 0.6$) to leadership; planning; customer focus; information analysis; people management; process management; and manufacturing performance at 0.01 significance level. It was observed that two practices, supplier relationship and employee involvement were not significant ($r < 0.6$) with performance at 0.05 level, to
indicate that further improvements are needed in these dimensions. This outcome again confirms the findings of regression analysis and previous bi-variate analysis.

On the other hand length of time with ISO certification in QA winning firms, has shown insignificant relationship \( (r \leq 0.6) \) with all other practices and performance. One interesting observation was also noted that certification has shown negative correlation \( (r = -0.13, P> 0.05) \) with employee involvement.

5.3 Impact of approaches to adopting quality on Manufacturing Practices and Performance of SMEs (H3)

In order to examine the impact of the approaches taken by organizations in implementing quality on manufacturing practices and performance (H3), the sample of TQM practicing SMEs was divided into three groups based on order in which ISO 9000 and TQM were implemented.

Table 4.25 provides the means for performance of three groups. The results are clear indicative that performance is higher in those firms, implemented TQM before ISO 9000. The interesting outcome was noted as performance is lower in those firms, had implemented ISO 9000 and TQM simultaneously.

The ANOVA for three groups was presented in Table 4.26. The first group (implemented TQM after ISO 9000) has shown highest mean for leadership \( (\text{Mean}= 4.02, F=3.33, P< 0.05) \) followed by people management \( (\text{Mean} =3.91,F=3.24, P< 0.05) \) and the lowest mean for planning \( (\text{Mean} =3.46, F=0.75, P> 0.05) \)

The second group (implemented TQM and ISO 9000 simultaneously) has shown the highest mean for leadership \( (\text{Mean} = 3.98, F=3.62 , P< 0.05) \) and the lowest mean for \( (\text{Mean} = 3.16, F=1.16 , P> 0.05) \)

The Third group represented the highest mean for leadership\( (\text{Mean} = 4.07, F=3.28 , P< 0.05) \) followed by planning \( (\text{Mean} = 3.94, F=4.05 , P< 0.05) \) people management \( (\text{Mean} = 3.91, F=3.61 , P< 0.05) \) and lowest mean for information analysis \( (\text{Mean} = 3.78, F=1.62 , P> 0.05) \)
5.4 Quality Practices significant with winning the Quality Awards (H4)

The result of H4, has indicated the highest means for QA practices, followed by TQM practices and finally lowest means for ISO 9000 practices.

The ANOVA for three groups was presented in Table 4.27. The first group of ISO certified SMEs represented the performance mean of 2.96 with 5.5 years of ISO certification. Among different quality manufacturing practices leadership has shown highest mean of 3.41, while supplier relationship was having the lowest mean of 2.76.

The second Group of SMEs practicing has shown the performance mean of 4.12 with 10.2 years of TQM implementation and 8.8 year with ISO certification. Among quality manufacturing practices leadership again represented the highest mean of 4.07, while both supplier relationship and information analysis have represented the lowest mean of 3.76.

Finally, the third group of QA winning firms, has represented the performance mean of 4.46 with 12 years of TQM practices and 6.0 years with ISO certification. Among the quality practices leadership once again represented the highest mean of 4.51, while information analysis was found with the lowest mean of 4.36. The second lowest mean value of 4.40 was found for supplier relationship. This group has focused specifically on QA guidelines implementation since past 7.2 years in their firms.

5.5 Impact of other factors on Quality Practices and Performance (H5-1 to H5-5)

The result of MANOVA for the first hypothesis (H5-1) was presented in Table 4.28. The finding shows the values for Pillai's Trace (F=2.361, P≤ 0.05), Wilks' λ (F = 2.904, P≤0.05), Hotelling's Trace (F=3.675, P≤0.05), and Roy's Largest Root (F = 11.133, P≤0.05), which indicates that using any of these four tests of multivariate difference confirms that combined dependent variables varied with performance measures. In other words, analysis has indicated that similar significance values for four intercepts and their combined effect on performance are not similar and influences the performance either positively or negatively.

To obtain the effect of an individual variable on performance Table 4.29 indicates the test between subject effects at 95% confidence interval (α =0.05). The F-tests shows there is no significant impact of age of Industry (F= 1.445, P>0.05), and type of
manufacturing ($F = 0.909, P>0.05$) on performance measures. However significant impact was observed for size of SMEs ($F=2.481, P <0.05$) and annual sale turnover ($F=8.970, P<0.05$). In same table, the results of MRA also indicates that, in SMEs; size of firm (Adjusted R Squared $=0.206$) and for annual sales turnover (Adjusted R Squared $= 0.583$) provides significant contribution to improving the manufacturing performance.

The Multivariate results for (H5-2) and (H5-3) were presented in Table 4.30. For ISO certified SMEs (N=129) and TQM practicing SMEs (N=60). The intercepts and performance models for both groups have indicated that there are difference in significance values for individual intercepts and model, to represent the similar type of influence on performance measures. It was observed further that Roy's Largest Root was comparatively smaller for ISO certified SMEs (Value 0.39, $F =1.56, P> 0.05$) and TQM practicing industries (Value 0.15, $F=2.08, P> 0.5$) in comparison with other three variables to indicate at least one or two variables are negatively influencing the performance.

Table 4.31 provides the results of Multivariate tests(H5-4) for QA winning firms(N=40). Table indicates the values for Pillai’s Trace ($F=1.69, P> 0.05$), Wilks’ λ ($F =1.61 2.904, P>0.05$), Hotelling’s Trace ($F=1.45, P> 0.05$), and Roy’s Largest Root ($F =26.45, P≤0.05$) to represent positive influence on performance.

The results of hypothesis test (H5-5) are shown in Table 4.32. It was observed that for ISO certified SMEs, the size of firm (Adj. $R^2= -0.009$) and annual sale turnover (Adj. $R^2= -0.008$) were negatively associated with performance. For TQM practicing SMEs, all variables were observed positive, and size of firm (Adj. $R^2= 0.656$) was statically significant to performance. Finally, for QA winning firms all values were positive, and statically significant to performance (Adj. $R^2 > 0.60$).

5.6 Impact of Quality practices on different performance measures (H6-1 and H6-2)
Prior to examining the impact of quality practices on several performance measures, the descriptive for SMEs and LE were presented in Table 4.33.

ISO certified SMEs have reported the highest mean (3.47) for reduction in inspection cost to suggest the improvement in processes along with improvement in product features (3.37) and labour productivity (3.31). Regarding customer focus, it was indicative that ISO certifying firms are observing improvement in customer services (3.37). However lowest means were observed for defect reduction (3.29) and employee motivation (3.30). It is important to mention that ISO certified firms haven’t reported significant mean for any of the financial indicators.

The QA winning firms have reported highest mean for customer satisfaction (4.62) followed by ROA/ROI (4.52), employee involvement (4.47), product innovation (4.45), and Reduction in operation cost (4.45). However lowest means were observed for labour productivity (4.35) and improvement in competitiveness (4.42).

To investigate further, the difference in performance measures of SMEs and LE the results of (H6-1) and (H6-2) were presented in Table 4.34 (a, and b) and Table 4.35 (a and b) respectively. The Regression model for SMEs has indicated the lower values (Adj.\( R^2 = 0.59, F = 47.60, P < 0.05 \)) than LE (Adj.\( R^2 = 0.77, F = 3.06, P < 0.05 \)). The regression coefficients of Table 4.35 (a) represented that ISO practices are statically significant (\( P \leq 0.05 \)) with product features, labour productivity, inspection cost, customer services. However statically insignificant relationship was observed for Defect reduction and employee motivation (\( P > 0.05 \)). Table 4.35 (b) of QA winning firms have shown statically significant relationship (\( P \leq 0.05 \)) with labour productivity, product innovation, reduction in operation cost, increase in ROA/ROI, improved competitiveness, and customer satisfaction, while insignificant relationship (\( P > 0.05 \)) was observed for employee motivation.
This section presents the interpretations of empirical findings of section 5.6. The comparison of results with past literature is also presented in this section.

### 5.7.1 Quality practices and relationship with Performance

One of the important points was mentioned previously by Ahire [12],

"...that less TQM practicing (or no TQM practicing) units are operating at less operational performance level, with less number of employees and no focus on training aspects, no exposure to SPC usage and design quality management in their firms. This substantially leads to low performance and less returns on investment (ROI) due to absence of “good quality practices” in their organizations."

This study, after empirical investigation of ISO certified (no TQM practicing) firms (N=129), found the similar type of results.

The result of first hypothesis (H1-1) testing indicated the impact of ISO certification principles; on performance measures are some what similar to past
empirical findings of Simmons and White [216], Romano [198], Withers and Ebrahimpour [62, 245-247], Quazi et al [186-188], Costa & Lorente [146] Dimara [55] Hongmeng et al. [101] Sedani and Lakhe [207] to represent that, there is very little influence of ISO certification on performance; since outcomes of this study also reported for significant relationship of only dimension i.e. processes management with performance measures.

However, above finding does not supports to the argument of past findings of Gotzamani and Tsiotras [84] and Prajogo and Brown [181] have mentioned in their studies: ‘Even though being introduced as process management model for managing the quality and continual improvement, we found ISO 9000 QMS does not provide any impact on process improvements in manufacturing firms.’ On contradictory, the finding of this study, has replicated that, “ISO certification at least provides the significant relationship with process improvement in manufacturing firms, due to its proper and rigorous documentation procedures, needed for attaining the certification.”

Regarding customer satisfaction, our study has supported to the findings of recent past, Mile Terziovski and Sohal [156], Inaki et al. [103], Costa and Lorente [149], Samat et al. [200], and Paulo et al. [177] to conclude that, “ISO certification does not provide any impact on increasing the customer satisfaction in firms; instead it provides negative approach towards managing the customers.”

The plausible reason, for this argument can be justified with the past literature, “…Since such certification is merely one step towards putting a tag as marketing tool, and in the absence of good quality practices (No TQM), most of the certified units are found lagging towards commitment from the top management to address the customer satisfaction.” [229]

It can be concluded further that, “Due to Bureaucratic approach of system with internal orientation on processes and responsibility mostly on managers to maintain Quality, ISO 9000 QMS doesn’t provides positive impact on manufacturing performance.” [80, 181, 222, 252]

The second hypothesis (H1-2) provided the relationship between TQM practices and performance measures. The findings for TQM practicing firms (N=60) were aligned with the past findings of Ahire [12] Rao et al. [195], Dow et al. [58], Samson and Terziovski [201], Taylor and Wright [229], Lorente and Costa [147], and Tervonen et al.
emphasizing the importance of TQM practices in firms to maintain the customer satisfaction.

The other dimension of strategic planning was also noted positive and significant with performance measures, which supports to the Deming’s [52] notation “Company must spend much time and efforts focusing on what customer want and need and appropriate quality planning is the first step towards achieving the customer satisfaction.” His philosophy begins with top management but maintains that a company must adopt the fourteen points at all levels. He believes that quality must be built into the product at all stages in order to achieve a high level of excellence.

Thus results are significant to conclude that TQM practicing SMEs have shown more focused mechanism for customer satisfaction and build there quality practices imbibed with well supported strategic plans. The finding provides the evidence that TQM organizations aim to excel in certain areas, regardless of their place of incorporation. This supports the Juran [117] when he says that the culture does not influence the approaches to TQM implementation.

The third and final hypothesis (H1-3) provides the investigations for QA winning large firms, and this finding adds certain information to link the QA models in the debate of ISO 9000 and TQM. These outcomes are from those industries bagged national Quality Award in recent past, and resembles the past work of Axland [21] has carried the empirical investigations for small US manufacturing firms, obtained the MBNQA for business excellence. However, the basic difference between the findings of this study, and his work is nothing else than size of the firm, since the inferences of present work is for large enterprises, not for SMEs. It is quite important to mention here, the size of the firms in both studies is different, but outcomes are quite similar to define the relationship quality practices and performance measures.

In past Bemowski and Stratton (1995) selected sample of large manufacturing firms in US, to investigate the usefulness criteria, however that study failed to establish a link between MBNQA and performance(as stated in 201, p. 395). The findings of this study indicated that quality practices (including top management support) of QA winning firms, have provided the foundation for the predictions of many scholars like David et al. [50], Ramirez and Loney [194], Neergaard [168], Martensen and
Dahlgaard [151], Sun [222], Kanji et al.[120], Lee et al. [121], Jha [114], Tanner and Oakland [226], Xie et al. [249] recommended the implementation Business Excellence Models for successful achievement of TQM along with continual improvement in performance. In past, importance of RGNQA in context to Indian manufacturing industries was already mentioned by Tan and Kho [225]. This study not only supports to his argument about the usefulness of RBNQA in Indian Manufacturing firms to increase the organizational competitiveness and benchmarking, but also provides an extension to his recommendations as, “The empirical outcomes of this study has pointed that apart from RGNQA, the other three Quality Award models of CII EXIM, GPNQA, and IMC RBNQA also contributes equally to achieve higher performance outcomes in Indian manufacturing firms.”

**Table 5.1: Result and Inferences for First Research Question (R1)**

<table>
<thead>
<tr>
<th>Industry Type</th>
<th>Hypothesis</th>
<th>Empirical Findings</th>
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<tbody>
<tr>
<td>ISO certified SMEs (N=129)</td>
<td>H1-1: There is significant relationship between ISO 9000 Principles and Performance Measures</td>
<td>Practices significant with performance measures: Process Management (t&gt;3.0 and p &lt; 0.05)</td>
</tr>
<tr>
<td>ISO certified and TQM practicing SMEs (N=60)</td>
<td>H1-2: There is significant relationship between TQM Practices and Performance Measures</td>
<td>Practices significant with performance measures: Strategic Planning and Customers focus (t&gt;3.0 and p &lt; 0.05)</td>
</tr>
<tr>
<td>Quality Award winning large enterprises (LE) (N = 40)</td>
<td>H1-3: There is significant relationship between Quality Award Guidelines and Performance Measures</td>
<td>Practices significant with performance measures: Leadership, Planning, Customer focus, People Management, Process Management, Supplier Relationship (t&gt;3.0 and p &lt; 0.05)</td>
</tr>
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</table>

**Major findings**
- Practices significant with performance measures: Process Management (t>3.0 and p < 0.05)
- Practices significant with performance measures: Strategic Planning and Customers focus (t>3.0 and p < 0.05)
- Practices significant with performance measures: Leadership, Planning, Customer focus, People Management, Process Management, Supplier Relationship (t>3.0 and p < 0.05)

**Finding Supports**

**Finding does not**
- Gotzamani and
5.7.2 Impact length of time with quality practices on Manufacturing Practices and Performance

Ahire [12] has suggested that length of TQM implementation will be realised over a period of time. Hongmeng et al.[101], in their analysis of Shanghai manufacturing industries found that length of quality management implementation is not related with TQM practices and results. On the other hand, Youssef et al. [252], and Prajogo and Brown [180] mentioned that length of time with quality implementation in firms is positively correlated with business performance.

The analysis for TQM practicing SMEs (H2-1) have reported the findings similar to past work of Ahire [12], Agus et al.[7], Prajogo and Brown [181] to maintain the significant correlation between the length of TQM adoption and level of manufacturing practices in SMEs. The length of TQM adoption is also significantly correlated to TQM performance (e.g. Productivity) which has similar scope with manufacturing performance, and this is also reported in the study by Powell [178], particularly in terms of employee training and process improvement. Ahire [12] in his study found that more years with TQM, shows the execution of more number TQM constructs to indicate further, “If managed properly, TQM efforts do pay off in a relative shorter time, and it is possible to attain higher operational performance in shorter horizon.”

On the other hand, the length of ISO certification has shown lesser impact on manufacturing practices and performance. In particular, the insignificant impact of the length of ISO 9000 implementation on performance measures expands the implications of findings of the previous studies, Such as Abraham et al. [2], Terziovski et al. [231], Wiele and Brown [32], Rahman [190], Mile Terziovski and Sohal [156], Prajogo and Brown [180], and Costa and Lorente [148-149]. Whilst these studies show that there is no significant difference on manufacturing practices and performance of ISO certified companies, our study advances the findings by showing that, “Insignificant value of ISO certification does not change over time.”
Based on empirical investigations, this study disapproves the argument of Hongmeng et al. [101]; that length of QM implementation is not related with TQM practices and results, since the other analysis of TQM firm of this study, also reported that accounting years with QM implementation in TQM practicing firms, have shown much significant correlation with manufacturing practices and performance, over the performance of TQM firms without accounting the years with QM implementation. This once again supports what is held by TQM scholars that TQM needs to be implemented with a long term vision and should not considered as ‘quick fix’ tool. Whilst these findings may support the obvious they do illustrate that consequences of sticking with TQM ultimately provides performance benefits.

Apart from ISO certified and TQM practising units, this study has attempted to investigate the relationship between TQM implementation year and its impact on manufacturing practices and performance of QA winning large manufacturing firms. The empirical finding (H2-2) has indicated that even in QA winning firms, the length of ISO certification has shown insignificant correlation with all manufacturing practices (except process management at 0.05 level) and performance. This finding is not different than previous analysis for ISO certified and TQM practing SMEs to advance the previous argument by adding the investigations from large manufacturing firms to mention further “The insignificant value of ISO certification with respect to performance remains same in SMEs and large firms.”

5.7.3 Approaches to quality adoption in firm and its impact on Manufacturing Practices and Performance

The structure of ANOVA table appears to be somewhat different to that in the study by Wiele and Brown [32], where the majority of respondents see ISO as preceding TQM and as a relevant first step in implementing a TQM programme, and considered it as a good basis to start the process of quality improvement, while only few felt that TQM and ISO could not be implemented simultaneously and very few thought that TQM should be implemented before ISO 9000.

The result of ANOVA table, to test the hypothesis (H3-1) shows the difference of the means scores on the quality management practices for each group. Comparative analysis indicated that Group 3 (implemented TQM before ISO 9000) shows highest
scores on most quality management practices and performance measures, followed by Group 1, and finally group 1. This difference although not significant, corresponds with the year of TQM implementation and is not affected by length of ISO 9000 certification.

Prajogo and Sohal [180] suggests that ‘firms who implemented TQM programme prior to seeking ISO 9000 certification were probably more committed to broader concepts of quality than certification and resulting benefits in terms of performance(p. 45)’

5.7.4 Quality practice significant to win the Quality Awards

The result of ANOVA of three groups provides that firms implemented only ISO 9000 practices for continual improvement are having lower means in comparison with other two groups of TQM practicing and QA winning units.

In comparison to ISO certified SMES, TQM practicing firms have shown improved means with performance and few manufacturing practices with 10 years of TQM practices and around 09 years with certification.

The analysis has indicated that third group of QA winning firms have implemented TQM practices since past ten years, while treated ISO certification practices secondarily (just six years of implementation). Infect, it was further indicative that along with TQM they specifically adopted QA Model guidelines since last seven years. Thus to win quality awards they adopted more years of TQM practices and QA guidelines, in comparison to ISO 9000 practices. Apart from QA model, the outcomes of highest performance means and other manufacturing practices are representing the evidence of their effort.

Thus above empirical finding supports to the past work of Sun [222] and Terziovski and Samson [232] to conclude; Business Excellence Models are nothing but integrated approaches to TQM and these practices are highly significant to winning the Quality Awards.

Regarding ISO certification practices, present finding does not support to Mann and Voss [144], found positive linkage between ISO 9000 and MBNQA and did not agree with the argument of Inaki et al. [103] that ‘ISO 9000 is motivational tool for EFQM’. Instead the finding has represented that, ‘More years with ISO 9000 is not
significant to bag the Quality Award, while more years with TQM (along with QA guidelines) is highly significant to win the Quality Awards.’

5.7.5 Impact of other factors on performance of a firm

The multivariate tests results of SMEs have indicated that intercepts individually provides different results than collectively in a group. The tests between subjects of effects also indicated low partial eta squared values for age of firm, size of firm and type of manufacturing to represent SMEs are having very weak association between these factors and performance of firm.

The separate analysis for ISO certified SMEs (N=129) have indicated that there is similar type of effect of all factors on firms performance, since partial eta squared values were very low for collective intercepts and performance. Thus it can be concluded that other factors does not provide any significant contribution to improve the performance of SMEs, instead they are negatively influencing the performance.

The finding support to the argument of Anderson and Sohal [17] ‘Organization concerned with improving the performance in SMEs need to concentrate on their resources (p. 875)’ In ISO certified SMEs resources are low and in the absence of appropriate crew size, and proper technological up gradation irrespective of establishment year, SMEs are unable to raise the annual turnover and performance. In past, Ahire and Golhar [13] in their comparative study of large and small firms have mentioned that ‘Most ISO certified SMEs are negatively influenced by size of firm and age of competitiveness, which ultimately results in low performance outcomes (p. 11)’. In recent studies, Hongmeng et al.[101], and Samat et al. [200] also found the similar outcomes with their studies in Thailand and Malaysia to represent that ISO certified firms are influenced by other factors in order to achieve the higher performance outcomes.

The TQM practicing SMEs, two variable of size of firm and annual sales turnover has shown higher partial eta squared values (0.65 and 0.74) to represent that performance of TQM practicing SMEs is positively influenced by no. of employees and annual turnover. This finding supports to recent finding of Arumugam et al. [19] that in ISO certified SMEs, the inclusion of TQM practices improves competitiveness and
annual sales turnover. However, present study also reported about no influence of age of firm (Partial eta square=0.027) and negative influence of type of manufacturing (Partial eta square =0.07) to indicate further improvements in these dimensions.

The findings for QA winning firms has indicated that all four factors both individually (all Partial eta square values > 0.90) and collectively (All Partial eta square values >0.80) provides positive influence on performance measures. This finding is aligned with recent study of Tari et al., (2007) mentioned that the successful adoption of TQM (or BE) impacts on the performance of a firm and financial results. Kaynak [124], and Wilford [244] also found that BE has a positive effect on firm performance, whilst Oakland [171] state that BE “is of benefit to organisations”.

To address the concluding part of research question (R5) that impact of other factors assists in differentiating SMEs with LE, the findings of this research has indicated that ISO certified SMEs and QA winning firms have shown different outcomes with regards to age of firm, size of firm, type of manufacturing and annual sales turnover. In only ISO certified SMEs, size of firm has shown negative impact on performance, since SMEs usually pay little conscious or systematic attention to maintain the suitable firm size and the use of innovation management techniques is also limited in SMEs. Less than a third of SMEs with fewer than 50 employees use techniques like benchmarking or SWOT analyses for strategy formulation [178]. The other finding for annual turnover of ISO certified SMEs also reported no relationship with performance. However, it is to be noted that second group of TQM practicing SMEs has reported that there is positive impact of employee size and annual turnover on manufacturing performance, because in general TQM practicing SMEs are more likely to be followers than pioneers (except for a small number of highly innovative SMEs) and generally spend less time and money on formal R&D than large companies and therefore very rarely introduce innovative products and instead, they are much better at developing new product-market combinations and adapting existing products to the demands of niche markets, which helps them in reaching the annual sales target [196], Samson and Terziovski [202], Gulbro et al. [80], Dimara [55]. In contrast QA winning LE has shown positive impact of all four factors on performance to indicate that these firms are maintaining appropriate employee size and have adequate human resources for quality
management and continual improvement. Age of industry indicates the richness in experience to understand the quality related issues and focus on proper implementation of quality. Positive impact of type of manufacturing represents that these firms are putting sincere efforts on selection of technology which supports to lead the expertise in manufacturing and innovative culture in organization. Finally, positive impact of annual sales turnover has indicated the growth in sales, ROA and ROI and increase in market shares.

5.7.6 Difference between performance outcomes of SMEs and LE

The finding provided the initial inference that ISO certified SMEs have shown the significant relationship with improvement in product features to support the previous findings of Samson and Terziovski [203] that ISO certification helps in improving the product features. The improvement in customer services was also found significant in finding to support the argument of Ho SKM [99], ‘ISO 9000 can provide the better start for improving delivery schedule and customer services; however to obtain the satisfied customers one must need to incorporate TQM culture in SMEs.’ The two other parameters of labour productivity and reduction in inspection cost also suggest that ISO certification can provide significant improvement in performance. This finding supports to the outcomes of (H1-1) since proper management of processes has indicated the improvement in product features, reduction in inspection cost and improved labour productivity.

This finding supports to the work of Kuratko, Goodale and Hornsby [122] that ISO certification in SMEs provides competitive advantage through process management and planning for improving the labour productivity. The significant value of employee motivation, has indicated that ISO certification initiates motivation for employee and this finding also supports to the statement of Mohanty and Lakhe [161] that ‘ISO 9000 is beginning of employee involvement in to the quality planning and building quality policy, since top management has shown their involvement for continual improvement in their firm and taking employees in to confidence that they are committed for quality and would like to provide necessary infrastructure, resources and training to meet the several quality objectives’.
The QA winning firms have shown significant relationship between labour productivity and quality practices and also indicated that these firms are capable to introduce innovative products in the market. The finding supports the claim of Thawesaengskulthai & Tannock [233], that ‘BE models supports the decision-aid to introduce innovative culture in the organization along with TQM practices’. The other important dimension of customer satisfaction was also noted significant in QA firms, which support the findings of Jha [114-115] and Adebanjo & Mann (5, p.1), “Excellence in strategies, business practices, and customers and stakeholder-related performance results that have been validated by assessments using proven business excellence models (BEMs)”. The finding also indicated that quality award practices also improves the operation cost and provides higher financial returns in terms of ROA and ROI. Saunders et al. [186] provided the reasons for adopting BE Models:

- BE provides a rigorous and sensible approach to identifying strengths and opportunities,
- BE guides the organisation’s continuous improvement effort
- BE co-ordinates a range of initiatives
- BE provides an external measure of performance
- BE educates staff on the characteristics of successful organisations
- BE allows companies to become “world class”
- BE improves organisational performance, and
- BE allows benchmarking against others in the same industry as well as those from other industries.

The finding also indicated QA practices has insignificant relationship with employee motivation, however positive significance of other quality dimension do not supports to this notation. It is important to mention that Hypothesis (H1-3) also provided similar type of outcome when performance measures were examined as single construct with other eight constructs of quality practices. In recent attempt, to find the limits of quality award incentives Wilford [244] found the similar type of results of low response for employee satisfaction in BE award winning firms. He mentioned the reason for low employee satisfaction in QA winning firms as,
...that most firms employed BE model practices see strategic planning, leadership, market growth, cultural and values, and innovation in products and services along with employee skill development and training as most important long term goal and consider employee satisfaction and dissatisfaction important for business excellence in short term goals, thus when asked to respond for employee satisfaction and involvement, we found non-significant relationship between employee satisfaction and performance.

Finally, to address the issue that all above findings provides any difference in relationship between quality practices and performance measures, and this part is presented as conclusion of this chapter in next section 5.8

5.8 DISCUSSION AND CONCLUSION

The first research question (R1) provides the difference in relationship between quality practices and performance measure, since the outcomes of ISO certified SMEs, TQM practicing SMEs and QA winning firms were significantly different than each other.

The second research question (R2) also indicates the difference in relation ship between manufacturing practices and performance, since length of time with TQM implementation in industries was found significant with performance measure, and all quality practises. In contrast length of time with ISO certification implementation has shown no significant improvement in performance measure and insignificant correlation with quality practices.

The third research question (R3) also represents the difference in manufacturing practices and performance of TQM practicing SMEs after examining the outcomes of performance measure. The finding suggests that firm implemented TQM before ISO 9000, have shown higher means for manufacturing practices and performance measure, in comparison to other two approaches of quality adoption.

The forth research question (R4) also indicates the difference between quality practices and their association with winning of quality awards in industries, as it is evident from finding that TQM practices are more significant to win the quality award in comparison to ISO certification.

The fifth research question (R5) also provides the difference in manufacturing performance of SMEs and LE since size of firm and annual sales turnover has shown negative influence in ISO certified SMEs. While, in TQM practicing SMEs, both size of
firm and annual sales turnover found significant association with manufacturing performance. The other two factors type of manufacturing and age of industry were found neither significant nor insignificant with manufacturing performance in SMEs. In contrast, all four factors have indicated significant association with manufacturing performance.

The empirical finding thus differentiated SME from LE, since culture of large manufacturing firms has represented that in their organization, the age of firm, size of employee, type of manufacturing (technology), and annual sales turnover also equally focused for attaining continual improvement along with deploying several quality practices.

The sixth research question (R6) also represents the difference in performance indicators of SMEs and LE. The finding indicates that SMEs are unable to achieve product innovation, although quality practice assists in improving the product features. Regarding improvement in processes, the quality practice in SMEs leads to reduce the inspection cost, but unable to prevent the defects in manufacturing. Whilst in large firms; quality practice helps in improving the operation cost along with improving the labour productivity. Regarding financial improvements, SMEs hasn’t shown any improvement in ROA/ROI, while QA winning large firms have shown significant improvement in ROA/ROI.

The overall summary of findings of this research along with recommendations, limitations and scope for future work is presented in chapter VI.