

University of Wollongong - Research Online

Thesis Collection

Title: Business success and ABEF evaluation results: on the nexus between manufacturing results and frameworks for business excellence

Author: Alexander Hausner

Year: 1999

Repository DOI:

Copyright Warning

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site.

You are reminded of the following: This work is copyright. Apart from any use permitted under the Copyright Act 1968, no part of this work may be reproduced by any process, nor may any other exclusive right be exercised, without the permission of the author. Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material.

Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

Unless otherwise indicated, the views expressed in this thesis are those of the author and do not necessarily represent the views of the University of Wollongong.

Research Online is the open access repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

1999

Business success and ABEF evaluation results: on the nexus between manufacturing results and frameworks for business excellence

Alexander Hausner
University of Wollongong

Recommended Citation

Hausner, Alexander, Business success and ABEF evaluation results: on the nexus between manufacturing results and frameworks for business excellence, Doctor of Philosophy thesis, University of Wollongong. Dept. of Mechanical Engineering, University of Wollongong, 1999. <http://ro.uow.edu.au/theses/1573>

NOTE

This online version of the thesis may have different page formatting and pagination from the paper copy held in the University of Wollongong Library.

UNIVERSITY OF WOLLONGONG

COPYRIGHT WARNING

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site. You are reminded of the following:

Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material. Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.



UNIVERSITY OF WOLLONGONG

**BUSINESS SUCCESS AND ABEF EVALUATION
RESULTS**

**On the Nexus between Manufacturing Results and
Frameworks for Business Excellence**

A thesis submitted in fulfilment of the requirements for the award of the degree

Doctor of Philosophy (PhD)

from

UNIVERSITY OF WOLLONGONG

by

Alexander Hausner, Dipl.-Wirt. Ing.

Department of Mechanical Engineering 1999

Executive Summary*

The aim of the study was to find whether quantitative evidence exists to link the Australian Business Excellence Framework (ABEF) with business outcomes. Improvements in the top key performance indicators (KPIs) of 22 manufacturers are considered against their ABEF evaluation scores.

The Results

- ❶ The findings show a direct link between performance in the Awards and annual improvements in bottom line results. Organisations achieving high ABEF scores were found to belong to that group of firms with the highest performance across a wide range of indicators, including financial results and productivity. This also manifests itself in profitability measures.
- ❷ Every percent of improvement in the ABEF score is associated with an approximate 2% increase in the average annual KPI improvement. Multiple-award-entering companies have received even stronger relationships (ca. 4%) than those which participated only once.
- ❸ Higher-scoring organisations have been more successful in achieving positive improvements in their business results from year to year.
- ❹ Management aspects such as 'senior executive leadership', 'analysis and use of data and information', 'measures of success' and 'planning processes' were found to be of particular importance.
- ❺ Simple equations were developed which organisations can use to focus their improvement efforts, and benchmark their benefits from applying the ABEF.

The Methodology

This research, based on rigorous principles, involved 22 manufacturing companies across a range of 13 different industry sectors with sizes ranging from 25 to over 2000 employees. All companies had participated in the Australian Quality Awards for Business Excellence between 1992 and 1997, some more than once, but not all were winners. This group includes data from a wide array of low and high performing organisations with respect to both ABEF evaluation results and KPIs. The Award scores were correlated with the same organisations' past business results. Nearly 1000 numerical, longitudinal and factual business performance measurements were taken, including typical bottom-line measures such as profitability, sales, costs and productivity with an overall emphasis on financial results.

In conclusion it can be said that an organisation's success is clearly linked to the effectiveness of its management practices, as reflected in the ABEF evaluation results.

* This research project has created significant interest amongst management practitioners and leaders. Hence two types of summaries are presented. The 'Executive Summary' is aimed at the non-academic audience, whilst the 'Abstract' is a more traditional way of providing an overview of this PhD thesis.

ABSTRACT

A scarcity of information concerning the real impact of implementing Quality Management strategies on organisational performance is believed to be the principal reason why many organisations are still hesitant to adopt a Quality Management philosophy, and continue to perceive it as a theory with little applicability or benefit for their particular business environment.

The principal aim of this study is to investigate the relationship between management practice and business performance of organisations that have been evaluated through the Australian Quality Awards for Business Excellence. Based on quantitative analysis and empirical validation methods, evidence for the existence or non-existence of benefits is identified, from factual information, which leads to a conclusion of the debate as to whether this concept “works or not”. This part of the study also aims at testing the capability of a new model for explaining and predicting the overall business performance of manufacturing organisations with the input of Awards scores and other relevant business information.

A secondary aim is to explore the “Best” management practices of high performing organisations with a particular emphasis on common themes and attributes.

The ABEF, formerly known as the Australian Quality Awards framework, is used as a measure of the goodness of organisations’ management practices. Results in the form of scores are generated using a consistent and repeatable process of independent team evaluation, which are correlated with empirical factual data on the same organisations’ past Business results. Here ‘business results’ are defined as the top priority Key Performance Indicators (KPIs) of Australian manufacturing organisations, which have been evaluated in the period between 1992-1997. They include typical bottom-line measures such as profitability, sales, costs and productivity. Other relevant business data and information used for explaining business success includes specific industry characteristics such as rivalry, entry barriers and agility.

The study draws upon 22 different manufacturing companies, which participated in the Awards during the six years between 1992 and 1997. The companies are taken from a broad range of 13 different industry sectors and their sizes range from 25 to over 2000 employees. This well-diversified sample group includes data from a wide array of low and high performing organisations with respect to both AQA scores and KPIs.

Business performance measurements taken were mainly longitudinal (up to 8 years), numerical and factual observations. The business performance analysis is based on 945 data points in 283 Key Performance Indicators (KPIs) with a clear emphasis on financial results (one third) and other measures which are of primary concern to the business owner (i.e. two thirds). These business results have been compared to 34 Awards evaluation results, which consist of over 950 sub-scores. The framework specific analysis used the original population's 75 evaluation results with over 2000 data points (i.e. sub-scores).

In addition, surveys aimed at identifying industry characteristics regarding the existence of entry barriers, rivalry and features of agility (on a 5 point Leichhardt scale) were conducted.

Qualitative information on special events, or factors with significant relevance to business results, was collected during interviews and taken into account for the quantitative analysis which involved mainly correlation and multiple regression methods to test the association between the numerous variables. For this purpose factual business success records of the organisations' most important performance indicators were collected, analysed and summarised with the computation of overall annual improvement indices. Their relationships with the same organisations' Awards evaluation scores were investigated. A specific aim of this study was to address issues identified as shortcomings in recent research (e.g. bias and subjectivity of perception-based data).

This research outcome clearly identified a strong positive correlation between the Quality Awards evaluation scores and improvements in bottom line business results, including financial ones. Also, multiple-award-entering companies outperformed those who only participated once. Management aspects such as senior executive leadership, analysis and use of data and information, measures of

success and planning processes were of outstanding importance when compared to the rest of the Quality Management oriented framework. The balance between these was found to be misrepresented in the Framework's weighting. A detailed proposal for a different emphasis of certain items based on a redesign of the current weighting factors is therefore suggested. The study's findings regarding the importance and potential of certain management aspects for improvement provide an empirically validated rationale based on which organisations can prioritize or direct their organisational improvement efforts.

Organisations achieving high performing scores when evaluated against the Australian Business Excellence Framework (ABEF) were found to belong to that group of firms with the highest profits, productivity and other favourable results. The positive relationship found was strongly significant and suggested that every percent of improvement in the ABEF score is associated with an approximately 2% increase in the average annual KPI improvement. The accuracy of predicting the overall level of business success can be significantly enhanced through the use of the developed and validated model whose elements are a selection of explainable, external but relevant business factors. The research also found that higher scoring organisations were significantly more successful in continuously improving their business results from year to year.

It is concluded that striving for improvements against the ABEF is therefore in the interest of all stakeholders of an enterprise, particularly the business owner and/or shareholder. An organisation's success is clearly correlated with the effectiveness of its management practices as reflected through the Australian Business Excellence Framework.

Keywords: Quality Management benefits, Australian Quality Awards, Business Excellence, Australian Business Excellence Frameworks (ABEF), Business performance analysis, Management Correlation Study, High Performance prediction, Key Performance Indicators (KPIs), Manufacturing Performance, Business Success, Management principles.

Acknowledgments

I am very grateful for the support given by the Australian Quality Council without which this project would not have been possible. In particular I would like to acknowledge the efforts of all persons who have been involved in this research project but who cannot be named individually.

I am deeply grateful to my Academic Supervisor, Professor Günter Arndt for his kind support and encouragement at all stages of this project including my initial decision to come to Australia to conduct this research and subsequently my choice for immigration to this country and to remain here permanently. His generous contribution to the success of this study goes well beyond the normal call of duty and I am looking forward to maintain my relationship to him as an academic colleague as well as a genuine friend.

I am also indebted to my supervisors at the AQC, Dr. Colin Mills, Melissa Dunn-Lampe and Norbert Vogel, whose support of this project was vital to its feasibility. They not only accepted my research proposal in 1995 but also enabled access to the Award's data base, took responsibility for sponsorship and have been one of my most inspiring mentors and colleagues. It is the work in which I collaborated with the AQC during which I gained a solid understanding and genuine passion for the subject of Business Excellence.

Similarly I wish to thank all those other enthusiastic persons who are selflessly dedicating themselves to the continuous development of intellectual property and knowledge around an Australian Framework for Business Excellence (ABEF) to build Australia's industry and for letting me be part of this by taking my contributions on board. Australia and in particular the Quality Council is very fortunate to have such capable and generous support without which, no doubt Australia would not play such a visible role in the global scene. My witnessing of so many charitable and volunteer contributions with the aim of producing a cleaner, safer and more prosperous future (Sprouster 1996) has certainly made it easier to persevere and to bridge a lean and sometimes difficult period of four years of dedication to this research.

Special thanks are due to BHP Steel, who as the principal industry sponsors made a significant contribution towards the costs of this research project. I would also like to thank the Department of Mechanical Engineering for having employed me on a part-time basis.

Those organisations which have been involved in surveying and interviewing, and for providing the time to meet with the researcher deserve special recognition. It is hoped that involvement in this study was mutually beneficial to them, and that the evidence found may encourage them to continue their journey towards business excellence.

Thanks are also due to Penny for her most efficient and kind proofreading services which had to be done mostly overnight and under great pressure.

Last but not least, I wish to thank my family for their patience and enduring support granted during a seemingly endless decade of tertiary education full of periods of stress and challenges but also significant joy, achievement and satisfaction. I am especially grateful to Lexa.

*Für meine Eltern und Lexa,
denen ich unendlich dankbar bin.*

BUSINESS SUCCESS AND ABEF EVALUATION RESULTS

On the Nexus between Manufacturing Results and Frameworks for Business Excellence

TABLE OF CONTENTS

1	INTRODUCTION	13
1.1	Background and Definitions	13
1.1.1	Quality Management or Business Excellence	15
1.1.1.1	Definition of Contemporary Quality Management or Business Excellence	15
1.1.1.2	Quality Management and Scientific Research	19
1.1.1.3	Benefit of Quality Management	20
1.1.2	Quality Awards and Business Excellence Frameworks	25
1.1.2.1	Role of National Awards	25
1.1.2.2	Comparison of Various Awards	26
1.1.2.3	Australian Quality Awards for Business Excellence	27
1.1.2.4	The Independent Variable: Official AQA Evaluation Scores	37
1.1.3	Business Performance Measurement	38
1.1.3.1	Dependent Variable: Key Performance Indicators	41
1.2	Summary of the Research Proposal and Objectives	43
1.3	Brief Summary of the Research Background	44
2	LITERATURE REVIEW	46
2.1	Research Focus Identification Model	46
2.2	Selection Process of Relevant Publications	47
2.2.1	Literature of Secondary Relevance	47
2.2.1.1	Summaries of all “Secondary” Literature	51
2.2.2	Short-Listed Literature with High Relevance	56
2.3	Assessment of the Short-Listed Literature	57
2.3.1	Analysis and Summaries of All Relevant Publications	59
2.3.2	Evidence Found in the Literature	66
2.3.2.1	Financial ‘C’ Linkages	66
2.3.2.2	Process Capability ‘A1’ Linkages	67
2.3.2.3	Process Efficiency ‘B’ Linkages	68
2.3.2.4	Other Linkages (A2 & A3)	68
2.4	Deficiencies in Work Published	69
2.5	Conclusions of Literature Review	71
3	DEVELOPMENT OF HYPOTHESES	73
3.1	Development of Research Questions	73
3.1.1	Relationships between Business Success and the ABEF	73
3.1.1.1	Implication of Higher Aggregate Award Scores	73
3.1.1.2	Multiple Award Entrants	74
3.1.1.3	Importance of Specific Items and Categories	75
3.1.1.4	Interdependencies and Relationships within the Framework	75
3.1.1.5	Re-Design of the ABEF	76
3.1.2	Role of other Extraneous Factors in Explaining Business Excellence	79
3.1.2.1	Isolation of Noise	80
3.1.2.2	Role of Industry Characteristics	80
3.2	Establishment of a New Model to Explain Business Success	81
3.2.1	A Visualisation of the Proposed Model	81

3.2.2	The Algorithm of the Model	82
3.3	Research Hypotheses	83
4	RESEARCH METHODOLOGY	85
4.1	Research Approach	85
4.1.1	Classification by Purpose	85
4.1.2	Classification by Method	86
4.1.3	Choice of Correlation and Causal Comparative Study Design	86
4.1.4	Choice of Representative Samples and Groups	88
4.1.5	Relationship Between Variables: Correlation:	89
4.2	Pre-Analysis Verification Methods (Validity)	90
4.3	The Subjects of the Study	99
4.3.1	Original Population and their Industries	99
4.4	Justification of the Design Chosen	102
5	DATA COLLECTION PROCESS & RESULTS	102
5.1	Description of the Field Work Data Collection Process	102
5.1.1	Description of the Methods Used to Collect Data	104
5.1.2	Sample Taken	107
5.1.2.1	Industry Sectors Involved	107
5.1.2.2	Size of Companies Involved	110
5.1.2.3	Geographical Location of Firms Involved	111
5.1.2.4	Response or Participation Rate	113
5.1.3	Data Collected	115
5.1.3.1	Award Evaluation Results	115
5.1.3.2	Business Performance Data (KPIs)	116
5.1.3.3	Survey of Business-Performance-Relevant Background Factors	118
5.1.3.4	Survey of Industry Characteristics	118
5.1.3.5	Best Management Practice Data	119
5.1.4	Difficulties Encountered	119
6	ANALYSIS AND FINDINGS	120
6.1	Initial Data Preparation and Analysis	120
6.1.1	Time Compliance of Award Scores	120
6.1.2	Conversion of Absolute Scores into Relative Achievements	125
6.1.3	Transformation of Business Performance into Relative Improvement Data	127
6.2	Relationships between Business Success and the ABEF	141
6.2.1	Implication of Higher Aggregate Award Scores	141
6.2.2	Multiple Award Entrants	151
6.2.3	Importance of Specific Items and Categories	154
6.2.4	Interdependencies and Relationships within the Framework	159
6.2.5	Re-Design of the ABEF	164
6.3	Role of other Extraneous Factors in Explaining Business Excellence	168
6.3.1	Isolation of Noise	168
6.3.2	Role of Industry Characteristics	169
6.4	Post-Analysis Validity Issues	176
7	DISCUSSION OF RESULTS	179
7.1	Association Between Business Results and the Framework of the Awards	179
7.1.1	Benefit of Higher ABEF Scores	179
7.1.1.1	Best Practice Tool for Performance Diagnostics	181

7.1.2	Advantage of Multiple Award Entries	190
7.1.3	Role of Industry Characteristics	190
7.2	Implications of Criteria-Specific Results	191
7.2.1	Interdependencies and Relationships within the Framework	191
7.3	Organisational Improvement Opportunities	192
7.3.1	Ranking of Opportunities in Order of Priority	192
7.3.2	Commonly Neglected Management Subjects with Significant Potential	197
7.4	Redesign of the ABEF Based on the Importance of its Criteria	199
7.5	Implications at International Level	203
7.5.1	Other Business Excellence Models	203
7.6	Theoretical Consequences	212
7.6.1	Proposal of Additions to Contemporary Theory of Quality Management	212
7.6.1.1	Recommendations for Future Research	215
7.7	Practical Consequences for Management Practice	216
7.7.1	The Proof that 'Quality Management Works'	216
7.7.2	Prioritisation of Improvement Opportunities based on their Importance	217
7.7.3	The ABEF Success Diagnostic Instrument	217
7.7.4	The Value of the New Business Success Explanation Model	218
7.8	A Note on the Identification of Best Management Practices	219
8	CONCLUSIONS	221
8.1	Empirical Evidence Links Business Success with the ABEF	120
8.2	Role of Other External Factors in Explaining Business Success	221
8.3	Completion of the 'Big Picture' Business Model and Algorithm	223
8.4	Recommendation to Use a Business Excellence Framework	224
8.5	Limitations	225
8.6	Contribution of Original Knowledge	225
9	REFERENCES	227
10	Bibliography	231
10.1	Bibliography-Books	231
10.2	Bibliography-Journal Publications	232
10.3	Bibliography-Unpublished Works	236
11	APPENDICES	237
11.1	Identification of Best Management Practices	237
11.1.1	Introduction of the Best Practice Study	237
11.1.2	Methodology of the Best Practice Study	238
11.1.3	Best Management Practice Findings	240
11.1.3.1	'Leadership' Category	240
11.1.3.2	'Strategy & Planning' Category	245
11.1.3.3	'Information and Analysis' Category	247
11.1.3.4	'People' Category	248
11.1.3.5	'Customer Focus' Category	253
11.1.3.6	'Processes, Products & Services' Category	256
11.1.3.7	'Organisational Performance' Category	259

11.2 Survey Cover Letters & Fax Response Forms	260
11.2.1 1992-96 Manufacturing Applicants Approach Letter	260
11.2.2 1997 Manufacturing Applicants Approach Letter	263
11.2.3 Pre-prepared Expression of Interest Reply Fax Form	265
11.2.4 Sample Performance Measures Document	266
11.2.5 Letter of Request for KPIs	270
11.2.6 Pre-prepared KPI Identification Fax Response Form	271
11.2.7 Letter of Requesting for Business Performance data	272
11.2.8 Sample Pre-prepared KPI data Fax Response Form	273
11.2.9 Industry Characteristics and Background Survey Response Form	274
11.3 Data Preparation Processes	276
11.3.1 Time Compliance Conversion Process	276
11.3.2 BP Study: Overview of Perceived Value of Data Available	278
11.4 SPSS Output	279
11.4.1.1 Factor Analysis Sample	279
11.4.1.2 Test of Normal Distribution of Residuals of the 'Difficulty to Enter' Variable	281
11.4.1.3 Curve Fit: Observed, Linear & Logarithmic	282
11.5 Awards Process Description Material	283
11.5.1 Evaluation Protocol Sample	283
11.5.2 Scoring Form	284
11.6 The 1998 and 1999 AQA models	285
11.7 Fold Out Section	286
1997 AQA Framework Foldout	286
11.7.2 Research Focus Identification Model Foldout	287

LIST OF TABLES

Table 1 The 1997 Australian Quality Awards criteria	31
Table 2 Overview of the Least-Related References	49
Table 3 Individual Summaries of the Content of Excluded Literature	52
Table 4 Literature Used for In-Depth Analysis	56
Table 5 List of Literature Analysis Results	58
Table 6 Overview of the Analysis of the Most Related studies' Content	60
Table 7 The 34 Industry Sectors Represented in the Underlying Population of Manufacturers	101
Table 8 Industry Sectors Represented by the Entire Population	108
Table 9 Tabular Overview of the Evolutionary Changes in the AQA Framework	121
Table 10 Sample calculation of relative improvement values	127
Table 11 Performance Improvement Data Base Sample	130
Table 12 Sample Calculation of Linear Trend Based Improvement Values	132
Table 13 Case-Wise Justification of Data Scrubbing	133
Table 14 Priority-based Weighting of KPIs	139
Table 15 Data-completeness-based Weighting of KPIs	140
Table 16 The basic correlation data	142
Table 17 Financial Correlation Data	146
Table 18 Count of Positive Annual KPI Improvements	148
Table 19 Multiple versus Single Applicants' data	152
Table 20 AQA Item Scores Cross Correlations	155
Table 21 Special Relationships between Selected Key-Items	161
Table 22 Categories Cross-Correlations	163
Table 23 Overview of the Re-Weighting Data	165
Table 24 Isolating Noise Effects on Correlation Coefficients	169
Table 25 Industry Characteristics to Explain Business Results	170

Table 26 SPSS Output Regression of 4 Industry Characteristics	172
Table 27 SPSS Output Regression Industry Characteristics with AQA scores	174
Table 28 SPSS Output Regression ‘Difficulty to Enter’ with AQA scores	175
Table 29 Comparison of Participants with Non-participants: t-test	178
Table 30 Performance Diagnostic Tool	189
Table 31 Categories and Items Ranked by their Average Score (n=75)	192
Table 32 Items ranked by their Overall AQA score correlation (n=34)	194
Table 33 Overall AQA result and KPI improvement correlation coefficients	196
Table 34 Items and their Multiplied Correlation Coefficients (KPIs and AQA Score)	197
Table 35 Business Management Principles vs. AQA Items	205
Table 36 Tabulated Data of Importance of Business Excellence Principles’	211
Table 37 Assessment of New Quality Management Theory	214

LIST OF FIGURES

Figure 1 Principles of Business Excellence	17
Figure 2 1997 Australian Quality Awards Model	30
Figure 3 Overview of the 1997 Awards Model	32
Figure 4 Summary of the ADRI Assessment Matrix	33
Figure 5 The Awards evaluation process	36
Figure 6: Performance Measurement as an Effective Feedback Concept	41
Figure 7: The author’s model of research relationships	46
Figure 8: Derivatives of original studies	47
Figure 9 Literature Assessment Plot	58
Figure 10: Copy of Figure 7: The author’s model of research relationships	71
Figure 11 Spider Chart Illustration of Sample Weighting Concepts	77
Figure 12: Sample Distributions of Category Weightings	78
Figure 13: Sample Correlation Coefficients of a Redesigned Framework	79
Figure 14 The Business Success Control Model	81
Figure 15 The Business Prediction Factor Model	82
Figure 16: Applicants of the AQA	100
Figure 17 Field Work Process Flow Chart	103
Figure 18: Manufacturing Sectors Represented by the Original Population	109
Figure 19: Manufacturing Sectors Represented After Selection of the Samples	110
Figure 20 Participating Firm Size	111
Figure 21 Manufacturing Industry of Each State	112
Figure 22 Number of Evaluations from Each State	112
Figure 23 Number of Organisations From Each State	112
Figure 24 Number of Organisations Applying in Each Year	114
Figure 25: Measures of Business Success	117
Figure 26 Linear Trending Sample	131
Figure 27 Principal Correlation Plot, $R = 0.79$	141
Figure 28 Linear Trend Based Correlation Plot	144
Figure 29 Mixed Non-Aggregate KPI Plot	145
Figure 30 Financial Correlation Plot	145
Figure 31 Financial Non-Aggregate KPI plot	146
Figure 32 Count of Positive Improvement Plot	149
Figure 33 Exponential Correlation Plot	150
Figure 34 Single Applicants’ Correlation Plot	153
Figure 35 Multiple Applicants’ Correlation Plot	153
Figure 36 Individual Item Scores and Overall AQA results (n=34 participants)	156
Figure 37 Individual Item Scores and Overall KPI improvements (Participants based)	157
Figure 38 Entire Population’s average scores	159

Figure 39 The Weighting of the AQA criteria	165
Figure 40 Item Based Proposal for a Redesign of the AQA Framework's Weighting	166
Figure 41 Consequences of redesigned items on categorical level.....	167
Figure 42 Participants' Average Scores	177
Figure 43 Determination of X and Y Ranges.....	182
Figure 44 Over- vs. Under- Performance	186
Figure 45 KPI Efficiency for Management Effectiveness	187
Figure 46 Highlighting Items by their Importance and Average Improvement Potential	199
Figure 47 Highlighting the proposed changes to the AQA framework at item level.....	200
Figure 48 Highlighting the proposed changes to the AQA framework at category level	201
Figure 49 Inconsistencies of the weighting structure of the 1997 framework	202
Figure 50 Inconsistency-free new weighting structure	203
Figure 51 A Conversion Matrix of Management Principles	207
Figure 52 Converted scores plot.....	208
Figure 53 Average Strength of Management Principles	209
Figure 54 Chart of Importance of Business Excellence Principles.....	210
Figure 55 Validated Business Success Prediction Model	223

1 INTRODUCTION

1.1 Background and Definitions

There is probably no other management concept or practice that has received so much practitioner attention, with so little academic study, as Quality Management. This study might begin to redress this imbalance.

There is very wide acceptance of the principles of Quality Management as a model for organisational improvement and Business Excellence. Based on these principles the Australian Quality Council has designed the Australian Business Excellence Framework (ABEF) which provides a system for the pursuit of systematic and holistic organisational improvement. This concept, after more than ten years of application in thousands of organisations, has become an important factor in enhancing and sustaining Australia's international competitiveness.

One of the key impediments in the dissemination of this approach has always been the lack of evidence which could prove its effectiveness, and thereby lead to a higher rate of adoption in Australia's industry. Depending on the impact of using the framework, this could make a significant difference in Australia's economy. Kevin Foley, in his most recent report on the role of Quality in Australia (Foley 1997) clearly identified the necessity for research on the 'benefits of Quality Management strategies' as an area of priority. As yet however there remains a scarcity of information concerning this issue, which is why many organisations are still hesitant about adopting this philosophy and continue to perceive it as a theory with little applicability or benefit for their particular business environment. Maani observes that despite the large body of published work on the subject of quality in manufacturing, there are still pronounced gaps in quantitative investigations into the nature and magnitude of Quality Management impacts on manufacturing organisations (Maani 1994).

Companies seeking hard evidence for the benefit of Quality Management found little research on the bottom-line effect of Quality Management. They also found that few empirical studies existed which conformed to minimum standards of rigour in the methodology employed. Consequently few

organisations were willing to invest their time and resources in something the outcome of which was at best unknown. Even today, after several decades of the presence of Quality Management, large proportions of manufacturers still have little commitment to Quality principles and techniques.

Practitioners' perception often stands in strong contrast with the theory of early management science gurus like the late Dr. Deming. He frequently argued "Improve Quality, you automatically improve productivity, you capture the market with lower price and better quality. You stay in business, and you provide jobs. So simple." (Deming, W.E., 1984). Instead of promises of benefits by charismatic individuals or lobbies with vested interest in the popularity of such an approach, today's practitioners are demanding proven paths to excellence with tangible outcomes, which they can measure, monitor and continuously improve. The Australian Quality Award for Business Excellence, like other national awards in Europe or in America, has developed such a path for more than 10 years now, however with little more than anecdotal success stories to prove it. It is believed that a significant increase in practitioners' interest could be achieved if substantial hard evidence were available. This could theoretically have significant implications for this country's economy and competitiveness.

The situation becomes even more delicate since at a time when hard evidence is desperately needed, more and more publications with a highly critical or even negative attitude towards the Quality Management philosophy emerge which constitute a challenge that could soon terminate the era of Quality. While some individuals, including internationally recognised contemporary management science gurus (e.g. Peter Drucker) are bidding farewell to Quality Management, new management fads or 'magic carpets' (e.g. Business Process Re-engineering) are seemingly emerging and disappearing again. There is some agreement that the Nineties were perhaps a period of Quality in which a lot of companies received Quality Assurance certification and a titled Business improvement program which usually contained the word 'Quality'. 'This trend is now clearly declining and recent observations suggest that the new Millennium could bring a different emphasis about some other vital aspect of modern business management, such as for example Innovation or Knowledge Management.

Many Quality institutions around the globe such as national quality awards have responded accordingly and are adopting new terminology while consciously avoiding the word ‘Quality’. Thus nearly all “Quality Awards” are by now renamed to something containing the words ‘Business Excellence’ rather than Quality. A similar trend can be observed in the latest publications in management science.

What is important to recognise is that much of what has evolved over many decades while continuously showing validity and some positive effects, may be just as relevant for tomorrow’s organisations seeking to improve as for example Deming’s fourteen points had in the past. It is true that whilst some of the original contributions of early leaders may have decreasing relevance for solving issues confronted by modern businesses, literally all national quality awards have demonstrated a great deal of flexibility and continuity in their effort to embrace current management themes. This is why it is some people’s strong belief that even though we may witness the disappearance of certain buzzwords, we will continue to see a growing interest and application of business improvement frameworks which once originated in the Quality-focussed school of thought but are today and tomorrow striving to embrace everything that could be considered vital to any enterprise.

This PhD research was proposed and conducted in recognition of this critical time for Quality Management. It was hoped that any significant contribution of new knowledge on the subject of Quality Management’s real benefit would be timely and would help to guide future trends into directions which may deserve the attention of both scientists and practitioners.

1.1.1 Quality Management or Business Excellence

1.1.1.1 Definition of Contemporary Quality Management or Business Excellence

The following is an attempt to encapsulate the essence of an umbrella concept that includes a multitude of related approaches which makes it difficult to produce one fully comprehensive and commonly accepted description. It may nevertheless serve as an introduction, as it introduces some fundamental pillars and terminology. Quality Management like every other business philosophy has its own jargon and terminology without which expressions of thoughts and concepts could be very cumbersome. This,

and in order to reduce the possibility of confusion, is why some basic and typical terms are being introduced in the following and throughout this thesis.

‘Quality Management’ or ‘Business Excellence’ represents a body of principles and practices applied to organisations with the ultimate goal of facilitating the best possible outcomes for all stakeholders while making optimal use of organisational resources. ‘Quality’ in this context is not just a product’s attribute or degree of perfection. The customer plays a pivotal role as his/her definition of Quality is the foundation, based on which an organisation strives to create value and achieve competitiveness through understanding, anticipating, influencing and ultimately satisfying customers’ needs.

The term ‘Total’ often added in the past in front of Quality Management (Total Quality Management TQM) referred to an organisation-wide approach in which everyone is equally Quality-concerned and driven. All resources and assets are tuned for the optimal production of value as perceived by the customer. This includes systems, processes and technology as well as more intangible aspects such as leadership, climate and culture.

Figure 1 shows the author’s interpretation of fundamental principles underlying any Business Excellence or contemporary Quality Management approach. The organisation is consistently and coherently interpreting and operationalising the principles of Quality Management by applying their own ‘values’ which are externally visible and expressed through their practices. Values in this context are norms which the organisation regards as important (e.g. always to say what one thinks). In other words it is the principles acting as general laws which through an organisation’s own values are translated into activities. These activities have a common purpose, which is often publicly expressed in a ‘Mission’ statement. It is leadership’s responsibility to set an appropriate direction, commonly referred to as ‘Vision’ and establishing goals and measures, which capture the progress made in moving towards the Vision. The results and information obtained through these measures can be regarded as the central nerve system of an organisation as it feeds the head (i.e. leadership) with vital feedback about how well the organisation is getting on.

The senior leadership's constant role modelling of these principles and creation of a supportive environment are necessary to achieve the organisation's potential.

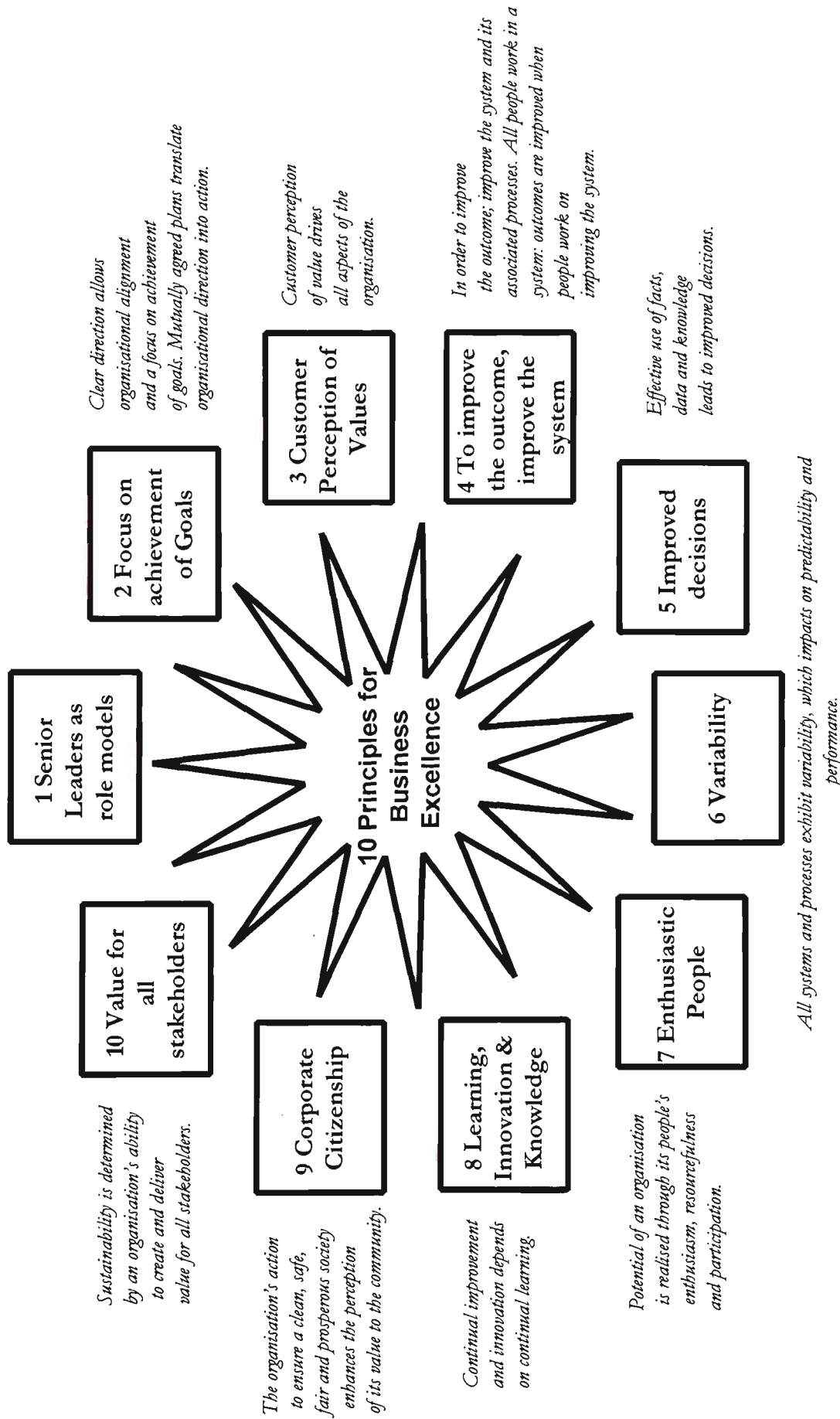


Figure 1 Principles of Business Excellence

By and large dimensions of a Quality Management concept cover practices such as continuous improvement, reduced reworking, long-range thinking, employee involvement and teamwork, process redesign, competitive benchmarking, performance measurements and closer relationships with supplier & customers.

This information in combination with the concepts introduced in the following chapters will serve as a reasonable working definition of Quality Management or Best Management Practice.

Historical review of Quality Management and its significance today

The origin of Quality Management goes far beyond the contributions of Deming, Juran and their colleagues Crosby and Feigenbaum. The less prominent but equally important work done by pioneers including Thomas Bat'a, Walter Shewhart and Homer Sarasohn is often understated or not adequately acknowledged in literature (Foley 1997).

Quality Management, in particular Total Quality Control (TQC) and Total Quality Management (TQM) is believed to have played a major role in the recuperation of a post-war devastated Japan to the degree that it became one of the most leading industrial nations. More recently it is believed to have played a vital role in restoring America's industrial competitiveness (Juran 1993)

Over the last 15 years this management concept has become the most pervasive and commonly adopted business philosophy that the history of management science has ever experienced. A vast study by Arthur D. Little found that 93% of America's 500 largest firms had adopted TQM in some way (Arthur D. Little 1992).

Samson has recognised that Quality in Australia has been and still remains the biggest area for potential gain in Australian Industry during the 1990's (Samson 1996). This is despite the observation of a recent hold-up in which "commitment to the development of a quality culture in Australian enterprise is losing its momentum. Ironically this is at a time when quality (and design) of products and services is becoming an ever-more important contributor to the competitive success of rising industrial nations such as South Korea, Singapore, Malaysia and China" (Foley 1997).

A significant advantage of Quality Management is its capability of linking other theories of management with a multi-disciplinary origin as diverse as economics, behavioural science, metrology and statistics.

One of the key conclusions of management science in the nineties may be that the call for new philosophies and paradigms is losing its urgency, as the rough architecture of a successful management concept becomes sufficiently known. For the great majority of practitioners the more important task is how to make Best Management Practice happen without losing focus on the importance of outcomes.

Underlying Management Principles

Whilst there was never one agreed set of principles underlying all Quality Management approaches as promoted by different gurus, management consultancies, quality awards and other institutions, the difference between the existing definitions are insignificant enough to be neglected for the purpose of this study. In this context, Quality Management is sufficiently underpinned through a set of principles which has recently been developed by one of the Australian Quality Council's (AQC) panel teams in which volunteers are working together to develop the intellectual content of the Australian approach towards Business Excellence. Figure 1 shows the most recent definition of principles, which are underlying the approach to quality management as it is promoted through the Australian Framework for Business Excellence (AQC 1999). These principles can be viewed as general laws used as a basis for reasoning how to achieve Business Excellence.

1.1.1.2 Quality Management and Scientific Research

Quality Management is a concept which at first glance is relatively easy to grasp. In fact many of its elements could be described as common sense, which has probably helped in the wide adoption by many industries.

The drawback of this is that academia and science have had some difficulties in accepting it as a 'legitimate' subject based on modern management science. In more conservative business schools,

Quality Management was for a long time often perceived as a concept competing with more ‘serious’ traditional business subjects which are distinguished by higher intellectual demands. Even today some management scientists will arguably deny the potential of Quality Management for integrating many management themes which so far are taught independently as separate and special matters.

Foley notes the highly disturbing fact that Quality has lacked intellectual respectability and has not yet been viewed as a subject worthy of research and teaching (Foley 1997). On this subject the Executive Manager of the AQC (Vogel 1997) pinpoints that research on quality related subjects in Australia is fragmented, distanced from industry, and at a low level. He recently saw no other choice for interested companies but to look outside Australia for advice. The four main themes around which attention is centred are:

1. development of better lead indicators of organisational performance
2. strategies for achieving goal alignment within the organisation
3. process benchmarking
4. organisational self-assessment against National Quality Award frameworks to drive improvement and
5. evidence of a direct link between the deployment of quality strategies to bottom line performance.

1.1.1.3 Benefit of Quality Management

When evaluating the effects of Quality Management it is important to understand that none of the principles and techniques are ends in themselves, and that business enterprises are not established to improve continuously quality or satisfy customers but that those activities are only performed because they contribute to the real raison d’être of the organisation maximisation of its long term value. In this context it is claimed that TQM leads to tacit improvements such as higher customer satisfaction, good employee morale but also bottom line operational performance and key business results.

The theory suggests that particularly in the early days of a total quality initiative, dramatic improvements are likely to occur in such things as cuts in waste and re-work and added productivity.

Practitioners find that as their organisation progresses and each improvement becomes harder, commitment easily begins to wane. This may be one of the reasons why many companies never seem to have experienced the ultimate benefit of this chain reaction: Improved bottom-line results such as profitability.

Some practitioners have identified extensive implementation costs (i.e. retraining, management time, and paperwork) as significant obstacles, which caused difficulties while attempting to create a TQM corporate culture (i.e. required employee commitment).

Anecdotal evidence and empirical studies suggest a considerable variability in TQM's performance impacts, ranging from unprecedented successes to bankruptcy and abandonment of TQM.

TQM is probably known for not being very effective in producing short-term improvements. Its primary role is sometimes seen more as a strategic management instrument for identifying, monitoring and interpreting measurable and quantifiable results. The clear identification of tangible benefits is often critical for the sustainability of any business improvement program. Research has shown that unless evidence for positive effects can justify expenditure in a traditional cost-benefit analysis the continuation of activities is highly questionable. An abandoned Quality program is commonly interpreted as a failure even though the difficulty may have been in demonstrating the links to benefits rather than causing them. The reported failure rate of total quality initiatives can be anything up to 80%, depending on which report you read and when it was produced. (Williams, M. 1993). While there could be several reasons for these mixed and lacklustre results, many of which are extensively discussed in literature, there is one unifying theme: the companies failed to link their quality initiatives to the bottom line (Keiningham T., 1994).

Another popular criticism is that Quality Management tends to overemphasise compliance with almost philosophical principles or standard procedures regardless of their effectiveness. This applies in particular to the aspect of quality certification (e.g. ISO 9000), and has contributed much to the controversial perception of Quality Management's usefulness and effectiveness. Some of the

problems of 'freezing' ineffective practices through extensive documentation rather than improving them may have by now been overcome with more flexible and dynamic Quality Assurance systems which no longer rely on piles of paper producing process documentation.

Foley argues in his review of Quality in the 1990's that 'Quality Management is presently languishing because it has too often been described in a piecemeal fashion and presented as if it were free and quick to achieve, has no antecedents in, or relationship with management thought and behavioural and cultural issues are sufficiently insignificant to be ignored' (Foley 1997). He also notes that in Australia in the early nineties, the vast majority of Quality Management practitioners or consultants were from an engineering/manufacturing background, and although often very skilled in technical processes and statistical thinking, very few had any formal qualifications and/or experience with affecting organisational change (Foley 1997).

Evidence was also found that some poorly-conducted research may have added to the belief of the non-sustainability of Quality Management and may have contributed to a general downward trend of people's perception of Quality Management, in particular of the acronym TQM.

Furthermore, very controversial stories have appeared about some of the Baldrige award winners that have suffered financial setbacks, layoffs, and even bankruptcy (e.g. Wallace Company, Florida Power and Light etc.) (Hendricks 1997). The actual reasons for their destiny, which could frequently be found outside the control of the enterprise, were deliberately ignored.

A good example of this and of how destructive insufficient analysis and premature judgements of anecdotal evidence can be, is the frequent citation of a company which went bankrupt soon after they received a Quality award (Wallace company/Baldrige award). Many authors like Hill (Hill 1993) claim that the high levels of spending on quality that enabled them to win the Baldrige also produced unsustainable losses, and within two years made them bankrupt. The true reasons can be found in its connection with the Gulf War which rarely ever received any acknowledgment at all. Florida Power and Light is an often cited example of another organisation spending too much on quality (in this case

on the prestigious Deming Prize) with the reasoning that inattention to rising costs caused a backlash by rate payers, resulting in its quality program being dismantled (Wiesendanger 1993). Of course even here the real reasons for their destiny could be found in problems associated with other organisations' recruitment of many of their senior executives.

Mahajan furthermore raises concern as to whether the Baldrige Award is a predictor of a company's financial success, based on the poor sales and earnings growth of Cadillac, Federal Express, and Wallace Co (Mahajan 1992). Overall this has contributed a great deal to the overall discussion of whether TQM "works" or not. Ultimately to answer this question requires an investigation focused on actual outcomes, preferably in measures such as figures or trend-data which can be linked to efforts within an improvement program. Hendricks and Singhal write on this issue that although it is widely assumed that Quality Management is an efficiency- increasing technique, there is particularly little discussion in the literature on how the impact varies with advancements in the approach of Quality Management (Hendricks 1995). They continue to argue that expectations about the magnitude of financial gains from TQM are based more on the publicity associated with a few well-publicised stories and less on rigorous empirical evidence.

It was at this time that certain lobbies attempted to sell an 'all new and different panacea e.g. Business Process Re-engineering, and to spread rumours about excessive failure rates and the overwhelmingly detrimental effects of stories of bankruptcy. These studies, which were often released in connection with a promotional campaign for an alternative management concept, appeared in the business press with headlines such as "The Cost of Quality: Faced with hard times" and "Business Sours on TQM" (both by Matthews and Kattel 1992), "Total Quality is termed only partial Success" (Fuchsberg 1992a), "Quality Programs show Shoddy Results" (Fuchsberg 1992b), "Why most Quality Efforts Fail" (Swerzgold 1992), "TQM Madness" (Business Review Weekly 1998) and "The myths of TQM exposed" (Chorn 1993).

Hawley (1995) criticises TQM as an invitation to some kind of promised land where all one has to do is believe and follow a few simple guidelines. He concludes that for most organisations better odds

could be achieved by increased efforts directed at business as usual, and that typically TQM is a practice that will probably fail.

Hendricks concludes that poor research and tactical opinion making are the reasons why the perception exists that TQM is not as effective as previously believed or might even damage firm performance, or is a fad that has run its course and is losing popularity (Hendricks 1995).

While some attempted to counter these allegations by referring to some publicised success stories, which were not really accepted as hard evidence either, others revisited the underlying theory to point out the common sense nature of its content, which meant that nobody can go wrong with it (Senge 1993). Other writers observed the still increasing adoption of TQM and thereby concluded that TQM was alive and well (Haim 1993). Many are now searching for stronger evidence that can allow them to draw accurate conclusions about the real relationship between these practices and performance (Ernst & Young 1993).

This scenario has contributed to a situation in which practitioners are significantly confused with their choice of an appropriate management approach and resist adherence until clear evidence is produced. Most of these practitioners have been continuously asking for evidence about the link to Bottom-Line results ever since they had started becoming interested in the implementation of Quality Management. Such documentation is regarded as particularly critical when it comes to breaking organisational resistance to this approach, as commonly encountered in various levels of management and staff.

This clarifies why high-level research has a pivotal role in this matter. The response to this by management scientists can be observed in a recent emergence of an increasing number of publications on this subject. It is most disappointing that claims and counterclaims about whether TQM programs have paid off in a financial sense are rarely supported by objective and rigorous empirical evidence. Any expectations today about the impact of Quality Management are therefore based on anecdotes, hype and publicity.

1.1.2 Quality Awards and Business Excellence Frameworks

1.1.2.1 Role of National Awards

To reward exemplary TQM initiatives, the American government instituted the Malcolm Baldrige Quality Award in 1987 at the same time at which the Australian Quality Awards Foundation was established to promote and recognise advances in the use of this management concept.

Promotion by these institutions is similar to that of early gurus including Joseph Juran, Philip Crosby and W. Edwards Deming and other adherents and was largely based on claiming that achievements in their Awards generate improved products and services, reduced costs, more satisfied customers and employees, and improved financial performance (Walton 1986, AQAF 1987).

In perfect analogy to the discussion of the benefits of Quality Management per se, claims about the effects of quality awards are controversial because of the mixed results of some organisations. A few studies on the relative performance of National Quality Award Winners exist from overseas (i.e. the Baldrige Award in the U.S. and the Deming Prize in Japan) but similar studies have not been carried out in Australia (Mills 1996).

One undisputed benefit of any national quality award framework is that it serves as an operational definition of Quality Management today. The frameworks commonly comprise of specific assessment criteria which unambiguously give numerous organisations specific targets to pursue if used as a holistic business improvement concept, which is based on the principles of Quality Management. The establishment of such frameworks can be considered a quantum leap forward from a relatively vague definition of TQM which was often differently interpreted and used by the management consultancies and did not allow for comparison of organisation's advances. This is one of the reasons why a national quality award framework is often accepted as the most current and applicable definition of a Best Management approach towards Quality Management.

1.1.2.2 Comparison of Various Awards

Any comparison of the AQA, MBNQA and the EQA (Raynor 1997, Mills 1995) is often concluded with a statement saying that they are all essentially the same and cover the important aspects of quality in all elements of any business. To go even further it could be said that any business anywhere in the world would be better off with any of these three evaluation tools than without (Raynor 1997).

Their objectives have commonality in their intent to

- recognise achievements
- use the recognition process to encourage others
- to encourage the adoption of quality as a business strategy through sharing of experiences and in other ways
- to develop criteria that can be used to assist the adoption of quality particularly through assessment of progress
- to encourage the use of the criteria for self-assessment of progress (Mills 1995)

Mills notes that in all cases the basic management philosophy underpinning the award process and criteria is Total Quality Management. He even anticipates that use of one award system over another is very unlikely to lead to a markedly different result provided that the underlying purpose is clearly understood. In fact the evaluation systems rely on the same data and aspects to be collected as part of the application including

- identification of strengths and opportunities as judged through desk top evaluation of the written submission and the responses to individual assessment items
- dealing with site visit issues for verification of performances
- obtaining numeric scores by reference to a scoring matrix.

In the past the AQC has actively assisted the efforts of organisations in converting their AQA evaluation and self-assessment results to make them directly comparable to the Malcolm Baldrige National Quality Awards (MBNQA).

The high degree of commonality is not surprising given that all National Quality Awards are continuously collaborating and benchmarking their processes and products. Those differences which are recognisable e.g. the MBNQA's competitive nature in which only one winner is chosen, have often evolved over the years and may better suit cultural differences.

1.1.2.3 Australian Quality Awards for Business Excellence

The Australian Quality Awards or, as it is referred to today, the Australian Quality Awards for Business Excellence have developed a framework with the primary goal of providing guidance while pursuing organisational improvements. Their evaluation process is based on how well the organisation mobilises all of its resources and integrates and directs all of its activities towards improving its processes (AQC 1998). The usefulness of the Australian Business Excellence framework (ABEF) for external or self-assessment can be that it highlights any weaknesses of a holistic business improvement program and suggests actions for opportunities. The AQA framework can be suitable for assessing the progress of an improvement program with the aid of the criteria, and also to a certain degree for assessing success in terms of effectiveness.

In one of their publications more than ten years ago it is stated that the Australian Quality Awards have been established to recognise outstanding performance in quality improvement through adherence to the approach to quality called Total Quality Management (AQA 1988). Whilst initially a stand-alone organisation it is today a subsidiary of the Australian Quality Council (AQC), a private not-for-profit organisation which was formed in 1993 by the merger of Australia's key organisations that pioneered the awareness, understanding and adoption of productivity and quality improvement concepts since the early 1980's (AQC 1997).

Australian Quality Council (AQC)

The AQC is formally recognised by the Commonwealth of Australia as the peak body for strategic development and deployment of quality principles and practices. It has a membership base of more than 1100 enterprises. The AQC has a vision of being recognised as making a substantial contribution to the quality of life in Australia through the leadership they provide for organisations to achieve and

sustain excellence. The purpose of the AQC as documented through their mission statement is to accelerate organisational improvement through the adoption of the management principles and practices that are reflected in the Australian Business Excellence Framework.

History of the Awards

The establishment of the Awards was the logical consequence of a preceding ‘Australia for Quality’ campaign which was led by Enterprise Australia several years prior to 1987. It was designed to recognise outstanding performance in the area of quality improvement. It was very much industry driven which is also reflected by the fact that half of the existing six award categories were sponsored by Ford, Hewlett-Packard and Wang Computers.

Bob Hawke, Australia’s Prime Minister in 1988, the year of their establishment, who in the following years regularly presented the Awards to its winners, stressed its importance by saying that “it is providing an important service in promoting excellence and quality through their community and business awareness campaigns” (AQA 1989). He also commended the Awards by saying, “it will not only deliver handsome dividends to enterprises involved but it will also underpin the future prosperity of Australia.” In 1998 the awards presentation event attracted over 3000 senior business and political leaders around the nation with the current NSW Premier, Bob Carr presenting the Awards in Sydney.

Current issues faced by the Awards

While its continuity and success until today reflects the emerging national interest in this management concept its wider dissemination and acceptance has always been significantly constrained by the lack of hard evidence of benefits. The steady but moderate growth in the interest of the AQA as reflected by the number of applications, which rose from fourteen applications in 1991 to sixty-six in 1997, indicates significant growth but still leaves potential for more growth (see also Figure 16 in Chapter 4.3.1 on page 100). Today’s Chief Executive Officer of the AQC, Barry Coleman is targeting an exponential growth in the number of 200 applications per year by 2000 and 500-1000 shortly thereafter (Coleman 1998).

There has been a significant shift away from the trend of only manufacturing industries using Quality principles to a much wider dissemination in the service industry including the public sector. Only 10% of the applicants in 1998 were manufacturers as opposed to over 60-70% in the early nineties. Government administration, Health and Community services and Utilities are increasingly using the framework.

The AQC estimates that there are currently more than one thousand organisations actively using the AQA framework for self-assessment only, which reflects the increasingly popularity of this approach, while only about 6% seek external recognition of their achievements through an Australian Quality Award application. This estimate is supported by the number of orders received for a copy of the current Quality Awards criteria which more recently have been in excess of 5000. It is also the belief of the AQC that these brochures get internally photocopied and distributed by about three to four times this amount which makes up a significant group of people with an interest in the Australian framework.

Coleman's targeted exponential growth may appear slightly ambitious but one has to understand that increases around that order are required in order to make a significant step forward. Only large scale impact programs are suitable to prepare Australia for meeting the nation's most critical challenges as outlined in a report commissioned by the Federal Government and compiled by Foley (Foley 1987).

In spite of the previously discussed and noticeably downward trend (BRW 1998, etc) of the public perception and associations of 'Quality' as today's management paradigm, such growth may just be timely enough to prevent a premature death of this concept. Given that in the global scene in which the more recent emergence of other management strategies e.g. Business Process Re-engineering often meant a significant recession in practitioners' interest in Quality Management, the AQC's demonstrated ability to embrace new trends and concepts in their revisions of the Business Excellence framework may have helped to alleviate such a general downwards trend.

The continuity in the development of the framework’s content i.e. the Awards criteria, which have significantly evolved through embracing more and more modern management science aspects, is not only necessary to ensure that it always reflects current Best Practice but may just be vital to its future existence. The AQC may therefore be positioned for a very prosperous future, most likely under different terms and umbrella concepts, but less likely without significantly deviating from the original principles and concept.

Content of the Awards framework

This research is based on the 1997 AQA model (see Figure 2). The framework has received further reviews since then and the more current models of 1998 and 1999 can be seen in Appendix 11.6 on page 285. It is an internationally recognised framework based on Quality Management principles on par with other leading National Quality Awards such as the Malcolm Baldrige National Quality Award (MBNQA) and the European Foundation of Quality Management Award (EFQMA).

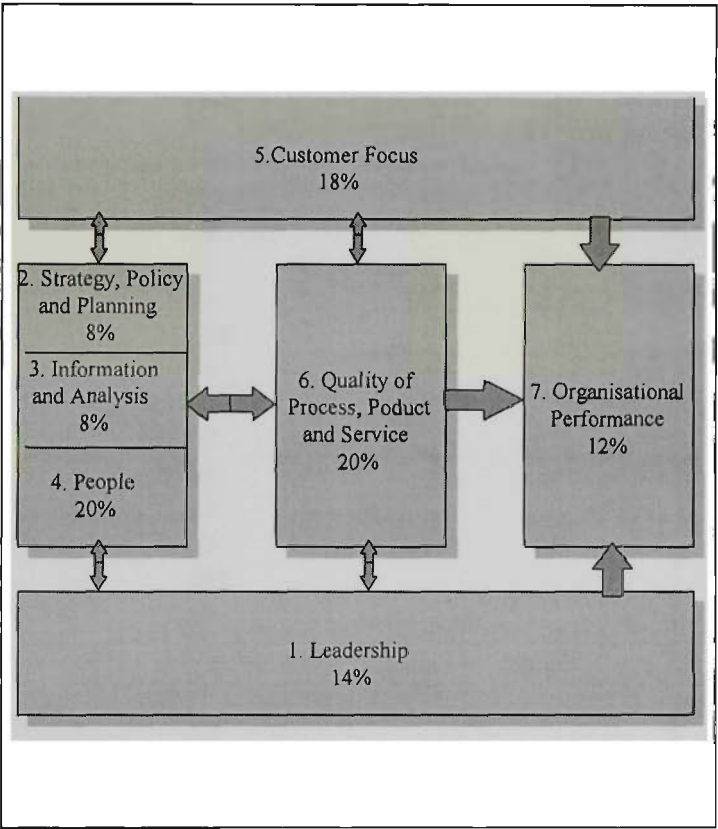


Figure 2 1997 Australian Quality Awards Model

It is used by thousands of Australian organisations for internal self-assessment and for application purposes (AQA 1999b).

The 1997 Awards framework consists of 7 Categories and 21 sub-categories (Items), all of which are weighted with different maximum scores that can be achieved, as shown in Table 1.

Content of the 1997 Model

The 1997 model consists of seven Categories or 21 Items (Table 1) which are concerned with specific management aspects that have been grouped together in the overall categories.

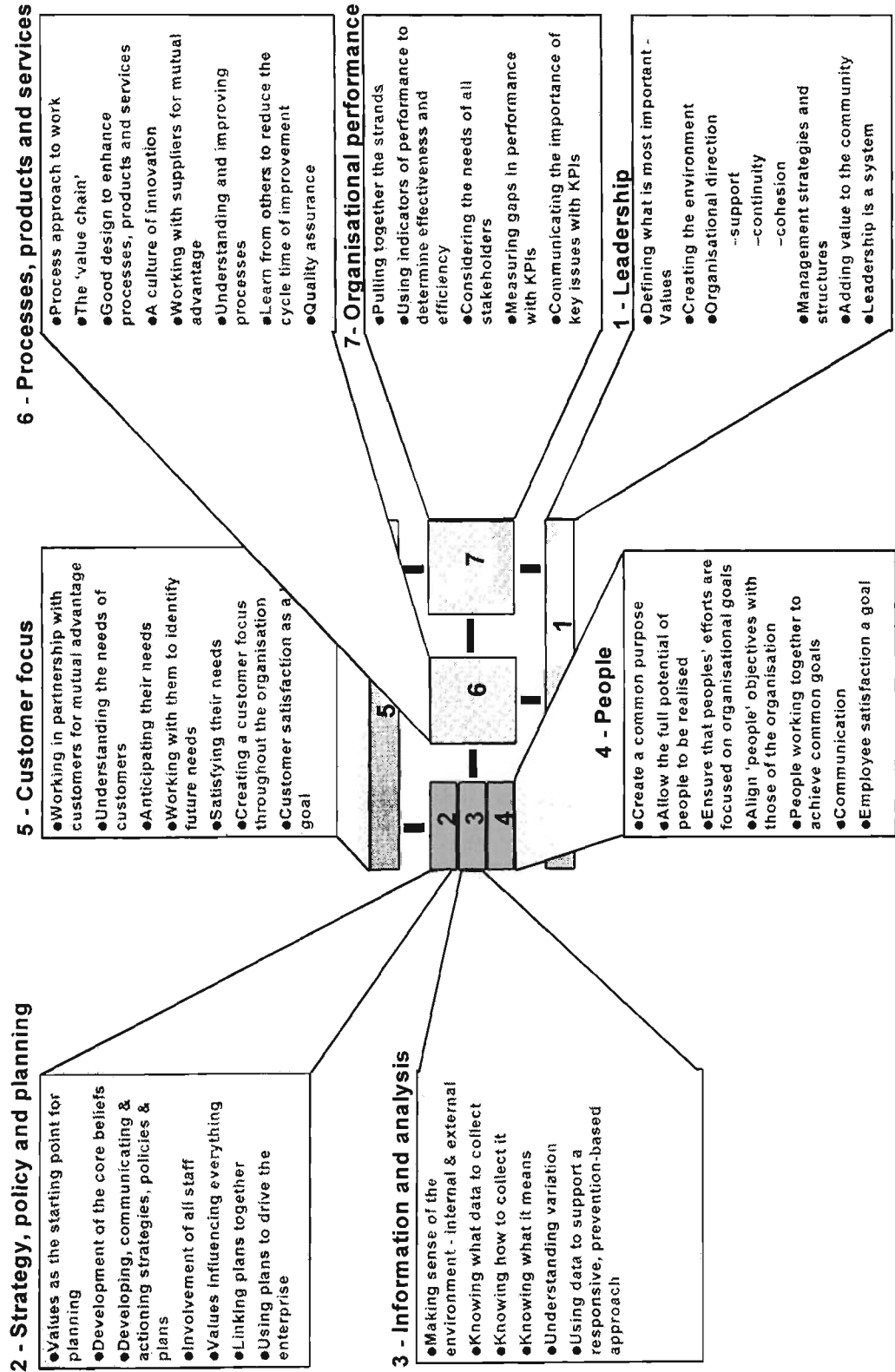
Table 1 The 1997 Australian Quality Awards criteria

(Note: Another copy of this table is presented as a foldout (Appendix 11.7.1 on page 286) for convenient referencing)

1	LEADERSHIP	140
1.1	Senior executive leadership	60
1.2	Leadership throughout the organisation	40
1.3	Leadership in the community	40
2	STRATEGY, POLICY AND PLANNING	80
2.1	Integration of values	30
2.2	The planning process	50
3	INFORMATION AND ANALYSIS	80
3.1	Scope and collection of data	40
3.2	Analysis and use of data and information	40
4	PEOPLE	200
4.1	Human resource management planning	30
4.2	Employee involvement	40
4.3	Performance management	30
4.4	Education and training	30
4.5	Communication	30
4.6	Well-being and satisfaction	40
5	CUSTOMER FOCUS	180
5.1	Knowledge of customers' need and expectation	60
5.2	Customer relationship management	60
5.3	Customer satisfaction	60
6	PROCESS, PRODUCT AND SERVICES	200
6.1	Design and innovation	40
6.2	Supplier relationships	30
6.3	Management and improvement of processes	70
6.4	Quality of products and services	60
7	ORGANISATIONAL PERFORMANCE	120
7.1	Measures of success	120

Figure 3 shows an interpretation of the 1997 model at Category level.

The 1997 Awards model: An Overview



Adapted from: Australian Quality Council 1997

Figure 3 Overview of the 1997 Awards Model

The Approach-Deployment-Results-Improvement (ADRI) Assessment Matrix

Figure 4 is an extract of the original Assessment matrix (AQC 1997). It introduces the four dimensions against which all of the framework's items were assessed. They are concerned with different stages of a continuous improvement cycle and are comparable to the more commonly seen four elements Plan-Do-Check-Act (PDCA).

- **APPROACH**
 - 0: No evidence for approach
 - 5: Systematically planned and somewhat focused.
 - 10: Best Practice
 - **DEPLOYMENT / INTEGRATION**
 - 0: Little use of approach
 - 5: Approach applied to many areas. Becoming part of normal business.
 - 10: Applied to all areas and totally integrated into normal operations.
 - **RESULTS / OUTCOMES**
 - 0: Anecdotal evidence in only few areas
 - 5: Positive and comparable trends in many areas
 - 10: Excellent comparison in all areas. Clear linkage between approach and results.
 - **IMPROVEMENT**
 - 0: No activities in place.
 - 5: A&D are regularly reviewed and some improvement has been made.
 - 10: Continuously learning based on a pro-active system

Figure 4 Summary of the ADRI Assessment Matrix

Scoring within the Framework

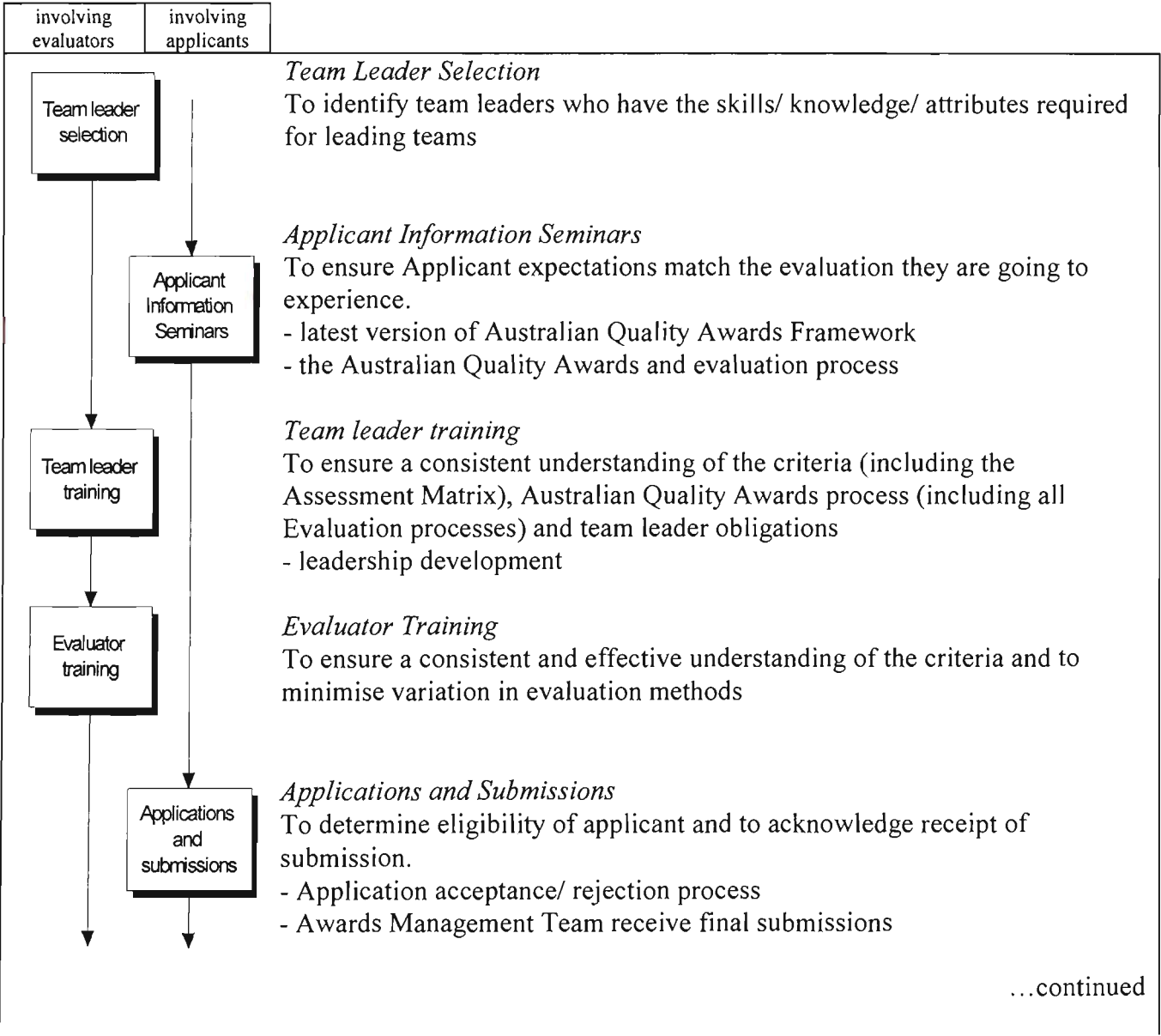
The Assessment Matrix is the core of the scoring process as every item is assessed against every dimension of ADRI (refer Appendix 11.5.1). In the bottom part of the interpretative guidelines of an individual Item are square blank fields in which each evaluator is to fill in a score on a scale between 0 and 10 (see the Assessment Matrix in Figure 4). These four scores are then combined into one representative score (e.g. through the arithmetic mean). After this score has been discussed and verified (through consensus with the other evaluation team members) the finally agreed score ratio (6/10) is to be weighted with the Item's weight (e.g. for Item 1.1 Senior Executive Leadership the maximum possible score is 60). 6/10 times 60 results in 36 points achieved in item 1.1. The repetition of this process for every one of the 21 Items eventually leads to the total aggregate score out of 1000 maximum possible points. A typical Award winner scores between 600 and 700 points.

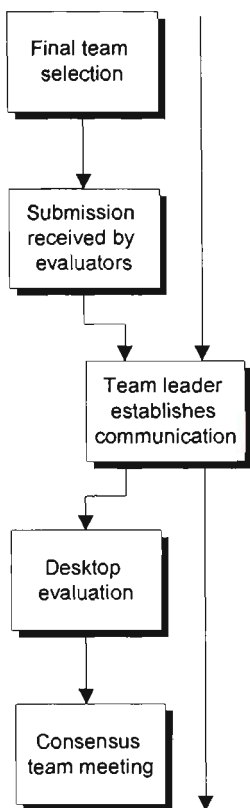
The Awards process

One of the advantages of using a business improvement framework is that it enables the determination of quantitative scores which describe an organisation's advances in its approach towards a management concept, which is normally intangible and consequently very difficult to research.

Furthermore, these officially obtained scores can be considered as very accurate and reliable since all organisations have been evaluated by using the same proven and repeatable process, which involves desktop evaluations, team consensus meetings and site-visits, all carried out by independent volunteer evaluators. The outcome of the evaluation process are statements which identify the strengths and opportunities (i.e. weaknesses) of an organisation, a list of Items in order of their potential for improvement (i.e. priorities), a summary report and for internal use only the aggregate overall score and Item specific scores.

The official evaluation process is described in more detail in Figure 5. As can be seen, it is a well-defined and quite rigorous process, which aims at producing a highly consistent outcome.





Final Team Selection

- To form teams with the necessary balance to evaluate selected evaluations
- Awards Management Team finalises teams based on:
 - Preference for 6 members, no conflict of interest, geographic compatibility

Submission received by evaluators

All team members receive appropriate documentation

Team leader establishes communication

To initiate communication between team leader and both team members and applicants

Desk Top Evaluation

Desk top evaluations are conducted prior to consensus meeting including written strengths and opportunities statements site visit issues

- Score of the ADRI levels as well as assigning an overall item score
- Members develop an applicant overview based on key themes

Consensus team meeting

To form initial consensus on the Strengths of the Applications and make a site visit plan to resolve the site visit issues.

- record strengths, opportunities and site visits and preliminary scores from desktop evaluation
- agree on key issues which will allow consensus after verification at the site visit

Site Visit Planning with Applicant

To develop in conjunction with the applicant a plan for the site visit

- communicate final site visit plan to team members

Site Visits

To verify strengths and resolve all outstanding issues

- interim site visit discussions
- all site visit issues must be clarified before leaving the applicant's organisation

Post Site Visit Consensus Meeting

To form a final consensus on the Strengths and Opportunities of the application and to draft the feedback report.

- consensus on strengths and opportunities and on the final score
- the completion of a draft feedback report by the team

Finalise Feedback Report

To prepare the final report for the panel of review and applicant

- executive summary prepared

...continued

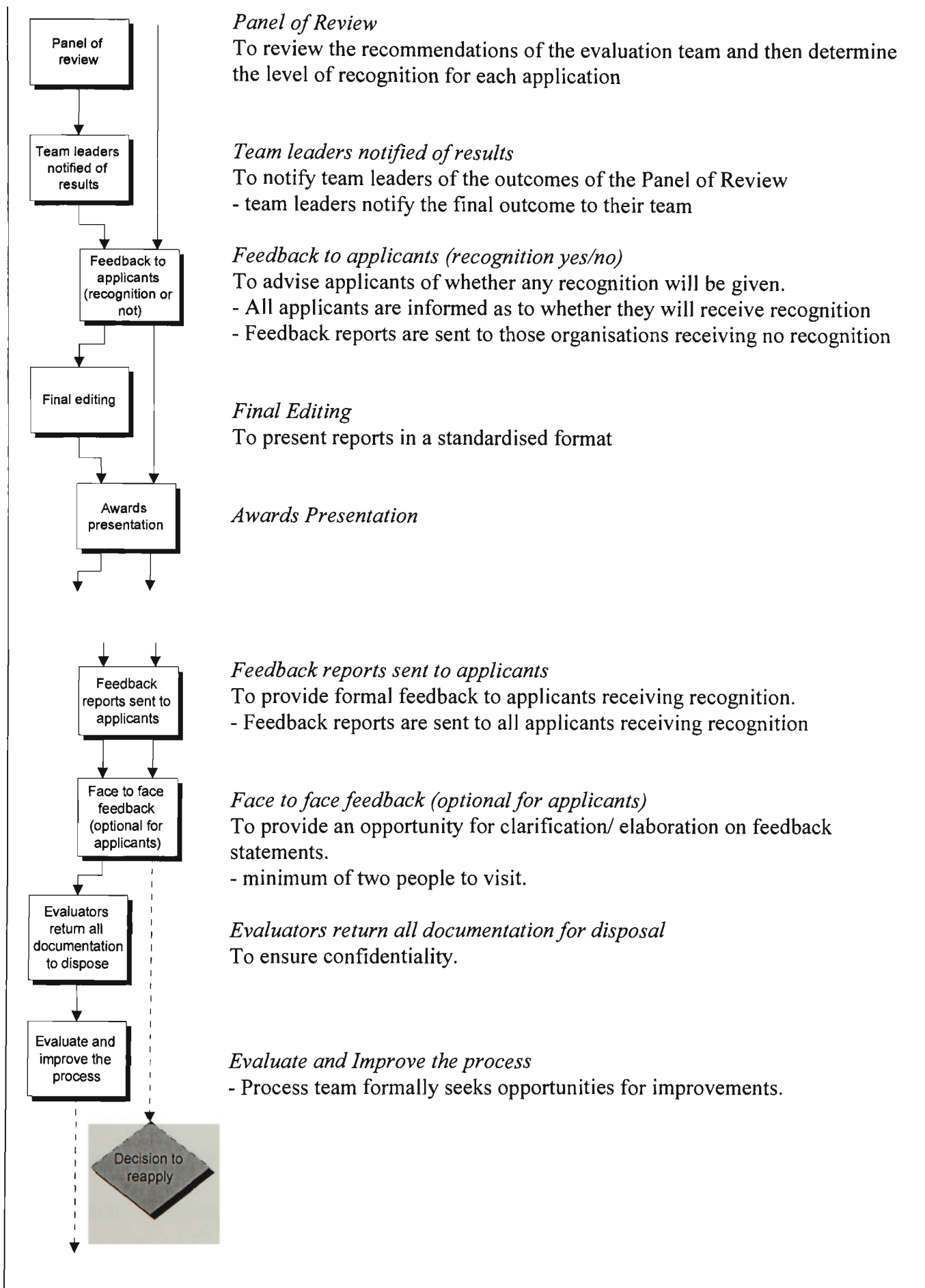


Figure 5 The Awards evaluation process

(Adapted from AQC 1999)

1.1.2.4 The Independent Variable: Official AQA Evaluation Scores

Even though no cause and effect study is being attempted here, since a relationship between two or more variables is investigated, one is declared to be the independent variable and one is chosen as the dependent variable. Causal relationships require the conduct of experimental research, which is nearly impossible to carry out in a real business environment (Zikmund 1994).

It is more plausible to regard improvements in the evaluation score as a means of achieving Business Excellence rather than the end in itself. It is for this reason that evaluation results are to be understood as the independent variable, which in a common coordinate system is usually plotted on the horizontal X-axis.

Whilst it is of primary interest to management science and practitioners to find out whether companies who adopted Quality Management belong to the better performing ones when compared with organisations with a different approach, it makes no sense to distinguish between Quality Management implementing companies and ‘Non-TQM’ companies. This would indicate an oversimplification of a more complex picture, which one should not attempt to reduce to a “black or white” answer. In nearly any company, elements of Quality Management can be found in some of their practices as applied by some of their personnel. In order to decide whether a company is truly implementing and committed to a Quality Management approach one has to look at the degree to which the approach is deployed and fully integrated throughout the entire organisation¹. This is why this research study is based on the comparison of organisations with different AQA evaluation results and therefore different degrees of advancements in a Quality Management approach. If the participating organisations were asked they would all consider themselves a ‘Quality-Management-implementing’ company, even though some AQA results may in some cases suggest quite the

¹ The Assessment Matrix which forms part of the AQA framework gives guidance when assessing the degree to which a Quality Management approach is implemented. The overall score of any AQA item is apart from other dimensions also dependent on the deployment of the approach which assesses to which degree (i.e. score between 0 and 10) the approach is applied to all areas and activities as well as fully integrated into normal operations and planning (Australian Business Excellence Framework 1999).

opposite. Measuring the effectiveness of a Quality Management approach through independently determined scores has the benefit of avoiding the disadvantages associated with asking firms to self-judge their own Quality Management program.

All hypotheses made in this study consequently emphasise differences in AQA evaluation results rather than the distinguishing of Quality Management and Non-Quality Management firms.

1.1.3 Business Performance Measurement

When asking for the purpose of an organisation one might receive different responses depending on who is asked (i.e. the business owner, the employees or the customers). Whilst the most expected response would probably be about ‘earning profits’ one could argue given that many organisations are actually slightly more profitable than some investment funds, not even counting the risk involved, why is it that organisations are not frequently shut down once their return on investment falls short of an alternative investment ?

It is not attempted here to seek a definite answer to this issue but the following may help to better understand what it is that organisations, as an entity, are striving for. A study of America’s most admired corporations which was based on the rating by Fortune (Sprout 1991) produced the following attributes which make up a company’s reputation:

- | | |
|-----------------------------------|--|
| • quality of management | • ability to attract new employees |
| • innovativeness | • develop and keep talented people |
| • quality of products or services | • community and environmental responsibility |
| • long term investment value | |
| • financial soundness | • use of corporate assets. |

The most intriguing item on this list is that ‘quality of management’ is one of the important factors. In the following an approach is taken which ignores such evidence since Quality Management would appear to become a self-sufficient prophecy in which no other benefits of implementing it are

expected other than evidence of implementing it. The truth is however, that in order for a business to be viable it has to meet certain expectations regarding returns for the investment taken. The issue of sustainability in the long run may then give importance to measures such as the extent of other stakeholders' expectations including keeping the environment clean. It is ultimately the organisation's own responsibility to set priorities for their own preferred measures. An externally imposed performance measurement system may not find the same commitment than one to which the executives are naturally aspiring.

In the following some original observations and thoughts on business performance measurement are presented:

Business results normally cover areas such as *effectiveness* (actual output/expected output), *efficiency* (actual resources used /planned resources used) *productivity* (output/input) and *quality* (customer orientation). They are often concerned with Business, Technical, Human and Environmental aspects of the enterprise. Common deficits of performance measurement systems are that they

- produce irrelevant or misleading information
- look at single, isolated dimensions
- do not allow for early correction
- do not take a customer's perspective
- distort views of the current strategy's effectiveness and
- undermine strategic objectives
- use of corporate assets.

(Oakland 1995).

If any of these problems occur, corrective action in terms of data exclusion or treatment may be undertaken to achieve a more accurate reflection of the organisation's performance.

Business results reporting in context with Quality Management and Manufacturing

Quite often traditional business monitors do not support Quality Management efforts, which contribute to the failure of many quality programs (Capon et al 1995). It is necessary to investigate whether this is due to inappropriate measures (e.g. too much external influence) such as fluctuating

exchange rates, etc. which might make it impossible to trace the involvement of TQM in business results, or whether this indicates the general failure of Quality programs. In the context of the difficulty to separate special causes from real improvements, Fry argues that the use of physical criteria to measure manufacturing performance rather than financial indicators based on a standard cost accounting system often provides a truer picture of what is really happening on the shop floor (Fry 1992).

Many Quality Management supporters tend primarily to measure on-time delivery, product percentage defects and lead time. Certain industrial sectors seem to have preferences for particular measures to evaluate quality success (i.e. procedural compliance in aerospace, defence and pharmaceutical industries and Statistical Process Control in car and electronics industries) whereas the service level (e.g. lead time of response) is increasingly perceived as a key measure of quality (Capon et al 1995).

More recently a trend for reporting of assessment results against business excellence frameworks as part of their reporting procedures against more traditional Key Performance Indicators is emerging. This does not necessarily exclude the successful implementation of a generic assessment tool (e.g. the use of AQA, Baldrige or EQA frameworks).

Figure 6 conceptually illustrates the author's interpretation of the role and benefits of effective business performance measurement system.

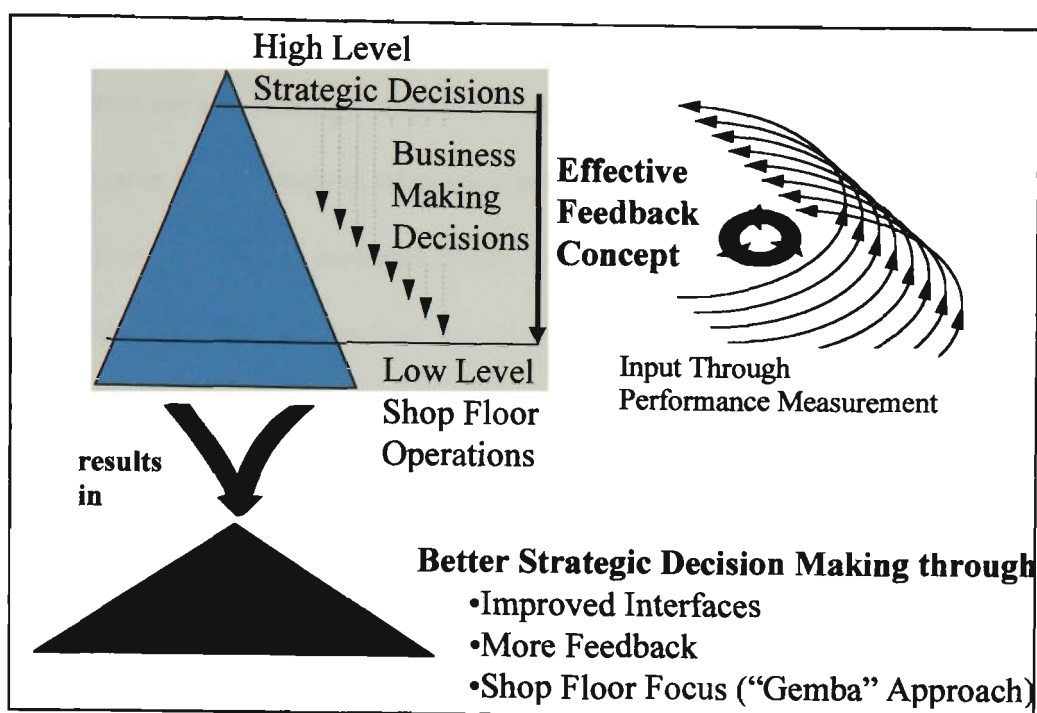


Figure 6: Performance Measurement as an Effective Feedback Concept

1.1.3.1 Dependent Variable: Key Performance Indicators

Performance measurement is one of the few vital tools for the successful management of changing systems. Evidence from current practice suggests that measurement is the weak link in many Quality Management programs. Process controls such as monitoring need to be in place to measure success and feed results to improvement teams. Without this foundation, the initial enthusiasm of an improvement program lacks direction and fails to achieve results (Capon et al 1995).

This study measures business results based on the organisations’ own and officially recorded set of top key performance indicators. This ensures that a relationship between evaluation results and something that is evidently meaningful for the organisation is investigated, rather than an imposed set of theoretical performance measures to which organisations may have difficulties in committing themselves.

This approach is believed to be more meaningful to practitioners if a positive relationship can be established. The practice of collecting an organisation’s own records of numerical and factual data is by far superior when compared with the common practice of surveying subjective perceptions on the

relative performance for reasons including bias etc.

Influencing business results through improvement against the Framework

The dependent variable in this study is what most practitioners would consider the *raison d'être* of all companies: to deliver value to its business owner and other important stakeholders. This is what is commonly referred to as the bottom-line of an enterprise, especially where financial results are concerned.

It is not the intention of this study to suggest that business results are directly caused by the pursuit of Quality Management strategies. The business dynamics are much too complex to be described by an over-simplistic relationship between two variables only. Nevertheless it is possible that one variable (i.e. Award results) could be a fair measure for how effectively an organisation is going about its day-to-day business and the result of which is directly reflected in key performance indicators.

Assuming that a positive relationship is established, the implication for an organisation would not be to shift their emphasis from carrying out day-to-day business to improvements against the AQA framework. Several performance dimensions contained in the ADRI Assessment Matrix ensure that an organisation is not conducting Quality as an add-on to normal business, but manifests these principles in all normal business operations at all levels and throughout the organisation. It is fairly safe to say that if an organisation would actually make improvements against the framework their first priority, the organisation would be guided towards a more sensible approach simply by following the requirements of the criteria for conducting their business. In such a hypothetical scenario, the only effect which such a rigorous if false commitment to Quality Management could have would be ultimately of a positive nature (i.e. more effective business processes and better end results). The unrealistic situation of an organisation which gets so distracted from their actual purpose of conducting business by their excessive focus on improvement is only thinkable in a situation where no thorough understanding of the concept exists. This of course would obviously show up in evaluation results anyway so that the possibility of improving Award scores and declining business results is quite impossible (assuming that the variation in business results is not caused by other events and that

the theory of a positive relationship has been proven).

Concluding it can be said that if a positive relationship is established and organisations are encouraged to strive for improvements against the framework in order to benefit from better business results, little or no danger of detrimental effects is involved in pursuing the Awards for Business Excellence

1.2 Summary of the Research Proposal and Objectives

In this study the implementation of Quality Management Strategies, as manifested through the results of an evaluation against the Australian Business Excellence Framework (ABEF), will be examined as a potential predictor of business excellence, measured in core manufacturing processes and other key business result improvements including profitability.

Research Objectives (Planned Outcome)

The objectives of this study were:

- a) To establish evidence for the existence or non-existence of clear relationships between evaluation scores and key performance indicators.
- b) Depending on the relationships found, to construct a business success prediction model (i.e. algorithm). This model should be capable of predicting business success (i.e. an overall rate of annual improvement of an organisation's top key performance areas based on known parameters, including evaluation scores and information about the industry's key characteristics (e.g. rivalry and entry barriers).
- c) To develop a better understanding of the relationship of specific items of the framework to business results which should lead to the proposition of an enhanced framework design in which the weighting of individual items and categories is designed to better reflect the importance of certain items. In particular the weighting should accurately reflect the importance of those Items which play a key role for predicting the overall organisation's advancement in implementing Quality Management (i.e. evaluation results) and the actual level of improvements to the bottom-line.

d) An investigation into Best Management Practices identified from top scoring organisations should provide some practical definitions and guidelines of what is currently applied as Best Practice in business management, and what organisations typically do to successfully implement Quality Management practices (i.e. advance against the Business Excellence framework).

Planned method of analysis

A comparative analysis of organisations that have undergone award evaluations with different levels of outcome will explore the relationship between award scores (the independent variable) and business results (the dependent variable). The main analysis will involve correlation studies between advancements in applying Quality Management principles as determined by the Australian Quality Awards for Business Excellence and various manufacturing industries' business success factors. This analysis will lead to the computation of correlation indices and levels of significance, which can then be used to test the hypotheses on the relationship between practice and performance. Whilst the main relationship will be studied based on the awards' aggregate score, some examination of how critical a role the specific awards criteria (i.e. Items) play in achieving improved organisational performance will also be undertaken.

Planned collection and use of data and information

Any quantitative investigation is to be based wherever possible on the collection of empirical and factual data (e.g. real business performance measurements). Additionally qualitative business background information is sought and put in context with specific business results in order to identify and isolate special causes of variation. For this purpose AQA evaluation documentation plus additional survey results regarding industry characteristics are taken into account.

1.3 Brief Summary of the Research Background

A rigorous investigation of the impact of quality management principles on product and process quality and especially on business results remains missing. Consequently to date it is difficult to reach a reliable conclusion about whether Quality Management is effective or even pays for itself. The Australian Quality Awards for Business Excellence offers a framework for the systematic pursuit

of holistic business improvement. While the framework is already widely used for internal self-assessment or external recognition purposes, practitioners are increasingly demanding hard evidence of the framework's effectiveness, i.e. whether using it works to improve the bottom-line or not.

The primary aim of this PhD research is to test the hypothesis that the Business Excellence Awards criteria, when effectively implemented (i.e. by demonstrable Best Management Practice), will lead to improved business performance. The testing of this relationship will also lead to an enhanced understanding of interdependencies and the importance of specific awards criteria (i.e. Items). As a corollary it should be possible to identify which management practices, if assessed against the AQA-framework, are considered 'effective', and not only distinguish high-scoring from low-scoring award applicants, but ultimately also high-performing from low-performing organisations.

2 LITERATURE REVIEW

Further to the general literature described above this chapter concentrates on a critical analysis of more specific publications on the link between pursuing Quality Management and achieving tangible benefits. Specific attention is paid to the strengths and weaknesses of the studies, leading to quantitative and qualitative conclusions on the standards of international research into Quality Management. It attempts to collect and consolidate any significant nationally or internationally published knowledge on this subject. An additional literature review that was conducted just before the final completion of this thesis aimed at detecting whether the most recent publications included any findings with significance for this research. While these eight references could not be fully included in the analysis their content is summarised in the second half of Table 2 on page 49.

2.1 Research Focus Identification Model

It was initially found very difficult to conclude whether sufficient evidence exists on the research issue, because of very contradictory research results which often looked at only isolated aspects of this topic, resulting in significant differences. It was then felt that a more systematic approach was needed which not only looked at findings of other research, but also took into account the way in which the researchers arrived at their findings i.e. their methodology and rigour in conducting their studies. It is therefore part of this review not only to provide an overview of the standards of recent publications, but also to highlight their gaps and shortcomings. Figure 7 presents a model showing the focus of the research regarding the investigated relationships.



Figure 7: The author's model of research relationships

Another copy of this model is presented as a foldout (Appendix 11.7.2 on page 287) for convenient referencing during the analysis in this chapter.

2.2 Selection Process of Relevant Publications

This chapter is based on 46 publications, which are the result of short-listing the most relevant and promising entries based on international CD-ROM Keyword searches and other sources. They are a mix of American, European, Australian and New Zealand publications. Of these 46 studies, only 23 entries were included in a more detailed analysis, introduced in Chapter 2.3, while the other ‘secondary’ literature were of no significance or use for detailed analysis. This includes those 8 publications which were found during the additional final literature search as they were not found to contain any significantly new or important findings. The fact that they are listed together with the literature that has been classified as ‘irrelevant’ is because they were only included at such a late stage at which the main analysis had already been concluded. In any case, they were not found to include research with significant implications for this study and even full consideration of their content would have not changed any conclusions made.

2.2.1 Literature of Secondary Relevance

Many publications had to be excluded for the reason that they were ‘secondary’ research only meaning that they were related to each other by the use of the same underlying original research.

An explanation for this could be by-and-large the very limited access to the databases of national quality awards, an important source of valuable data. Many of the secondary studies used the original work done in the PIMS study (Reference No 17), the GAO report (No 7) and Peters and Waterman’s research (No 15) (see Figure 8). Unfortunately various authors left their own and original contribution very unclear, resulting in potentially misleading contribution claims.

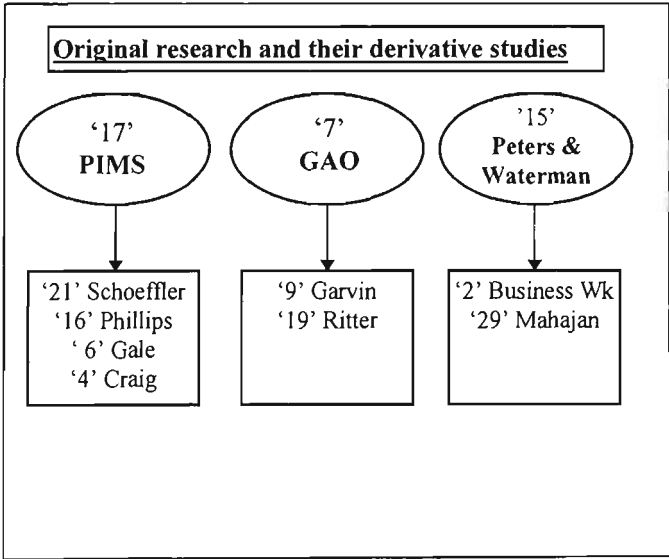


Figure 8: Derivatives of original studies
(Numbers are reference numbers as allocated in Table 2 and Table 3)

Other studies were found unsuitable because they were not specific enough on the effects of Quality Management practices, or they were essentially not a correlation-type study. This stood often in contrast to the titles of publications which often raised high expectations but, when regarded in more detail, did not deliver anything substantial other than some anecdotal and inconclusive observations. While the title of a study is a significant factor for what level of interest a publication receives, researchers should not abuse this by giving highly promising titles without having done the necessary work to report on such issues (e.g. 'Getting return on quality' by Keiningham 1994).

A few of the excluded studies were restricted to identifying effects of Quality Management on organisational climates or management attitude only. They argued that it is this difference in culture or attitude, which makes organisations perform at different levels. This conclusion is too far-fetched to be acceptable as an attempt to research hard evidence. Table 2 represents entries which, even though they had some relevance to this research, did not deliver any significant empirical findings or simply had another study focus.

Table 2 Overview of the Least-Related References

Ref. No	Title	Authors and source
1	Being Baldrige eligible is not enough	Bowls J and Hammond J: NY Times 22 Sept. 1991
2	Who's excellent now ?	Business Week, 5 Nov 1984
4	Strategic Factors Associated with Market and Financial Performance	Craig C., and Douglas S., Quarterly Review of Economics and Business, Summer 1982
6	Formulating a Quality Improvement Strategy	Gale B., and Klavans R., Journal of Business Strategy, Vol. 5 No. 3, 1985
8	How the Baldrige award really works ?	Garvin Harvard Business Review 1991
10	Quality on the Line	Garvin D., Harvard Business Review, Oct. 1983 pp65-75
11	Redefining Excellence: The financial performance of America's 'Best Run' Companies	Ghosh, A Praeger, NY 1989
13	Corporate Culture and Performance	Kotter, JP and Heskett JL 1992 NY The free press
15	In search of excellence	Peters and Waterman (1982)
16	Product Quality Cost Position and Business Performance: A test of some key hypotheses	Phillips L., Chang D. and Buzzell R., Journal of Marketing, Spring 1983
21	Impact of Strategic Planning on Profit Performance	Schoeffler S., Buzzell R. and Heany D., Harvard Business Review March/April 1984
25	A comparison of values espoused by quality and other managers	Entrekin L.V. and Pearson C.A.L., Murdoch University, Australia 1992
32	The Relationship between Quality Management Strategies and Organisational Performance in Manufacturing Firms	Terciovski M., PhD Thesis Melbourne Business School, University of Melbourne, Feb. 1997
36	Getting return on Quality	Keiningham T., Zahorik A, Rust R. Journal of Retail Banking 1992
38	Does implementing an effective TQM program actually improve Operating Performance ? Empirical Evidence from firms that have won quality awards.,	Singhal V., Hendricks V., Management Science Journal , Vol. 43, No9 September 1997.

Continued...

39*	Achieving Simultaneous Competitive Advantages Through Continuous Improvement: World Class Manufacturing as Competitive Strategy	Flynn Barbara B, and E.J. Flynn, Journal of Managerial Issues, 8 (3) p360-379, 1996
40*	The Impact of Quality Management Practices on Performance and Competitive Advantage	Flynn Barbara B, and S. Sakakibara, and R.G. Schroeder, Decision Sciences 26 (5) p659-692, 1995
41*	Which TQM practices really matter: an empirical investigation	Grandzol, JR & Gershon M, Quality Management Journal, 4 (4) p43-59, 1997
42*	The effects of Quality on Business Performance	Hardie, N. Quality Management Journal, 5 (3) p 34-49, 1998
43*	Tools and techniques of Quality Management: an empirical investigation of their impact on performance.	Kannan, V.R., Tan, KC, Handfield, RB & Ghosh, S Quality Management Journal 6 (3), p34-49, 1999
44*	Strategic Quality Management and financial performance indicators	Chapman R, Mellor R, & Murray PC, International Journal of Quality and Reliability Management, 14 (4) p 432-448, 1997
45*	Beyond Process: TQM content and firm performance	Montgomery JC, Reed R & Lemak DJ, Academy of Management Review, 21 (1), p173-202, 1996
46*	The measurement of TQM principles and work-related outcomes	Morrow PC, Journal of Organisational Behaviour, 18, p363-376, 1997

* Please note that Literature No 39-46 are listed here together with less relevant studies primarily because of their late inclusion in this review rather than because of the relevance of their content. Whilst some of these studies are equally relevant to the literature which has been included in the more detailed analysis (see Table 4 on page 56) these publications were overall not found to include any findings with significant new or different implications to those already analysed. Even if they had been fully included in the detailed analyses of Chapter 2.3, the same conclusions would have been made.

2.2.1.1 Summaries of all “Secondary” Literature

Table 3 is an analytic summary of the literature excluded after initial analysis had been conducted. It summarises the main content and background of each study together with comments on their particular features. It names the reason for exclusion for further analysis but makes recognition of some aspects of the findings of such literature which contain relevant information for this research.

Table 3 Individual Summaries of the Content of Excluded Literature

Ref No	REASON FOR EXCLUSION	SUMMARY	COMMENTS
1	No correlation study	The BA does not address certain key elements of Management....	
2	Not Quality Management specific	Followed up Peters and Waterman's study 2 years earlier and found that some of the financial high performers with common management characteristics were not so excellent anymore. It mainly questions the sustainability of certain financial achievements.	
4	PIMS study based	It analysed the PIMS study and found a positive relationship between quality and profitability. It concludes that further research on the influence of quality on market share is needed.	'Quality' here refers to service and product quality.
6	PIMS study based	It analysed the PIMS study. High quality products are among the most profitable. Improvements in product quality lead to market share increase. Quality improvements increase profits by increasing customer perceived value.	Does not make legitimate conclusions about cause & effect relationships.
8	GAO secondary research	It is a critical response to the GAO study findings. It claims that the Baldrige Award does not address certain key elements of Management. It says that the GAO study was not scientifically performed using statistical methods and the 20 companies surveyed did not answer all questions.	
10	No correlation study	It supports the positive association between quality and productivity. It finds evidence for the inverse relationship between quality and production costs.	
11	Not Quality Management specific	It compared the financial performance of the much-lauded 'excellent' companies of the 1980's with a control group from the Fortune 500. Concluded that over the period 1960-1984, the control group surpassed the "excellent group" in financial performance and market valuation in the long run.	
13	Not Quality Management specific	It investigates the relationship between Organisational Culture and Corporate Performance. It claims that there is significant correlation between culture and corporate performance, as long as the type of culture is appropriate to the context in which the organisation is striving. Culture can be made stronger and more performance enhancing if leadership is willing to take a long-term view by articulating and communicating a vision for the organisation.	The study has limitations in significance and validity.
15	Not Quality Management specific	Peters and Waterman identified 8 attributes of excellent (financial performance) companies: 1. A bias for action (analytical problem solving, objective, simplicity). 2. Close to the customer (customer satisfaction). 3. Autonomy and entrepreneurship (managers' aptitudes). 4. Productivity through people (narrow the gap between management and labour). 5. Hands-on value driven (basic values dominate the corporate culture) 6. Stick to the knitting (hesitant to tread unknown waters) 7. Simple form lean staff (simplify the organisational structure and reduce the red tape) Simultaneous loose-tight properties (motivate by authority and reward)	A study by Business Week two years later revealed that some were no longer financial high performers.

...continued

16	<i>PIMS secondary research</i>	It analysed the PIMS study <i>The findings are quoted in Wisner 1993</i>	
21	<i>PIMS secondary research</i>	analysed the PIMS study It found a positive relationship between quality and profitability.	
25	<i>Irrelevant Study Focus</i>	<p>It looks into the relationship between Quality Management/Assurance and Attitudes/Values. 231 Western Australian Managers were surveyed (by mail) on their personal values. 112 randomly chosen General Managers are compared to 119 Managers taken from Quality Assurance certified organisations. It found great variations with significant implications on Human Resource Management. Demographic data led to interesting findings: Quality Managers have less responsibility, are younger people with less experience and lower formal education. They are more pragmatic (success oriented) than General Managers who tend to belong more to the affective category (aim for pleasant outcomes). It suggests that Quality is a way of thinking, an attitude.</p> <p>It also introduces England's work on the goals of business organisations as High Productivity, Employee Welfare, Profit Maximisation, Social Welfare, Industry Leadership Organisational Stability, Organisational Efficiency and Organisational Growth. Defines "values" as the chosen priorities that energise individuals. England distinguishes between 3 categories of types of values which lead to a certain behaviour: pragmatic (success and achievement oriented), moralistic (the right thing), affective (emotionally governed, aim for pleasant outcomes).</p> <p>The quantitative part of this PhD research is based on data collected by the "Leading the Way" study carried out by the Australian Manufacturing Council AMC. The other non-relevant because Quality Assurance focussed aspect of this study contains some regression analysis of organisations which are ISO certified. In addition some qualitative research is conducted based on six case studies.</p>	<p><i>It fails to distinguish. between QA and TQM, (findings are not suitable to be generalised or transferred to Quality Management. It does not exhaust the potential of the study i.e.. Not very ambitious hypotheses are tested. Gathered data is not presented. Much of the analysis is limited to the statistical validity of the constructs. Does not put it into context with HRM which stands in contrary to the abstract.</i></p>
32	<i>AMC secondary research (Ref.No 24)</i>	<p>Discusses some of the statistical methods and problems of these research issues. It presents a Return on Quality (ROQ) approach and one bank's experience with implementing it.</p> <p>While the quantitatively gained correlation results reveal significant advantages of award winners as opposed to a control group's average performance the fact that the so-called 'quality award winners' were mostly Supplier and Customer Award recipients (65%) raises many questions. The results presented vary significantly with the researcher's own definition of pre- and post implementation period. A choice of different time periods could result in significantly different and even contradicting results.</p>	<p><i>This research uses mainly previously collected and analysed data with relatively little original contribution.</i></p>
36	<i>No correlation study</i>		
38	<i>Mixes Quality Award winners with Supplier and Customer Award recipients</i>		<p><i>Only about 35% of all study subjects are actually Quality Award winners. The rest are organisations which have only received some kind of Supplier or Customer recognition. These two fundamentally different business aspects are too different to be combined since their level of rigour and holism are not comparable.</i></p>

continued...

39	<i>No empirical Study & Late Inclusion</i>	<p>Discussion is based on Porter's recommendation to either choose Cost or Product Differentiation as the primary strategy. It challenges his belief that they are mutually exclusive competitive strategies and argues that World Class Manufacturing (WCM) as a continuum with 4 stages can overcome the conflict seen by Porter as it effectively combines the pursuit of Cost, Quality, Speed and Flexibility through Continuous Improvement methods. It draws together other literature from Hill, Mintzberg & D'Aveni to underpin its theory. The article includes propositions that Business Performance is positively associated with Process management and Continuous Improvement as well as with Quality Management. It also assumes that organisations who pursue Quality Management on a continuous basis (e.g. are likely to receive the best business results).</p>	<p><i>It is mainly a literature review and contains no empirical research but makes propositions about relationships which this PhD study explicitly aims to provide answers to.</i></p>
40	<i>Late Inclusion</i>	<p>A perception based correlation study which tests a number of relationships which have been proposed based on anecdotal observations of Management Science (i.e. Japanese Management Techniques). It refers to business performance definitions provided by Garvin and Maani & Sluti. The data is based on 45 US manufacturing plants with more than 100 employees. Two third of all proposed links did not stand the test of significance ($p < 0.15$) and many results are questionable as they were found to be "counter-intuitive" or "very surprising" (e.g. 4 of 6 links with business performance turned out as negative instead of positive associations). Author suspects that some measurement problems may be responsible and demonstrates awareness of the strong limitations of this study. Mainly deals with and finds support for the existence of A1 and A2 links while the attempt of establishing a C relationship clearly failed.</p>	<p><i>A combination of poor measurement of perceptual data with limited reliability and ambitious research objectives which aimed at establishing very specific practice related links leads to contradictions in findings with little credibility.</i></p>
41	<i>Late Inclusion</i>	<p>Study is based on questionnaire responses from 275 organisations (=47% response rate) made on a 5 stage scale ranging from 'short term focus' to 'process/system focus' and 'continuous improvement' focus as well as on a 6 point Likert type scale starting with 'Not applicable'. The Hypotheses made suggest relationships between specific aspects (Financial results related to process management and customer focus as well as to product quality and customer satisfaction. Finds positive correlations between customer focus and product quality, business performance and process management, customer focus and employee participation, leadership and financial performance. However it also produces highly questionable negative relationships at equal strength including Customer Focus with Employee Satisfaction, financial performance with process management and customer focus with employee satisfaction. Author acknowledges that these findings are contrary to own hypotheses and most related literature and suspect flaws in the model and inappropriate constructs. It also argues that no linear model can adequately describe what occurs and that many interactive effects (as suggested by Deming) may exist.</p>	<p><i>It confuses some process means with ends and does not manage to validate the model proposed. Some of the strongest results are the most surprising and doubtful. Could have benefited from the use of a more refined model (e.g. one of the established awards models)</i></p>
42	<i>No empirical study & Late Inclusion</i>	<p>The paper merely summarises and classifies other research studies with the intention of providing guidance for future empirical research. It then proposes a theoretical framework which includes a number of linear relationships (e.g. increased Quality leads to decreases in cost but also to increased customer satisfaction and subsequently to increased profits). It also cautions about various alternative research designs including causal investigations and chain links.</p>	<p><i>Contains no empirical work but only recommendations for research designs.</i></p>

continued...

43	<i>Late Inclusion</i>	<p>Study targeted the operational (non-strategic) level of Quality Management. It defines Business Results with mainly non-bottom line measures including Market Share, RoA, Customer Service, Product Quality and Competitiveness and argues that they may be dependent on four operational factors of Quality Management implementation (Management Practice, Use of tools, Documentation and Measures used). The measures used for these constructs are a fragmentary and somewhat arbitrary selection of practices which may not be indicative of how holistic a Quality Management program is being implemented. The 313 surveys received (21% response rate) are led to surprising findings including negative relationships between ROA and Measures used, Product Quality and Data collection, Business Results and Design and most contracting even between business results and Product Quality (incl. defect rates). One positive association was found to exist between business results and Process management. Overall very questionable and contradicting findings were produced which are presumably the result of a non-strategic and non-holistic TQM focus which was revealed as unsuitable methodology despite the large scale.</p>	<p>Poor research design and focus have produced highly contradicting findings with little meaning.</p>
44	<i>Late Inclusion</i>	<p>Study is based on 75 responses (50% return rate) on a questionnaire with a 5point scale which was mailed out to medium sized Australian companies including some manufacturers. It collected data regarding the financial performance (Earnings on shareholder funds, RoTA, Labour productivity ratio of sales over employees) of these companies via ASX listings or annual reports. It correlated these results with 5 aspects of TQM regarding its strategic integration, deployment/involvement, customer focussed planning, measurement/benchmarking and Innovation/CI. The findings include insights on the perceived importance of these aspects but found moderate associations with TQM's strategic integration and its measurement/benchmarking only. The associations exist with Labour productivity aspect of business results only and are opposite for RoTA. This finding is very controversial as a negative relationship was found to exist. The study also completely failed to establish any significant correlations for the subgroup of manufacturing companies.</p>	<p>The limited rigour and depth (e.g. non-adjustments of financial data) in connection with the high heterogeneity of participants in this study may be responsible for its limited success.</p>
45	<i>No empirical study & Late Inclusion</i>	<p>This purely theoretical paper discusses various chain links through which a basic firm orientation towards either the customer or the operations can be linked to business results. It then makes assumptions about how TQM could be linked to firm performance in the presence of environmental uncertainty. It refers to the 'contingency theory' as well as to the positive findings of the PIMS study which linked product quality with business results to underpin its conclusion that TQM is linked to business results.</p>	<p>This is a purely theoretical discussion of various propositions without any empirical validation.</p>
46	<i>Late Inclusion</i>	<p>Is based on a survey of the employees of one organisation only (2250 responses=61%) and investigates TQM practices including customer focus, Continuous Improvement and Teamwork. Its business results are limited to relatively soft 'work related outcomes' including job satisfaction, communication and perception of work environment. It finds positive correlations between all measures except between customer focus and job satisfaction as well as between Teamwork and importance of goal and performance standards. It concludes the study as an initial attempt to develop measures of TQM and to stimulate further research with harder performance measures.</p>	<p>Whilst an investigation of one organisation only cannot be accepted as empirical evidence no attempt has been made to link TQM to real business results.</p>

2.2.2 Short-Listed Literature with High Relevance

Table 4 identifies the titles and authors of publications which were classified as ‘highly relevant’ based on their close association with this research issue. This literature is included for further analysis and assessment.

Table 4 Literature Used for In-Depth Analysis

Ref. No	Title	Authors and source
3	The myths of TQM exposed	Chorn N. 1993, Marketing, Feb.
5	‘A European Quality benefit study’	EFQM/Coopers & Lybrand 1993
7	‘The GAO report’	GAO (US General Accounts Study) or Ritter D. 1991
9	Managing Quality: The strategic and competitive edge	Garvin 1988, The Free Press, NY
12	‘A quality benefit study’	Hayes and Clark 1994
14	An empirical examination of Statistical Quality Control and its relationships with Quality, Quality cost and productivity.	Modarress B. University of Nebraska, NB 1987 PHD dissertation
17	PIMS Study	PIMS) (Profit Impact of Marketing Strategies) Strategic Planning Institute 1992
18	Linking Manufacturing Strategy and Performance: An empirical investigation	Roth, A.V., Manufacturing Round Table Research Report Series, Boston University, MA, 1989
19	Executive Caravan TQM Survey Summary	Arthur D Little Corporation (or Ranganath Nayak 1992)
20	Explaining productivity differences in North Carolina Factories	Schmenner RW & Cook RL Journal of Operations Mgmt, Vol5 No3 May 85 pp273-89
22	‘Linking the results’	Smith Geoff Aug 93 The TQM Magazine by Melanie Williams UK
23	Made in Europe	Voss C., 1994 London Business School
24	Leading the Way: A study of Best Manufacturing Practices in Australia and New Zealand.	AMC 1994
26	Quality Management and Productivity-A preliminary study	Fisher T.J. 1990 UTS, Australian Journal of Management 1993
27	The impact of Quality Management on Productivity	Fisher Tom, UTS Australia, Asia Pacific QC Organisations Conf, NZ, March, 91.
28	Evaluating the Organisation - A Deming Prize Perspective	Kano Noriaki, JUSE 1983 AQC Seminar proceedings 1993
29	Should we expect the BA to predict a Company’s financial success ?	Mahajan V, Sharma S, Netemeyer R, College of Business Administration University of Texas at Austin 1992
30	Empirical Analysis of Quality Improvement in Manufacturing	Maani K.E., Putterill M.S. & Sluti D.G. Uni of Auckland NZ, Int Journal of Q and Reliability Mgmt Vol11 No 7 1994, MCB University Press
31	Total Quality Management as a competitive advantage: A review and empirical study,	Powell T.C. 1995, Strategic Management Journal, Vol. 16, pp15-37
33	A performance assessment of the US Baldrige Quality Award Winners	Wisner J.D., Eakins S.G. University of Nevada, Las Vegas 1993
34	Does TQM impact on bottom line results?	Zairi M, Letza S.R. and Oakland J.S., University of Bradford Mgmt Centre 1993
35	International Quality Study	American Quality Foundation and Ernst & Young 1991
37	The impact of winning the Australian Quality Award	Gilmour P., Driva H., Macquarie Uni, 1993

2.3 Assessment of the Short-Listed Literature

Figure 9 and Table 5 provide overviews of the literature assessment (i.e. with regards to the relationship found as well as the quality of the various studies in terms of rigour and methodology). All literature which is listed in Table 4 has been analysed with respect to the following three criteria:

1. the type of linkage it is concerned with. For an explanation of these relationships please refer to the foldout copy of Figure 7 in Appendix 11.7.2 (e.g. Process capability link A1).
2. the nature and strength of a relationship or correlation between one measure (independent variable) e.g. winning the Award, and the other measure (dependent variable) e.g. improved productivity. This relationship is expressed through a score on a scale between -10 and +10.
3. the quality of the methodology i.e. rigour. This includes conceptual design, analysis, consistency with conclusions, reliability and size of sampling, consideration of control groups, etc. The higher the score (again on a -10 to +10 scale), the more meaningful and reliable the study and its findings are. Zero is set as the group’s average level of rigour.

While Table 5 lists all the numeric data which is underlying to the visualisation in Figure 9 plus an extract of the findings for studies dealing with certain relationships (i.e. Links) only. The values listed in the rows (e.g. Link A1 Avg) are the arithmetic means of the underlying individual studies’ assessments.

Table 5 List of Literature Analysis Results

Study NO	RIGOUR / METHODOLOGY	ASSOCIATION	LINKAGES
3	-10	-10	B
5	0	7	C
7	1	6	C
9	4	3	A1
12	5	4	B
14	4	5	A2
17	5	8	A2, A3
18	0	-4	C
19	0	1	C
20	2	6	A1, A2
22	2	7	C
23	0	6	C
24	-2	4	C
26	-6	-1	C
27	-3	-5	C
28	-2	5	C
29	6	2	C
30	6	6	A2, A3
31	6	3	C
33	-6	6	C
34	-4	7	C
35	0	3	C
37	-7	2	C
Overall Avg	0	3	Overall (24 studies)
Link A1 Avg	3	5	A1 only (2 studies)
Link A2 Avg	4	6	A2 only (5 studies)
Link A3 Avg	6	7	A3 only (3 studies)
Link B Avg	-3	-3	B only (2 studies)
Link C Avg	-1	3	C only (16 studies)

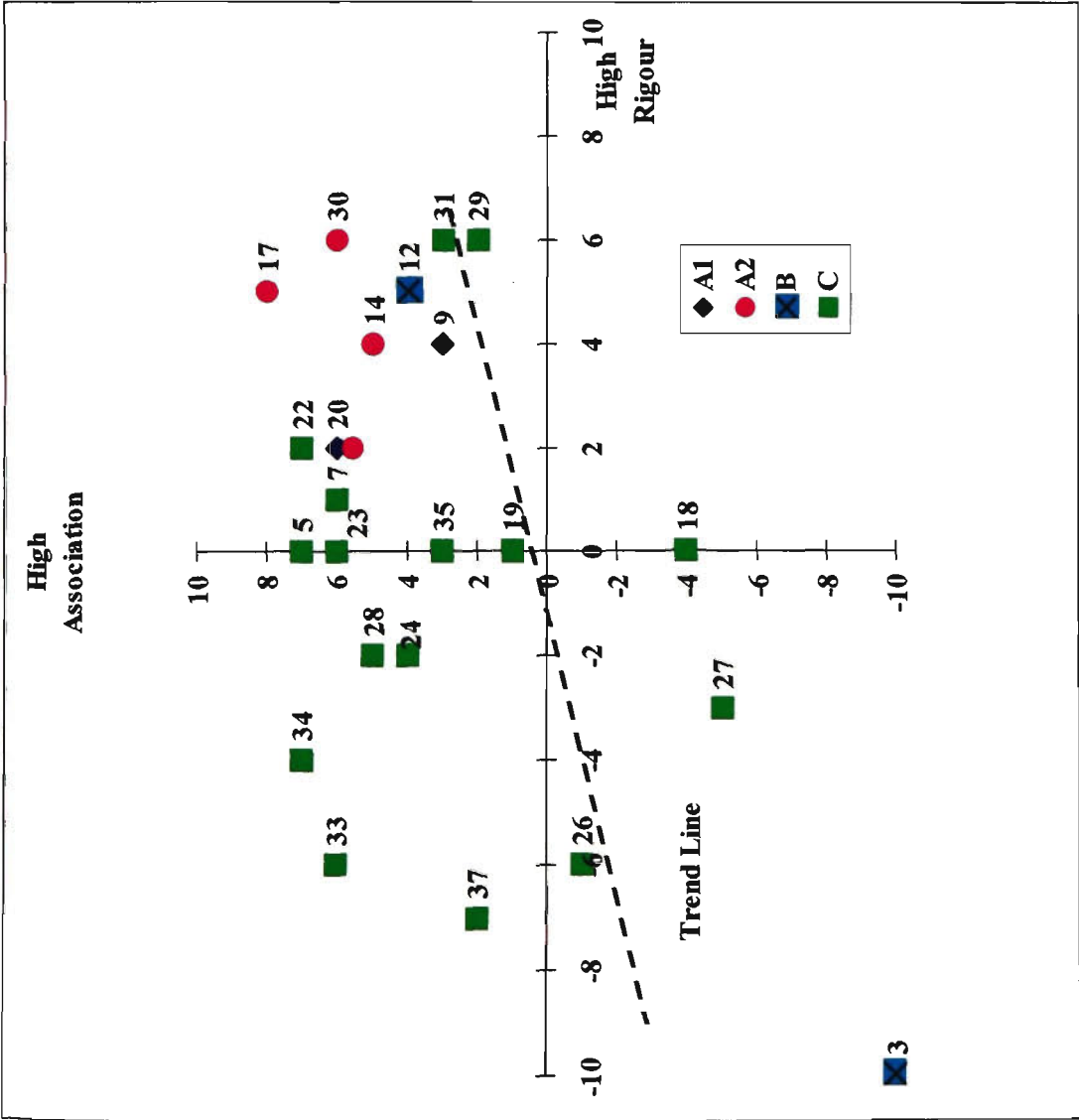


Figure 9 Literature Assessment Plot
(Numbers shown as per Table 5)

2.3.1 Analysis and Summaries of All Relevant Publications

In analogy to the previous Table 3 the following table (Table 6) is a detailed summary of the assessment of each paper. It summarises the main content and background of each study together with comments made on a study’s particular feature or methodology used. It also classifies the relationship concerned (e.g. Link B) and lists the results of the assessment regarding the association found and the rigour in its methodology.

Table 6 Overview of the Analysis of the Most Related studies' Content

Ref No	Rigour	Assoc.	Conclusion	Summary	Comments
3	-10	-10	No empirical research Link B	criticises TQM for being ineffective It claims that TQM addresses efficiency not effectiveness, creates an inward looking organisation and does not guarantee long-term higher productivity. TQM can even be dysfunctional and can reduce the overall effectiveness of an organisation.	purely judgmental Not based on empirical evidence
5	0	7	methodology unknown Link C	1000 samples taken. Return on Investment focused. It found 80%/44%/35% higher ROI for Quality Management companies with small/medium/large market shares.	
7	1	6	Claims Cause and Effect. Link C	Looked at the 20 MBNQA Top Scoring Organisations in employee relations, operating indicators customer satisfaction and BPI from 1988/89, It found a strong relationship between strong customer focus, senior management leadership, employee training, empowerment, involvement, systematic fact finding and the decision making process and 'corporate performance' measures. 'Corporate performance' is measured as employee relations, quality, productivity, customer satisfaction and profitability. It claims that there is a cause and effect relationship between the total quality management practices and corporate performance.	It uses a questionable methodology (see Garvin) and makes an illegitimate conclusion about cause & effect relations. This is the first Western study conducted. It is not a longitudinal study. It did not constitute a statistically rigorous analysis. It did not control for industry factors and did not include firms that did not apply for the Baldrige and did not report on the progress of non-TQM firms over the same time.
9	4	3	Management practices vs. Process Quality Link A1	9 US and 7 Japanese companies are compared regarding their internal and external defect rates and quality practices in use. It identifies Quality Management policies and practices that are associated with superior quality performance in the room air-conditioner manufacturing industry.	
12	5	4	Process Quality vs. Productivity, Managerial Policies vs. Productivity Link B	12 US manufacturers have been surveyed on-site. Multiple regression analysis tests the impact of managerial policies on productivity. It provides empirical evidence of an inverse link between quality and work in process inventory. It found that reductions in waste or reject rates were always associated with increases in total factor productivity.	

...continued

14	4	5	Product Quality vs. Productivity, Statistical Quality Control (SQC) vs. Productivity Link A2	205 US manufacturers have been surveyed by mail (PHD dissertation). It looks at the role of SQC in quality and productivity improvement. It found that SQC can improve productivity through higher product quality and lower costs. It concludes that there is a positive association between quality and the production capability of the firm.	It suffers from slightly fuzzy conclusions
17	5	8	Linkages A2, A3	It is based on data of over 3,000 business units in Europe and North America. It identified that every 2 % improvement in customer rating of quality is associated with a 1 % increase in return on investment.	The PIMS's definition of quality is product based and the measure of quality is based on subjective quality comparison of their products against two competitors.
18	0	-4	Quality Management strategies vs. Business Performance Link C	Study found no significant association between business performance and a change in the level of quality	Methodology is unknown
19	0	1	Link C	This is a survey of 500 large US firms. The following results were found: 93% claimed to have some sort of TQM. 35% said it had significant performance impacts (two thirds of these have failed to achieve significant results). 62% are expecting a significant impact over the next 3 years	Methodology was never released. Did probably not include small firms or non-TQM firms.
20	2	6	Process Quality vs. Productivity. People Management vs. Productivity Linkages A1 & A2	It is based on 95 cases. Productivity is highly influenced by simplified material flow, valuing the workforce, high quality and controlling growth rate. It is not as strongly influenced by unionism, plant size and equipment advances.	
22	2	7	Management Decision Making vs. Profits Link C (very vague)	It is based on the EQA. It is a five year study of 8 case studies plus the Fin. Times top 100 and top 500. A 5% change would impact profits in the FT100 index companies by 8-15.7%, in the FT500 by 11.9-19.7% and in 8 eight case studies by 13-27%. Small changes of 1 % in key decisions which impact the elements of the model could have a very large effect on business results (profits in the 8 case studies would be improved by between 13-45%, in the FT over 35%). It provided a business model that links business results to management decisions that improve results and uses a profit and loss accounting structure.	

...continued

23	0	6	<p>Quality Management ~ Business results similar to AMC's Leading the Way study Link C</p>	<p>663 manufacturers from the UK, Germany, Netherlands and Finland. Internal people , customer, operational, business impact. It claims to have found a significant correlation between Quality Management approach and results. A plot of the overall practice and overall performance scores from the sample shows a strong link between practices and performance. Over 50% of the variation in performance is explained by practice.</p>	<p>A conservative estimation of the study rigour (= 0) had to be made since the actual methodology was not released.. A retail price of £ 200 stresses its commercial emphasis</p>
24	-2	4	<p>Quality Management ~ Operational Business Results (very little scientific rigour in approach) Austrian and International based Link C</p>	<p>Based on 1300 manufacturing sites. Study is based purely on employees' perceptions (5 point Leichard scale). This includes both estimations of the business performance level as well as advancements in TQM. Few attempts are made to control for bias and subjectivity problems. High level statistics are calculated with great accuracy without taking a critical view about the original data's reliability. Cultural differences with regards to self estimations are reflected in comparison with data collected from overseas where American respondents generally ranked themselves higher than Australians.</p>	<p>Some members of the committee (i.e. representatives of the Boston Consulting Group and the AQC) which oversaw this study had vested interests in promoting a Quality Management/Best Practice approach.. Little attempt was made to produce a high rigour study other than the large number of participants. No documentation on the study's full methodology is publicly available.</p>
26	-6	-1	<p>Quality Management ~ Corporate Performance Austrian Link C</p>	<p>Based on a survey of 4 companies. It argues that Quality Management does not result in significant direct improvements in the overall corporate performance but does contribute to the development of a climate of cooperation and team spirit. Such a change may then have an impact on the overall performance. Concludes that convincing financial arguments are yet to be found. Based</p>	<p>Quality Management ~ Corporate Performance; Samples not randomly taken, no attempt was made to assess their TQM program in use; Participants rate their results of TQM as very successful which suggests bias. No set of uniform or imposed performance measures was used, instead mixed information which was voluntarily provided was used. Author acknowledges these limitations and expresses awareness of external factors with impact on the business results.</p>

...continued

27	-3	-5	Quality Management ~ Business Performance Australian Link C	<p>Four Sydney-based companies were surveyed. Tested Deming's statement as to whether TQM companies are achieving improvements in quality of processes and products, and whether these improvements in quality are being matched by improvements in overall organisational productivity or performance. It found that an improved labour productivity can be a direct result of capital injections into the operations, resulting in higher throughput without increases in labour. Quality Management programs DO NOT result in significant DIRECT improvements in overall company performance. The impacts of Quality Management are greatly overshadowed by the effects of internal factors (e.g. capital investment in new equipment) and the generally uncontrollable external (economic and competitive) factors. An attempt to take into account some external factors including GDP, the exchange rate and the stock market. Find little relevance though. Concludes that if we are to gain broader acceptance of this approach, we must find convincing FINANCIAL arguments to demonstrate that the TQM approach does indeed deliver superior results.</p>	<p>Has no particular rigour in the applied methodology. Arbitrarily chosen samples are not suitable for generalising findings. Author demonstrates awareness of the limitation of this study. No investigation has been made into the approach towards TQM (commonality, degree of progress etc.) Companies considered themselves successful in TQM. Did not take the same measures from all companies.</p>
28	-2	5	Deming Prize vs. Business Performance Link C	<p>It is based on the 1983 Reports of Statistical Application Research, JUSE 1961-1980 Deming Prize Winners. Defines and quantifies the purposes of TQC promotion in Deming prize awarded companies. Shows the tangible and intangible effect of TQC activities based on observations of above average long-term performance. Managerial effectiveness demonstrated through profitability, productivity and growth rate.</p>	<p>It is not a scientific study. It did not include firms that did not win the Deming Prize, it did not observe the progress made by non-TQM firms over the same period of time and it did not control for industry factors that might have produced the observed differences. Not all recommendations are relevant due to cultural differences: Ex: In Japan, the competitiveness is measured in the rate of nuclear energy usage !!!</p>
29	6	2	Management Attributes vs. Financial Performance Link C	<p>Reviews some previous similar studies and examines the performance of 12 companies' (office and computer equipment) over 2 years. Finds a positive relationship that decays over the time. The 8 attribute scores were correlated to the following financial performance data: Market to book value, Return on equity, Return on sales, Working capital to assets, Return on total capital, Earnings before interest and taxes to total assets, Debt to equity, Working capital and sales. The correlation was found to be statistically significant for KPI No.2, 6, 5 and 3. This correlation consistently decays over time as the data for the following two years (89 and 90) revealed. A positive relationship between the 12 organisations' characteristics (based on Peters and Waterman) and financial success is found but its strength seems to decay over time.</p>	<p>The methodology of using experts to obtain the companies' scores based on Peters and Waterman's attributes is questionable.</p>

...continued

30	6	6	Process Quality (Conformance) vs. Operational Performance and Business Performance Linkages A2& A3	<p>It is based on a survey of 184 New Zealand manufacturing enterprises (=21% response rate). It focuses on the relationship between conformance quality (scrap, rework, complaints etc.), Productivity and Manufacturing Performance. The findings provide empirical support for significant associations between quality and improved operations performance across manufacturing firms.</p>	<p>This is an exemplary research article including a comprehensive literature review which makes good use of descriptive statistics plus structured equation modelling (SEM). Suggests further research over longer period of time (>3 years). Shows awareness of other business functions, which may mask or overwhelm the impact of manufacturing quality effects.</p>
31	6	3	TQM vs. Business Performance Link C	<p>Concluded that some quality practices, particularly supplier certification and process improvement, did have a significant effect on performance. The key to TQM performance does not lie in the tools and techniques such as ISO certification and benchmarking but in recognition that intangible factors such as employee empowerment and senior management commitment have a greater influence on TQM performance. It includes investigation of other performance explaining variables such as entry barriers and rivalry.</p>	<p>Good use of descriptive statistics. Relies on subjective perceptions of Business performance and TQM implementation. Tests nearly obvious hypotheses with over-theoretical concepts and lack of common sense (e.g. length of TQM implementation ~ TQM satisfaction)</p>
33	-6	6	Quality Management vs. Business Performance Link C	<p>This study looked at 17 award winners between 1988 and '92 with their Quality programs plus some of their claimed achievements and data gathered from a minor survey. It focuses on the companies' own selection of KPIs. It considers the financial characteristics of 4 of the publicly owned award winners in comparison with the industry average plus survey results of 4 of the privately-owned companies. Seeks only positive evidence for the link. It also identified 4 commonalities between award winners: customer satisfaction =overriding objective, use of SQC techniques, formal establishment of Q improvement programs, communication seen as vital, Relies mainly on data published by the BA winners.</p>	<p>It is insufficiently based on empirical data or original research. Uses mostly submissions or other published material.. The results of the financial performance of the 4 publicly held companies are very mixed and inconclusive. It looks at winners only and does not consider other factors. It relies on subjective opinions on performances compared with industry averages and estimates of the change due to Quality programs. Inconsistency and variability within the BA might be an issue because of the early times of BA (88-92) Makes claims about 'cause and effect' relationships. No testing of the control group (i.e. industry averages) for Quality Management implementation occurred. These KPIs are partly process measures (efforts) rather than achievements only. Excuses for negative performance developments only are provided (e.g. real estate investment, unfortunate acquisitions, industry). A biased researcher draws attention towards KPIs that are supportive of his hypotheses. This leads to a distorted representation of facts.</p>

....continued

34	-4	7	Quality Management vs. Business Performance Link C	<p>It is based on 29 Quality Management implementing companies. 8 measures are taken over 5 years and compared to the industry median: Profit per Employee, Average Remuneration, Total Assets per Employee, Return on Total Assets, Turnover per Employee, Profit Margin, Fixed Asset Trend, Trend in number employed. The findings say that 79% of companies have higher 'Profit per Employee' than the industry average, 93% 'Average Remuneration', '79% Total Assets per Employee', 76% 'Return on Total Assets', 79% 'Turnover per Employee', 76% 'Profit Margin', and 72% 'Fixed Asset Trend'.</p>	<p>It is a European study of which the Executive Summary only is available. The sample selection process of taking 29 companies 'known' for their TQM programs suggests bias.</p>
35	0	3	Selected Quality Management practices vs. Business performance Link C	<p>The study collected 945 management practices in 580 organisations in the US, Canada, Germany and Japan. Performance has been measured in the dimensions Profitability, Productivity and Quality. It concludes that there are no universally beneficial practices. Practices that are beneficial at one level of organisational performance show no association-or even a negative association-with performance at other levels. Some TQM processes, particularly process improvement and supplier certification were found to have improved performance. The performance impacts of other TQM features depend on the firm's stage of TQM advancements.</p>	<p>An international study of which no methodology is revealed. The assessment on Quality performance in relation to their competitor was based on self-perception. It controlled for national and industry differences but has no particular theoretical (scientific) grounding. The consultancy's researchers had vested interests in disseminating TQM. It excluded medium and small-size firms and did not have a control sample of non-TQM firms.</p>
37	-7	2	Link C	<p>It surveyed 17 past AQA winners between 88 and 92. It asked them to list any direct and measurable results gained from winning the award. Only six of these 17 listed measurable improvements. It found that improvements after winning the award were primarily in 'soft' factors (awareness, pride and recognition) and less obvious in 'hard' factors such as market share, profitability and customer satisfaction. It also found that employee morale was the main benefit.</p>	<p>The study suffers from insufficient rigour in its methodology and conduct. Ambiguous titling and interviewing leads to confusion: Is the impact of reaching, applying, or pursuing the AQA meant? Are the improvement initiatives since the AQA, because of the AQA or as part of the AQA, or after it meant?</p>

2.3.2 Evidence Found in the Literature

Table 5 represents an overview of the studies together with their rating in terms of relationship found (i.e. strength of the correlation), their rigour and the type of linkage studied. The lower part of the table shows some arithmetic mean values for parts of the group, depending on which linkage they studied.

Twenty out of the twenty-three studies (87%) attempted to investigate relationships between Quality Management and certain aspects of business results. The other four focused on A2 and A3 type of linkages, only linking certain aspects of business performance with each other but not with the philosophical concept of Quality Management (see Figure 7).

2.3.2.1 Financial ‘C’ Linkages

Looking at Figure 9 above and the series of those sixteen data pairs which represent Financial linkages (Link C) it is notable that most studies are scattered around the upper half which is confirmed by an arithmetic mean of 3 (see Table 4). This stands for a moderately strong and positive correlation. Also this group of studies tends to be scattered a little more around the left side of the Y-Axis which is explained by a relatively low mean rigour of -1.

The only two studies that were carried out with an acceptable degree of rigour (i.e. No. 31 & 29) did not find a very strong relationship. The majority of those studies that were conducted with lower rigour concluded along the lines that they found a significantly strong and positive relationship.

Given that it normally takes a higher level of rigour to identify relationships clearly, it gives the impression that some of these researchers may have been biased towards strong and positive findings. This suggestion is supported by the fact that often the researchers’ association with certain organisations (e.g. large consultancies) must result in their interest being vested in disseminating Quality Management.

It should be noted here that the five studies (No 5, 23, 35, 19 and 18) along the Y axis did not fully reveal their methodology, which consequently did not allow for an accurate assessment of their rigour. A conservative (because indifferent) score of zero had to be allocated in order not to falsify the overall quality of the sample group. Not surprisingly the few features of the studies which were revealed were those which are relatively easy to achieve (e.g. large sample size), and which commonly lead to a public perception of a high quality study. The more subtle facts though, including the surveying method (e.g. perception-based or not) were kept secret. It is hard not to believe that some studies were designed to 'impress', but with inadequate work content.

While few studies including the comparison of share price development under BA winners as opposed to S&P's list of 500 may suggest there is a positive link between quality and financial return, the challenge remains to provide operational methods for measuring the link (Keiningham T., 1994).

Another observation is that the studies by the big consultancies are clearly competing with each other and emphasise the features unique to them, whilst the academic research papers at least refer to other researchers' work or findings and thereby often mutually benefit from the learning of others. This is regrettable as it often leads to duplication of efforts and no real new findings. Instead heavy emphasis was put on making the study 'easy to sell' to the public.

Concluding on Financial linkages it can be said that rigorous testing and empirical validation of the relationship of Quality Management and bottom line results are inconclusive and fragmentary. This is true even though many researchers have produced publications in this area.

2.3.2.2 Process Capability 'A1' Linkages

The only two assessed studies on this link (No 20 & 9) have produced similar results (both moderately strong positive correlations ($\bar{x}=5$) which were achieved with reasonable rigour ($\bar{x}=3$)). This similarity although on a very small sample size, may indicate a greater confidence in a relationship which by its nature should be much easier to identify, since it is less affected by other business-relevant but external noise factors when compared with financial benefits. In recognition of this,

some researchers (Terciovski 1996, Maani 1994) recommend studying this particular link rather than the more ambitious task of tracing quality impacts right through to business performance. Such an approach has the advantage of reduced complexity and increased chances for achieving truly significant and meaningful findings. This is particularly applicable in the manufacturing industry where data on process or product quality is often available or relatively easily measured. Concluding, some evidence for a moderately positive relationship seems to exist but is not quite sufficiently researched yet.

2.3.2.3 Process Efficiency 'B' Linkages

Only two studies belong to this group, of which only No 12 can be taken seriously. This study traced a Process Capability 'A1'-type of linkage through to Inter-efficiency 'A2'-type linkages. This affinity is likely to be the reason why it fits so well together with 'A1 and A2'-type studies.

The only other 'Link B' study (No 3) serves as a classic example for a number of publications which frequently appear as part of a political movement of unqualified criticism against the effectiveness of Quality Management-related approaches. This paper takes an extremely negative stand with no empirical evidence whatsoever. It appears that such publications are produced primarily by people who may benefit from the frequent occurrence of new management 'fads' (among them consultants, journalists and publishers). Concluding, little evidence exists which makes more higher rigour research necessary.

2.3.2.4 Other Linkages (A2 & A3)

Concluding, those four studies, dedicated to the much more straightforward mechanistic and less controversial links 'A2' and 'A3', have enough rigour (for A2 and for A3) to be accepted as sufficient evidence for a significant and positive correlation (for A2 and for A3) between Process/Product Quality and Productivity (Link A2) and Business Performance (Link A3).

2.4 Deficiencies in Work Published

Various critical observations relating to the shortcomings of unsuccessful research are made throughout this section. The very complex task of 'Bottom Line impacts' is often not supported by appropriate study design and research conduct. A lot of faults occurred because of the following shortcomings:

- Not a longitudinal study; did not constitute a statistically rigorous analysis
- did not control industry factors
- did not include firms which did not receive an Award
- did not report on the progress of non-Quality Management firms over the same period
- Measurements are based on subjective perceptions only, inappropriate conclusions have been drawn which are not supported by the research design.

The most commonly encountered shortcoming is bias based on the attempt to promote certain views. While generally speaking there is nothing wrong with research being demand-driven and even guided by market opportunities, integrity must always be maintained and should not be compromised by commercial interests.

Another very critical issue for any study is that Quality Management-related benefits are often confounded by the effects of other extraneous variables (i.e. noise factors). Control of the extraneous variables is what research design is all about; good design controls many sources of invalidity while poor design controls only a few or even none (Gay et al. 1992). This may well justify the inclusion of a qualitative type of research, which gives more opportunity to recognise and control noise factors. The three next most common 'flaws' are:

1. It is inappropriate to discuss the existence of a 'cause and effect' relationship when conducting correlation research, which by definition is only suitable to conclude a perhaps positive or negative relationship or association under the investigated variables. To actually test for a 'cause and effect' relationship requires experimental research with very strict requirements for control

over the research situation, which makes it practically impossible for practice in real business environments (Zikmund 1994, Newton 1973).

2. Studies on organisations who have been awarded for their achievements (e.g. AQA, Deming Prize or MB Award) are biased, since business performance is one critical criterion for actually winning an Award, which reduces it to a self-fulfilling prophecy with not much value.
3. Perception-based data where participants rank their own achievements against industry or competitor standards should be regarded very sceptically in terms of reliability and accuracy. Research has shown that especially very low performing organisations are significantly (by nearly 40%) over-estimating their own relative performance (Voss C. 1994) .

Another critical observation is that many measures target only efforts (i.e. means or processes) such as top management commitment (e.g. time spent on TQM or CI programs) or employee empowerment (e.g. time spent on training) etc. which are then misinterpreted as indicators for TQM progress (i.e. ends or outcomes).

The most intriguing observation is that a study's rigour is related to the strength of the relationship found. This is supported by the fact that a trend-line fitted through all data points of Figure 9 has a strong positive slope which suggests that the stronger the rigour of the study the stronger the positive correlation found. Unfortunately none of the type C link studies have been substantial enough to identify a strong correlation. The encouraging positive implication of this, is that it should be worthwhile conducting a high quality study with no short cuts, since it will eventually produce sustainable findings which in this case may be those which are favoured by so many others.

Implications of low research standards

Quality Management with its heavy emphasis on 'common sense' has earned itself a reputation for being intellectually trivial, which is much welcomed by most practitioners. It is unacceptable though to tolerate low standards in the conduct of R&D and in its scientific reasoning. This could seriously question the standing of Quality Management as a recognised Business management science. Its

practical implications could be even more significant as it may damage the credibility and hinders the acceptance of the entire Quality Management concept. Large consultancy groups producing fake in-house research reports should be equally concerned about their reputation as professional and reliable business partners.

2.5 Conclusions of Literature Review

Overall the findings that are concluded with rigorous testing and empirical validation of the relationship of Quality Management and bottom line results are inconclusive and fragmentary. This is despite a large body of existing publications.

Implications for the need and requirements for this research

Figure 7 is repeated here because it shows the assumptions made before this literature review had been conducted. It was assumed that Inter-efficiency link A2 and Inter-financial Link A3 are sufficiently proven to exist (indicated by the relatively large tick marks).

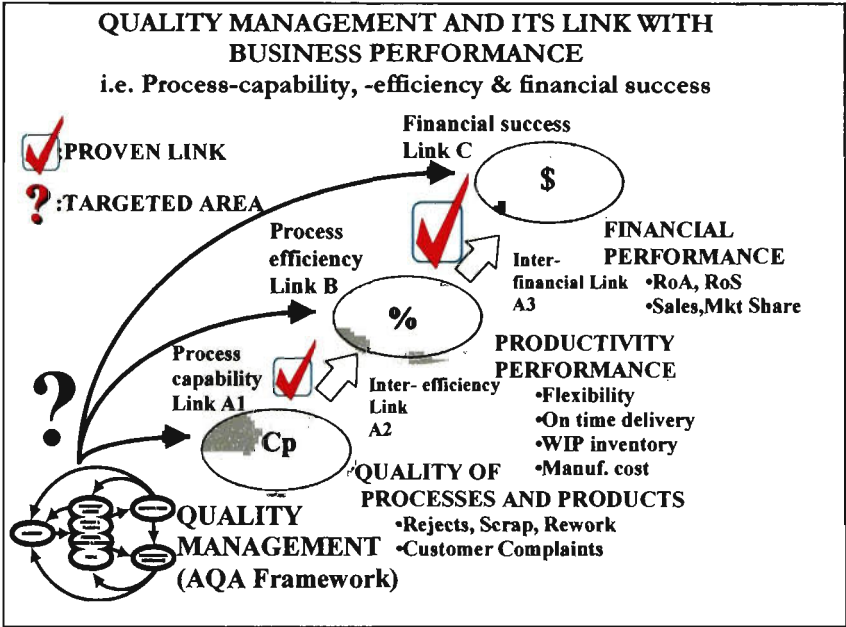


Figure 10: Copy of Figure 7: The author's model of research relationships

This assumption is confirmed with the findings discussed in Chapter 2.3.2.4. In fact most recent research has focused on investigating those A2 & A3 links between quality product features (e.g. reduced rework and customer complaints) and operational performance indicators (e.g. reduced Work In Progress (WIP) inventory and increased flexibility). As far as the larger step links A1 and B are concerned (the part in the figure with a large question mark indicated relationships), only some evidence was found which is too insignificant to consider this area as sufficiently tested. Link C types of relationships clearly represent the area with the largest potential for original research. It can

be concluded that the assumptions made and expressed in Figure 7 regarding the potential for this research to fill in gaps and make significant original contributions of new knowledge are confirmed. This justifies the pursuit of the research as planned in the original proposal.

Reducing the potential limitations of this study

This literature search also revealed major shortcomings in the methodology of the majority of all reviewed studies (13 out of 23 highly relevant reports were rated as unacceptable). The implications for this PhD research are that many of the potential problems could be identified in advance, and an attempt was made to address or overcome them in the design of this study to avoid similar limitations. Some of the key issues could be summarised as:

- The study found that too often researchers attempted to draw rather ambitious conclusions, with sweeping implications, based on insufficient data and analysis.
- It also identified significant opportunities for learning from the work of other researchers, which could easily lead to higher research quality based on a more rigorous approach and a better conceptual design.
- The major deficiencies found include an overall tendency to overuse higher level quantitative research methods applied to questionable data, gathered through opinion surveys with too little factual foundation. In fact most research appears to rely on people’s (usually employees’) perceptions, even in the context of performance assessments and comparisons. This practice often raises reliability issues including bias, especially when it comes to judgements about achievements (e.g. quality practices or business performances) where it does not always provide a reliable vehicle for gaining meaningful information.
- Furthermore some publications contain vague reasoning and inappropriate methodologies (e.g. correlation studies to establish cause and effect links).

Other research limitations found included

- | | |
|----------------------------|---|
| • short time frames, | • misuse or misinterpretation of statistical tools, |
| • narrow industry sectors, | • failure to conduct pilot studies and non-use of |
| • small sample sizes, | control groups as a means of data validation. |

3 DEVELOPMENT OF HYPOTHESES

3.1 Development of Research Questions

Most practitioners as well as scientists have particularly strong interest in the question whether ‘Quality Management pays for itself’, i.e. its implication on the company’s financial results. Because of the difficulty of controlling other extraneous variables, researchers found it especially difficult to find empirical evidence for testing such a hypothesis. This research, because of its special approach and design (including a qualitative surveying component through which extensive business-relevant background information is collected and used for a successive isolation of Quality Management effects) promises to deliver data which is suitable for investigating this particular relationship.

The following sections are discussions of the research questions to be addressed as well as elaboration of their specific background.

3.1.1 Relationships between Business Success and the ABEF

The measures of business success at the top level of manufacturing organisations are normally not purely financial but include a mix of production efficiency indicators and various stakeholders’ needs which are fulfilment measures beyond the actual shareholder or business owner.

3.1.1.1 Implication of Higher Aggregate Award Scores

This research question involves two aspects, the primary one being the assumption that a higher score may be associated with a higher improvement of business results. If this assumption is true a significantly positive correlation coefficient should be established.

The secondary one is concerned with the difference in the marginal effects (i.e. benefit) experienced by an organisation which is starting at an already significant level (e.g. score 500). It is expected that this marginal effect is lower than that of an improvement made by a company at a moderate level (e.g. score 300). This theory is supported by the theory of organisational learning (e.g. S-curve learning development) and the commonly recognised ease in ‘harvesting low hanging fruit’ first. Management science and the school of thought of ‘organisational learning’ in particular suggest that any learning

and competency enhancement process follows the pattern of a “S”-curve rather than a straight line. In other words, after a successful start has been made, a beginner’s learning is relatively easily achieved while at an advanced level any further incremental effect requires more effort than what it did initially. If there is a connecting relationship between AQA scores and Business results, it is likely not to be one of a linear characteristic but of a polynomial or exponential nature. Foley takes this insight further and expresses “there may be times in the life of an enterprise when, to satisfy its survival (profit) criterion it will be necessary to discontinue or slow down the rate of quality improvement activity”. He continues with “even before reaching the point where quality enhancing activity meets the profit constraint, these activities may need to be stopped because the point of diminishing return has been reached (Foley 1997).” The slightly extreme belief of a point at which any Quality Management based efforts can actually be detrimental to the business success is highly controversial and shall not be discussed here any further.

If true then correlation plots should indicate that the relationship between an organisation’s overall evaluation scores and its business performance results is better described through an exponential curve (with a decreasing positive slope) rather than a straight linear line.

3.1.1.2 Multiple Award Entrants

It is of interest whether firms with a track record of several improvements in evaluations against the framework (i.e. aggregate score) outperform others.

The underlying thinking here is that companies with more than one entry in the award demonstrates a high degree of commitment which cannot necessarily be assumed to be existing under other organisations with single evaluations. If such commitment has actually lasted over an extensive period of time during which the several evaluation scores have been produced, then chances are much better for this organisation to receive tangible benefit in return for their consistent management approach. Especially if opportunities for improvement were recognised and acted on which is evident through an increase in the score from one evaluation to another, the organisation is likely to be lifted

to a higher business performance level. Such improvements should then be noticeable in relative comparison to these companies' bottom-line results.

3.1.1.3 Importance of Specific Items and Categories

Certain items could be identified to have 'key-enabling' character based on their outstanding association with Business results. Even the comparison between individual items' scores and the aggregate score of the same sample could yield interesting findings.

It is of interest which particular management aspects deserve special attention based on their importance (i.e. high correlation with KPI improvements or evaluation scores). While certain items (i.e. management disciplines) have already drawn a lot of attention and are relatively popular and commonly targeted for improvement, other items may be underestimated and their full potential has so far not been recognised.

3.1.1.4 Interdependencies and Relationships within the Framework

The Business Excellence Framework is a complex system, which is best used as a total system for holistic business improvement. The segregation of it and the use of certain elements only is not recommended since it is not likely to deliver the expected benefit or even worse maybe create sub-optima in one area which has unintended consequences or even detrimental effects in a neighbouring area. This is why it is important to understand the dynamics and relationships within the framework. This section explores some of the more interesting aspects in this context.

Special linkages between certain categories

There are certain categories, which are more closely associated with the results of other categories. For example, it could be expected that People's performance depends on effective Leadership whilst Leadership needs the support and trust of its People. If such outstanding relationships exist then they could be identifiable through special associations.

Process or performance enabler

Whilst the evaluation criteria encompass some process measures (the ‘means’ of business success) and some gauge the achievement of the actual purpose (results) of processes, it is of interest whether process oriented criteria are effective for achieving these ‘ends’.

For example a manager contemplating fighting poor employee satisfaction (Item 4.6) could decide to do so by giving particular emphasis to issues covered in the remaining Category 4 Items (4.1-4.5). This would make particular sense if a particularly strong relationship between Items 4.1 to 4.5 and Item 4.6 had been established.

If such relationships exist, there should be a direct relationship between the more process-oriented criteria and specific outcome or result oriented criteria.

3.1.1.5 Re-Design of the ABEF

The AQA framework and its weighting have significant responsibilities for setting the right emphasis or directions. Many practitioners when using the framework will want to see evidence of having improved preferably in the scores obtained through an evaluation or self-assessment. They may even find that their own success in coordinating a Business Excellence Improvement program is judged by the increase in score, which is hopefully independently determined.

Whenever an increase in the aggregate score is targeted a great deal of attention will usually be paid to those items with the highest weights, since an improvement in those can much more easily be noticed in the aggregate score. This illustrates the potential importance of weights and gives rise to the following research questions.

Re-weighting the Framework

The importance of specific items and categories as in their relationship with bottomline results and the overall assessment score is unlikely to be reflected in the framework’s current weighting.

The current weighting of individual items has been chosen by experts (i.e. the AQC framework development panel) based on their intuitively felt importance of specific items. While this intuition is far from scientific reasoning, the significant experience and knowledge of members of the panel should not be underestimated. It is expected that some of those items with a particularly strong emphasis in the current weighting might even turn out to be identified as key-items when investigated in the here-proposed scientific manner. In either case this aspect gives the opportunity of reviewing the current weighting and perhaps where appropriate of recognizing established relationships through reweighting.

Sample procedure of revising the weighting of the current Framework

The step below is a hypothetical documentation of the process of redesigning a framework to strengthen its relationship with important performance aspects.

Figure 11 to Figure 13 below visualise the rationale of a potential redesign of the framework’s weighting based on correlations with Business Results.

Various concepts may put different emphasis on the management aspects, which are reflected in the Business Excellence framework. Rather than the arbitrary or even political distribution of the weighting percentages, a better rationale could be found based on which all items would find their appropriate weighting.

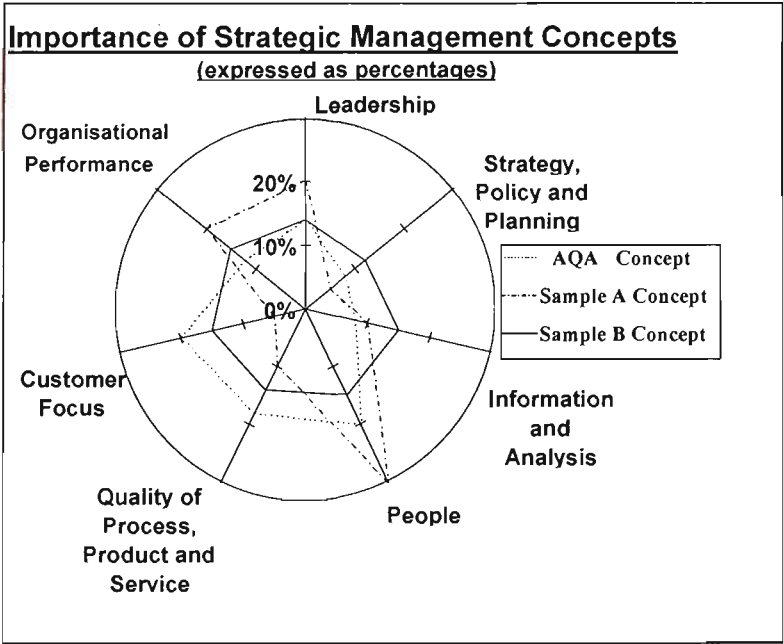


Figure 11 Spider Chart Illustration of Sample Weighting Concepts

Figure 12 shows a hypothetical comparison between a choice of alternative designs of a framework with regards to the weighting structure which puts different emphasis on different management

aspects (e.g. AQA Items). It suggests that the current weighting structure may not necessarily be consistent with a favourable pattern that for example could be typical of a high performing organisation. It is hoped that as a result of this research similar patterns to those illustrated in Figure 12 can be identified and used as a rationale for redesigning the current framework.

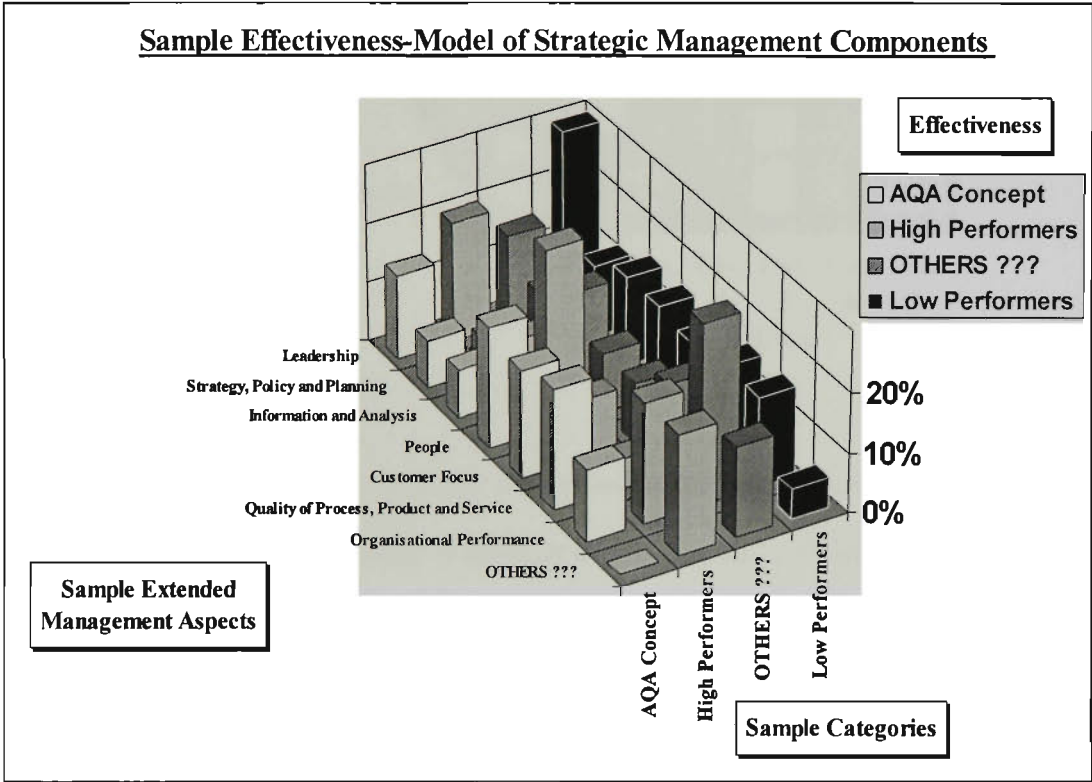
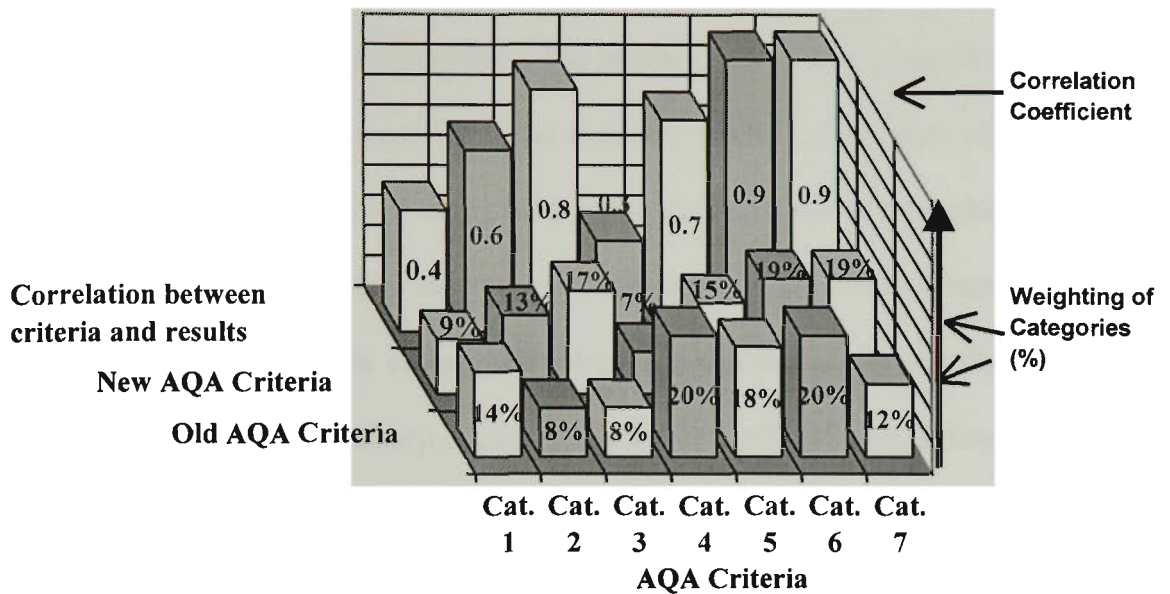


Figure 12: Sample Distributions of Category Weightings

This improvement opportunity is consequently addressed through adoption of those patterns which can be found less successful (i.e. high performing organisations). Figure 13 shows in this respect a more consistent appearance of the framework’s weighting when put into context with the categories’ associations with business results. In this sample the correlation coefficients between individual categories and business results have been used as a scaling factor for deciding how much emphasis each of the seven categories should receive.

Hypothetical weighing of the AQA criteria in conformance with their importance to achieve improved results



Note: All of the above distributions were randomly chosen and are for the sole purpose of providing an example.

The weighting of the “new AQA criteria” is based on the down-scaled correlation series (Sum = 100%)

Figure 13: Sample Correlation Coefficients of a Redesigned Framework

3.1.2 Role of other Extraneous Factors in Explaining Business Excellence

Most other bottom-line impact studies failed to identify clear trends because the researchers were unable to isolate extraneous factors, which blurred any existing improvement trends to the extent that the data collected appeared to contain too much noise to allow for significant conclusions to be drawn.

This recognition gives rise to two fundamental research opportunities with significant potential impact for the findings. The first opportunity is the attempt of identifying and isolating noise and the other is the inclusion of Industry characteristics as another variable for explaining business success. Both of them will now be dealt with in more detail.

3.1.2.1 Isolation of Noise

The first is based on the fact that extraneous variables do not have to be identified to the extent that they can be measured and isolated or controlled. The primary task of this research is to investigate the relationship between Quality Management and business results. Any other effects which are outside the normal business activities and not Quality Management related are therefore considered as noise. Whilst this noise can have significant impact on the data analysis results it can be sufficient to simply extract it or extract those data components which are believed to contain the bulk of noise. This practice is believed to have significant impact on the strength of relationships found.

The second approach goes beyond extraction of noise to the extent to which these other extraneous and business effecting variables are actually used as another parameter to explain (i.e predict) business results. In other words rather than eliminating them they are being used to increase the accuracy or perfection by which relationships can be described. This approach requires a firm definition and identification of those variables, which enables their accurate measurement.

The following section is concerned with one of the further extraneous variables, which are believed to be researchable.

3.1.2.2 Role of Industry Characteristics

Some variables are believed to play a significant role in influencing improvements to the bottomline. Three of them have been proven to be of considerable influence in empirical studies (Powell 1995). They are Rivalry, Entry Barriers and Agility.

Rivalry is a variable which indicates if similarities to 'cut throat' business exist or if one can rely on the loyalty of customers. Entry barriers is a variable, which relates to the ease with which new market entrants can establish themselves and acquire a growing proportion of market share. Some industries are very mature, rely on well-established customer relationships, which offer little or no chance for a new entrant to take over the business of the others. The Agility variable describes how fast-moving an Industry is with respect to its improvement and innovation rate. In a highly agile industry a

competitor has to be quick in product developments and other key factors in order not to fall rapidly behind.

The above three variables are assumed to add to the explanatory power of Award evaluation scores.

3.2 Establishment of a New Model to Explain Business Success

3.2.1 A Visualisation of the Proposed Model

Figure 14 identifies the main factors which influence an organisation’s business success. It distinguishes between those which are controllable and uncontrollable and highlights that one important factor, an organisation’s fitness for purpose, is conveniently reflected in the ABEF evaluation score.

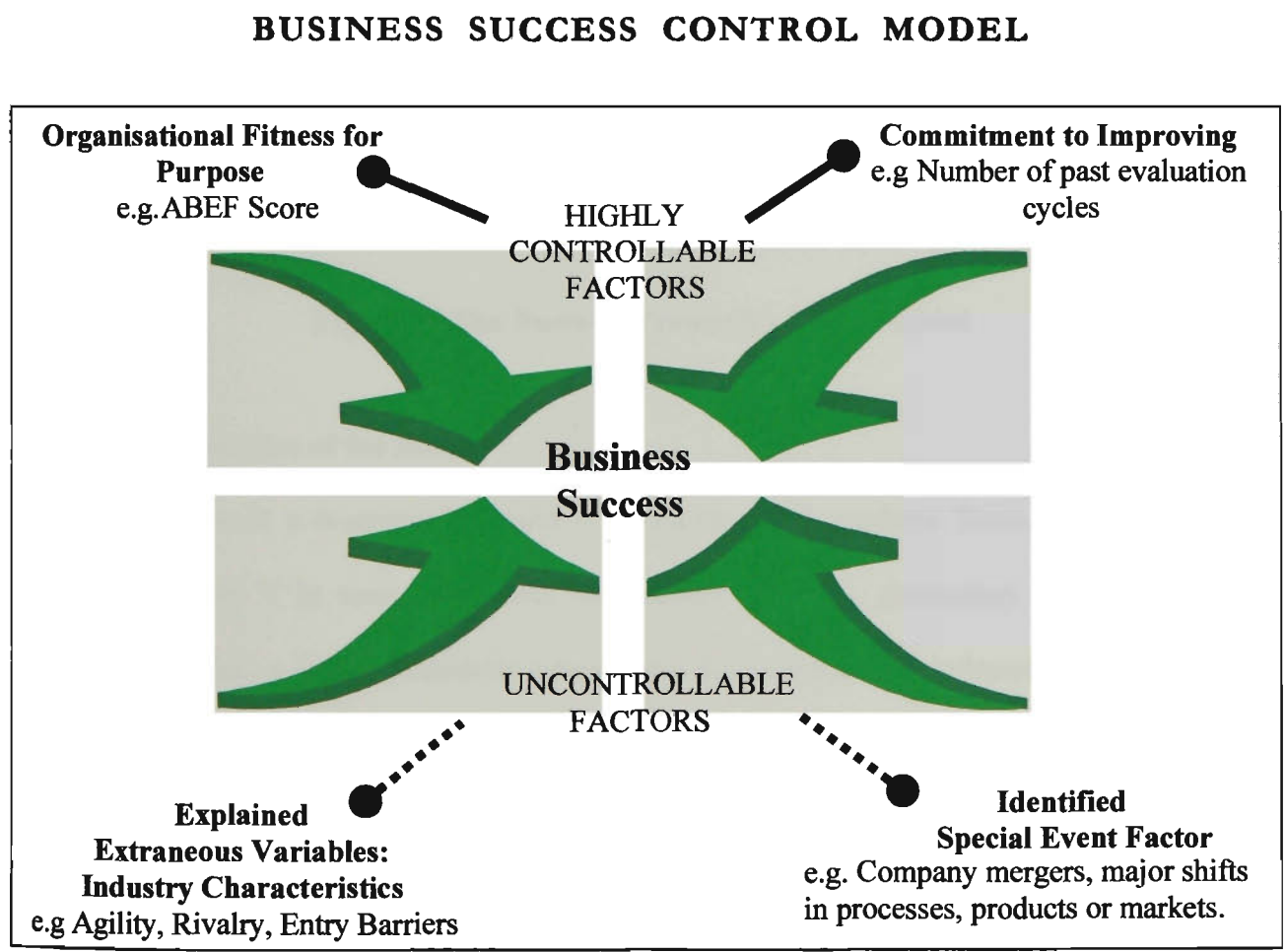


Figure 14 The Business Success Control Model

Figure 15 suggests that the information contained in the evaluation result against the ABEF is not only an important element of an organisation’s fate, but also that it serves as a fair predictor of

business outcome. The other elements if taken into consideration, together with the ABEF score then allow to draw the rest of the ‘big picture’.

BUSINESS OUTCOME PREDICTORS

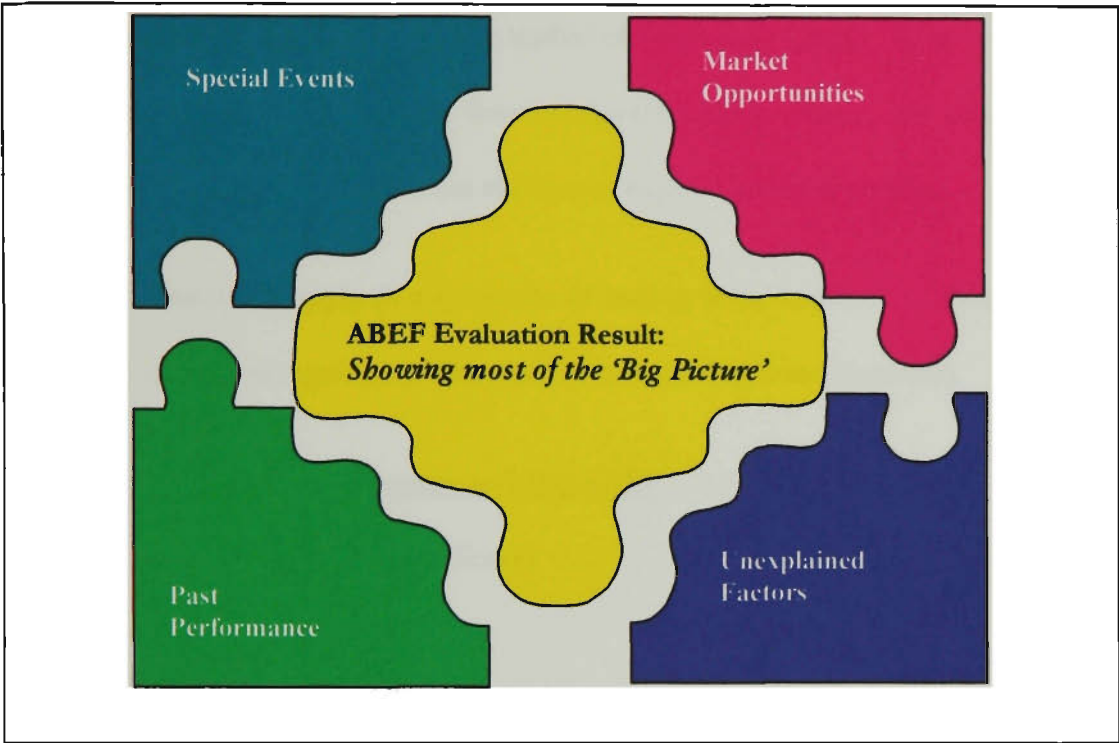


Figure 15 The Business Prediction Factor Model

3.2.2 The Algorithm of the Model

Equation 1 below is a theoretically-possible algorithm which explains Business results (i.e. the dependent variable Y in terms of several independent variables, parameters (i.e. factors) and a constant. It assumes a linear relationship between the dependent and the independent variables.

Equation 1 Linear Business Predictor Equation

$$Y = \alpha \times \text{ABEF} + \beta \times \text{Industry Characteristics} + \chi \times \text{Past Performance} + \delta \times \text{Unexplained Factors} + c$$

where α , β , χ and δ are unknown parameters which determine the significance of the individual four variables and C is an unknown constant of the equation.

It is the aim of this research to gain knowledge about these parameters so that a maximum possible accuracy in predicting the business results can be achieved.

3.3 Research Hypotheses

The following hypotheses are directly articulated from the content of Chapter 3.1, in which the underlying research questions were discussed. They are the result of deductive reasoning and need to be interpreted and tested in the context of what has been previously discussed. This includes use of the terminology which has been introduced in earlier chapters (e.g. Items). They are essentially sorted into two different categories, one being framework-relationship-related, the others are extraneous factor-related. All hypotheses aspire to test abilities to explain business results.

Note that certain limitations apply to any results of testing these hypotheses, even though they may not be repeatedly spelled out again (e.g. this study is restricted to manufacturers).

Relationships between Business Success and the ABEF

Implication of Higher Aggregate Award Scores

Hypothesis 1:

There is a clear, positive association between an organisation’s aggregate evaluation scores and its overall improvement in key business performance results.

Multiple Award Entrants

Hypothesis 2:

Companies with a history of improved evaluation results outperform those with only single involvements in the Awards.

Importance of Specific Items and Categories

Hypothesis 3a:

Some Items, when assessed for their predictive power of the overall organisation’s business results, show correlations that can be identified as special relationships when compared to others.

Hypothesis 3b:

Some Items, when assessed for their predictive power of the overall evaluation results, show correlations that can be identified as special relationships when compared to others.

Interdependencies and Relationships within the Framework

Hypothesis 4:

Some items or categories, when assessed for their association with others, can be identified as having a special relationship in terms of having outstanding power to explain evaluation results.

Re-Design of the ABEF

Hypothesis 5:

The overall framework's relationship with important organisational performance aspects can be significantly strengthened through adoption of the individual Items' predictive power as a new pattern for redesigning the weighting structure.

Role of other Extraneous Factors in Explaining Business Excellence

Isolation of Noise

Hypothesis 6:

The effect of systematically extracting data components with a high noise content is significant, and can be demonstrated by direct strengthening effects in the relationships found.

Role of Industry Characteristics

Hypothesis 7:

The characteristics of the industry in which a firm conducts business are a significant additional factor for explaining business success beyond AQA scores.

4 RESEARCH METHODOLOGY

4.1 Research Approach

4.1.1 Classification by Purpose

Research, being a formal, systematic application of the scientific method to the study of problems, can be classified by purpose and by method (Gay 1992). Classification by purpose is based primarily on the extent to which findings have direct application and to which they are generally relevant in other situations.

The conduct of 'Basic research' involves the development of a theory, while 'Applied research' is concerned with applying theory to the solution of problems including facilitation of decision making (e.g. Evaluation Research), development of effective products (e.g. R&D), and solutions to specific problems (e.g. Action Research). The attempt of clearly identifying and separating this research would be difficult and impractical, as this categorisation is intended to be perceived as a continuum (Gay 1992). What is more important is the recognition that this research, like most business and management research projects, has elements of all of these classifications, with a clear emphasis on Applied Research.

The theory underlying the premise that Quality Management is beneficial for the bottom line gives substantial opportunity to Evaluation Research (e.g. the decision-making of whether it is worthwhile to adopt the Awards framework), and also to the conduct of R&D activities (e.g. the design of an improved framework which emphasises the most important criteria). The feedback given to all study participants on how they compared to the rest of the sample in terms of relative performance may be considered Action Research as it may be used to solve the firms' decision making problems in deciding how successful they were using the AQA framework. The study's element of pure Basic Research is particularly predominant in the development of the business prediction model and the algorithm presented in Chapter 3.2. The theory developed is the proposition that business result improvements are sufficiently explained by the variables and parameters used in the model and the

equation describing it.

It is therefore evident, that even under the aspect of the possible research intentions, the study is of complex nature and has hybrid characteristics.

4.1.2 Classification by Method

Science distinguishes between Historical, Descriptive, Correlational and Causal Comparative or Experimental research methods. In this context the emphasis of this study is twofold on 'Descriptives' with the attempt to report the current status of the subjects of this study (using questionnaires, surveys, interviews and observations) and on 'Correlational' while investigating the relationships between the AQA framework and Business results. Traces of 'Historical' research, which attempts to explain present or future events based on past occurrences can be found in parts of the Introduction (Chapter 1) and more prominently throughout the Literature Review in Chapter 2.

4.1.3 Choice of Correlation and Causal Comparative Study Design

As indicated above the Correlation method has been chosen as the fundamental research design. Correlation studies are applied here for essentially two reasons, first to identify and select variables, which are related, and secondly to test assumptions made regarding likely associations.

The fundamental correlation design of this study is complemented by elements of Causal-Comparative methods wherever the attempt of merely describing existing conditions (i.e. management practices and business performances) is exceeded by the attempt to determine reasons or causes (i.e. the height of the evaluation score) for differences in their performance levels. Whilst any propositions regarding causal relationships are made with maximum caution, given that their proper establishment requires Experimental research (Zikmund 1994), some legitimate reasoning concerning predictions and tentative cause-effect relationships is made. A general word of caution based on the tenuousness of such relationships is made here as well as throughout this thesis.

One of the reasons why proper cause-effect and experimental research cannot usually be conducted in

real business environments is that the alleged cause (i.e. the Independent variables) are usually not determined or manipulated by the researcher. Instead it is found that groups are different with respect to some variables (i.e. business performance in the case of the dependent variable) and attempts are being made to identify the major factor (i.e. evaluation scores in the case of the independent variable) that has led to this difference. This research could be referred to as ex post facto (Latin for 'after the fact') since both the effect and the alleged cause have already occurred and are studied in retrospect.

Limitations of the Causal-Comparative extended design

Great caution must be applied in interpreting results. An apparent cause-effect relationship may not be as it appears. As with a purely correlational study, only some relationship is established, not necessarily a 'causal one'. The alleged cause of an observed effect may in fact be the effect, or there may be a third variable that has 'caused' both the identified cause and effect.

An example for this limitation is a company which is very 'rich' in resources (e.g. sheikhdом with huge oil reserves) which can consequently demonstrate impressive business results (e.g. profitability and returns). Such an organisation is likely to have the resources and necessary willingness to get involved in 'non-core business activities' such as applications for awards. It may also be able to afford the best available consultants to facilitate their application, which could ultimately make them benefit from a very well designed application and perhaps a substantial chance for higher scores.

In such a scenario the establishment of a relationship between high scores and big profits may not be very surprising. The crux here is obviously that a holistic business improvement framework and a well-developed evaluation process is capable of distinguishing between genuinely well-managed organisations and overstated applications with little substantial footing.

Only experimental research, which guarantees that the alleged cause or independent variable came before the observed effect, or dependent variable, can truly establish cause-effect relationships.

Choice of Correlation and Causal Comparative study design: Conclusion

The scientific core in this study i.e. the testing of hypotheses is conducted while drawing from

correlation methods only. Only where the implications of results are discussed, causal—comparative study methods are being considered. This conservative approach is in alignment with the aim of this study to produce highly reliable findings based on sound and rigorous analysis.

4.1.4 Choice of Representative Samples and Groups

Each group of individuals represents a different population. The way in which the groups are defined will affect the ability to generalise results. Since this study is only concerned with manufacturing organisations no findings should be generalised beyond the scope of this industry sector. While generally speaking random selection is found to be the preferred method of selection, it may not be very practical for this study as the size of population and samples available are very limited. The ability of dividing samples into groups is in this study largely governed by the firms' willingness to participate.

An important task is to select samples that are representative of their respective selection criterion but similar with respect to critical variables other than the independent variable (i.e. evaluation score). For example those companies studied which have applied for the award on multiple occasions and which are used for building the group of multiple applicants should be as representative of the underlying population as possible. In order to determine the equality of groups, information on a number of background and current status variables including the demographics are collected. In other words every opportunity is made to ensure that the groups are as equivalent as possible on all factors except of course the independent variable.

Preference of studying individual samples

By and large the bulk of analysis in this study is based on comparing individual samples (i.e. firms) rather than groups. The reason for this is again that on the one hand the small sample size may not be sufficient enough to allow correlation studies to be carried out and on the other hand the individual samples are diverse enough to contain enough data to support analysis if studied as individuals.

Dealing with individual and independent samples only is actually one of this study's strengths, since it

avoids most of the problems which are usually associated with the practice of forming groups. An example of a typical problem is the common practice of distinguishing between Quality Management and non-Quality Management implementing firms. One could argue that any company can demonstrate to have some Quality Management elements evident in their practices. The question here is clearly where to draw the line between both groups, which is very difficult though of potentially large impact for the results of the study.

4.1.5 Relationship Between Variables: Correlation:

In order to test the relationship between the AQA framework and Business results, the AQA evaluation score, a readily determined figure, which is indicative of the extent to which Quality Management is implemented, is used as the independent variable.

On the business results side empirical data was collected from participating companies. Data on this dependent variable is numeric, factual and indicative of the organisation's long term performance improvement at a high level.

An investigation of the relationship between both variables involves a correlation type analysis to determine how much of the variation in the dependent variable is explained by variation in the independent variable. In practical terms, it is of interest whether there is an association between Business Results and AQA scores and if yes whether this allows for a reasonably accurate prediction of an organisation's overall business improvement achievements.

Unlike most other studies where high performing (e.g. "leading") organisations are identified, grouped and then analysed, this study uses an ordinal scoring system for both description of the Business results and the management practices which has several advantages. Mahajan in this context argues that excellence is not a dichotomous characteristic of a company but a matter of degree (Mahajan 1992). This, even though it appears plausible, stands in contrast to nearly all other studies where groups of companies with similarities such as Quality Award winning were compared to non-award winning control groups with the assumption that 'black/white' distinguishing sufficiently explains

most variation found between the samples. The decision as to where to draw the line between ‘leaders’ and ‘laggers’ of course is difficult to make and of potentially significant impact for the results of a study. It is therefore not surprising that most empirical studies (which have made use of this ‘black & white’ distinction have not shown that “TQM firms” consistently outperform “non-TQM firms” (Matthews 1992; Fuchsberg 1993, Powell 1995).

A reliable scoring system like the Business Excellence Frameworks can provide a useful tool in determining the extent to which an organisation’s management practices are excellent (in alignment with Quality principles).

4.2 Pre-Analysis Verification Methods (Validity)

Validity is concerned with the certainty with which a test measures what it is intended to measure. A test is valid for a particular purpose and for a particular group. A study is valid if results obtained are due only to the independent variable and if they can be generalised to situations outside the research setting. The two conditions that must be met are referred to as internal validity and external validity (Zikmund 1994).

Internal validity

Internal validity in the context of cause-effect studies refers for example to the condition that observed differences on the dependent variable are a direct result of the independent variable, not some other variable. In other words, the outcome of the study is the result of what the researcher believes, not of something else. In this study’s context internal validity refers to the confidence with which business results are believed to be caused by the effectiveness of a management system. If a plausible alternative explanation (a rival hypothesis) for the study’s results (i.e. relationship between evaluation scores and business success) exists, the study may not be internally valid.

Some of the more relevant and major potential threats to internal validity as originally identified by Campbell and Stanley (1972) include:

- **History-** *the occurrence of any event that is not part of the study but may affect performance on the dependent variable.*

This study has attempted to gather qualitative information on special business background events, which was isolated through correction or extraction of their effects on the dependent variable (i.e. business performance).

- **Maturation-** *physical or mental changes that may occur within the subjects over a period of time.*

Some businesses for instance had only just been established prior to the time when business performance records were taken. The businesses were subject to a natural process of growth and maturation. The number of staff multiplied as did the sales and profits earned. The bulk of these changes could of course not be attributed to the pursuit of Quality Management which is why once again manual intervention (i.e. data scrubbing was required).

- **Instrumentation-** *unreliability or lack of consistency in measuring instruments, which may result in an invalid assessment of performance. If data is collected through observation, observers may not be observing or evaluating behaviour the same way at the end of the study as at the beginning.*

The evaluation process is believed to be very rigorous with many inbuilt control factors (e.g. the process of finding team consensus). The likelihood for the critical occurrence of this problem is further reduced through a focus on factual data records rather than perceptions. Since only post 1992 evaluation scores are considered for this study, most of the variation caused by the initial learning in the evaluation's process would have occurred outside the samples studied (i.e. between 1987 and 1991).

- **Statistical regression-** *occurs when subjects are selected on the basis of their extreme scores. It refers to the tendency of subjects which score highest on a pre-test to score lower on a post-test and vice versa. The tendency is for scores to regress, or move towards, the mean (average) or expected score.*

Since no groups of samples with extreme scores are included (e.g. leading or lagging firms) the possibility of this validity problem is avoided.

- **Differential selection of subjects-** *occurs when already formed groups are used. It refers to the fact that the groups may be different before the study even begins, and this initial difference may at least partially account for post-test differences. Thus using already formed groups should be avoided if possible. If they must be used, groups should be selected that are as similar as possible, and a pre-test should be administered to check for initial equivalence.*

This problem is particularly relevant for all those studies where the performance characteristics of award winners are investigated. One could argue that it is no surprise to find particularly strong business results in award winners if business success may, officially acknowledged or not, be one of the criteria by which an organisation is ultimately selected as the one to receive the award. In the Australian Business Excellence Award a minimum evaluation score (i.e. 650-700 points) is only one of the criteria to be met by an award winner. The final selection is ultimately made by a panel of business representatives who amongst other criteria also look for the overall picture and balance in those high performing organisations. This is why the score is a more superior independent variable (strictly based on the framework's criteria) rather than the level of recognition achieved (i.e. award or none).

- **Mortality or attrition-** *occurs in longer studies and refers to the fact that subjects which drop out of a group may share a characteristic such that their absence has a significant influence on the results of the study. Mortality is especially a problem when volunteers are used. They rarely drop out of control groups because few or no demands are made on them, but they may drop out of an experimental group if too much effort or commitment is required for participation. The experimental groups that remain at the end of the study may as a whole represent a more motivated group than the control group.*

This issue was indeed perceived to be of potentially significant importance. It is quite thinkable that

participants will feel obliged to serve as a sample which can demonstrate something that would be favoured by certain lobbies (including the AQC). An organisation's decision whether to participate or not may therefore be influenced by their own assessment as to whether they will be able to live up to such expectations. A participant may especially be tempted to review their own participation value at an advanced stage at which business result data is collected and prepared and is starting to show certain trends. It is then very likely for them to make a judgement as to whether their case will be a positive one or not and whether this is of any importance to them.

With much effort and perseverance continuation was achieved with no participants dropping out during the advanced stage of a study. This is despite the protest of some participants against this study's growing demands (i.e. business performance data collection). Much attention was paid to whether organisations with more favourable results and relationships were more willing to participate than others. Extensive comparison studies between participants and non-participants performance characteristics have been carried out to assess this problem. In some cases, the researcher and the awards had to be reassured that confidentiality was always maintained and that no links existed between participation in this study and information used for evaluation purposes in those cases where companies had the intention of reapplying for the award.

In certain cases counselling was felt important and sometimes plain urging to continue participation in this study was necessary to avoid any dropping out at an advanced stage.

- **Selection-maturation interaction-** *means that selection may also interact with factors such as history and testing although selection-maturation interaction is more common. If already formed groups are used for instance one group may profit (more or less) from treatment or have an initial advantage (or disadvantage) because of maturation, history or testing factors. It then might be this initial advantage that caused post-test differences, rather than the independent variable.*

This concern is certainly relevant for this study, as some of the industries are simply booming more vigorously and are more profitable than others. Whilst some of this variation can be explained some

will simply have to be accepted as a disturbing but inevitable inaccuracy when predictions are made.

While little can be done to keep control over the occurrence of most of the above events responsibility remains to select control for their occurrence as far as possible and to make every effort to determine if it is critical.

External validity

External validity refers to the condition that results are suitable for generalisation or applicable to environments outside the study. In other words similar results would be expected from other groups, in other settings, at other times, as long as the principal conditions are similar to those of the study.

If research results are not suitable for generalisation to any other situation outside the experimental setting, then no one can profit from anyone else's research, and each and every effort would have to be re-established over and over. An experimental study can only contribute to business-and-management theory or practice if there is some assurance that confirmed relationships and observed effects are replicable and likely to occur at other times and places with other groups. The term ecological validity is sometimes used to the degree in which results can be generalised to other environments. If results cannot be replicated in other environments by other researchers, the study has low ecological validity. Some of the threats to this type of research's more relevant external validity include (Bracht 1968, Campbell 1972):

- **Pre-test-treatment interaction** *occurs when subjects respond or react differently to a treatment because they have been pre-tested.*

In any cases of pre-testing (i.e. pioneering) it has been conducted in was done with utmost sensitivity to avoid guiding or influencing results. The majority of data is factual and numeric and where it has been verified as true performance records, it is not susceptible to such effects.

- **Selection-treatment interaction:** *similar to the differential-selection-of-subjects problem associated with internal invalidity. It also occurs when subjects are not randomly selected from a*

population and greatly affects the representativeness of samples taken. This non-representativeness may also result in a selection-treatment interaction. Extra caution must be taken in stating conclusions and generalisations based on studies involving existing groups. If a researcher is turned down by 9 companies and accepted by the 10th, the acceptance system is bound to be different from the other 9. Management in this company may exhibit more openness, more introspection as a company, greater familiarity with research techniques or even pride in being included in a study than management and personnel in an average company. Problems involved in acquiring subjects should therefore be adequately reported.

Whilst initially potential participants were found to be quite reluctant in deciding whether they should be involved in this study, a significantly high response rate of close to 50% provides in this context a less critical setting.

- **Experimenter bias effects;** *possibility in which the researcher unintentionally affects execution of study procedures, the behaviour of subjects, or the assessment of that behaviour, and hence results. Active bias results when the researcher's expectation affect her/his behaviour and hence outcomes. In other words the way an experimenter looks, feels, or acts may unintentionally affect study results, typically in the desired direction. It is recommended that the researcher is not to be involved directly in conducting his/her own study, if at all possible.*

While a conscious effort was made to assume a neutral position throughout the study the possibility for this phenomenon cannot be entirely ruled out.

- **Reactive arrangement,** *refers to a number of factors associated with the way in which a study is conducted and the feelings and attitudes of the subjects involved. It is about creating artificial environments which for instance may result from the subject's knowledge that they are in some way receiving special attention. Any situation in which the subjects' behaviour is affected not by treatment per se but by their knowledge of participation in a study. This is called the „Hawthorne effect“.*

This effect could only occur in perception based surveying which even though part of this study is not a critical factor of testing the hypotheses.

Especially when it comes to business performance measurements at a financial level the issue of extraneous variables having significant impact on the results is considerable and needs to be addressed. This is part of the reason why this study not only researches the variable which is believed to play the principal role in explaining business success (AQA score) but goes beyond this and investigates other factors which the management system may not be responsible for. Generally speaking control of the extraneous variables is what good design is all about when clear relationships with high explanatory power are to be established. However it is not universally recommendable to strive for maximisation of internal and external validity through the rigorous application of control over subjects and conditions which would create a laboratory experimental type of environment with literally no relevance to a natural business setting. It is important though that the researcher strives for a good design, which makes an effort to control most of the threats to internal or external validity.

Apart from the above-explained issues one aspect of validity can be tested with the aid of the t test, an often used inferential statistic, which is used to see if there is a significant difference between the means of two groups. Other very commonly used statistics are often descriptive (e.g. the arithmetic mean, which indicates the average performance of a group on a measure of some variable and the standard deviation, which indicates how spread out a set of scores is). These descriptives, if for example used to compare non-participants with participants, can be helpful tools in establishing the validity of a study.

‘Self-sufficient prophecy’ issue

Furthermore this section deals with one specific issue which at first glance may justify valid concerns about this study’s limitations. This problem is known as a: *‘Self-Sufficient Prophecy’ Issue*

This concern challenges this study’s validity based on the recognition that identification of an association between an AQA score and Business performance may not be very surprising as the AQA score also partially reflects performance data through its category 7 ‘Business Results’. The

investigation of a relationship between one thing (ie. AQA score) and something else (i.e. Business Results) which is actually explicitly included as a component (ie. one of seven categories) may therefore be just testing an essentially 'self-sufficient' assumption, something that is always bound to turn out as true. The arguments against this concern are as follows.

The AQA framework is designed to be a holistic business improvement instrument which through the application of its components in unison and synthesis, aims at maximising business performance. No significant results can be achieved by addressing isolated issues (or items and categories) only.². Whilst the category 'Organisational Performance' clearly refers to 'Measures of success' and should show success through the organisation's superior organisational performance there are also other requirements to be met. In line with the ADRI system used throughout all criteria, one expects to find a description of how the results are used to assist routine management, to identify opportunities for further improvement and how the results are communicated to all stakeholders. The actual performance level of business indicators e.g. profitability is only one aspect (the 'R' of the ADRI system) of in total four dimensions of a system which in every aspect has to be clearly aligned to the fundamental principles of Quality Management.

In fact, the assessment matrix, through which scores are determined explicitly require the business results to be clearly caused by the 'Approach' and its 'Deployment' in all areas in order to be accepted as evidence for the outcomes of a Quality Management approach. It is therefore impossible only to score highly in category 7 without having management practices in place which are recognised as an effective approach of Quality Management and which have resulted in business results as traced in category 7.

² The 1999 ABEF booklet on page 6 reads on this issue, 'Since the framework and the model represent a systems approach to management, all categories and all items link to one another. Categories and Items are interdependent so that the model cannot be broken into separate parts. For example, innovative leadership could not achieve any of its strategies and goals without working through people. ... There is absolute interdependency between all parts of the Framework, as represented by the model.

This explains why a company, which can demonstrate very high levels of profitability for whatever reasons other than their effective management system, may not score very highly at all in the AQA category 7 at all. In fact this is often found in excessive cost cutting exercises by means of redundancies, downsizing and outsourcing. Some AQA applicants who managed temporarily to make their balance sheets look prosperous may find themselves disappointed of not being given credit for these results if, for example, they are perceived as unsustainable and the result of actions which are not in alignment at all with Quality principles. The results presented in category 7 or any other category (e.g. 5.3 Customer Satisfaction) are therefore to be viewed in connection with a company's goals and practices as detailed and evaluated in other categories.

This is therefore quite different from those business results which were collected as part of this study. One other fundamental difference between category 7 or other results oriented items (e.g. 4.6, 5.3, 6.3 and 6.4) and the collected top Key Performance Indicators is that anyone without any reservations will agree to the desirability of high achievements in KPIs. However not everyone may perceive achievements in certain AQA Items as critical. In fact, depending on one's personal values they may not appear to be of vital importance to the success of an enterprise at all. This study however clearly focused on exploring relationships which if found to exist are of relevance and importance to everyone regardless of philosophical management beliefs.

A good example for this may be that 'employee satisfaction' could be viewed as not very important for perhaps someone with a leaning towards a more autocratic, control-oriented management style. For implementation of the Quality Management philosophy though, it is part of the fundamental goals and beliefs (see Principle 7). The relationship between category 7 results (i.e. AQA evaluation scores in category 7) and average KPI improvements is by no means at all outstanding when compared with other category scores and average KPI improvements. Concluding on this issue it can be said than no evidence was found which suggests the existence of a significant 'self-sufficient prophecy' phenomenon.

4.3 The Subjects of the Study

4.3.1 Original Population and their Industries

This research is restricted to the population of Australian manufacturing organisations who have applied for the Award at least once during any time between 1992 and 1997. While targeting such a specific study group has several limiting implications on the ability to generalise findings, it has also a number of benefits:

Firstly, manufacturers are the industry with the longest history in a 'Total Quality' approach, even though most other service industries have by now recognised the equal relevance of this concept to them. The fact that 32% of all AQA applicants in 1998 belong to either the Defence Department or to other government administrations highlights that today the popularity of Quality Management in the public sector is significant (AQC 1999). Indeed the demographics of 1998 AQA applicants show that the majority belong to the service industry sector (see Figure 16). Nevertheless the manufacturing industry represents the study group with by far the greatest history and experience in implementing Quality Management which makes it a much more interesting population to study.

Secondly in terms of the available number of organisations who applied for the award at some time in the past there are many more manufacturers than service providers. Manufacturing companies have by far the greater Quality Management adoption rate and many service industries are latecomers, which have only recently adhered to this. This offers better chances for inclusion of highly diverse study groups consisting of very experienced practitioners as well as recent newcomers from a variety of industry sectors with both high and low performance outcomes. The chance for a significantly greater average implementation period also opens up the horizon for more longitudinal observations.

The third argument for using manufacturing enterprises is that they are more comparable i.e. they have more similarity in their business performance metrics than what service industries do. They are likely to have similar interests and measures in place in terms of their basic goals regarding profitability, productivity and other efficiency measures. The inclusion of service industries and thereby potential non-profit or charitable organisations would make the study subjects much more

difficult to compare. Furthermore, the concept of measuring organisational performance is relatively new and the meaningfulness of early measurements may be strongly limited by initial learning in designing and applying the right performance measures.

Whilst the number of annual applicants increased significantly in 1996/97 (see Figure 16), there is no significant increase in the number of applying manufacturing organisations. Today's popularity under service industries such as Public service, Health etc. shows that manufacturing companies rank only number 4 when compared with other AQA applying industries.

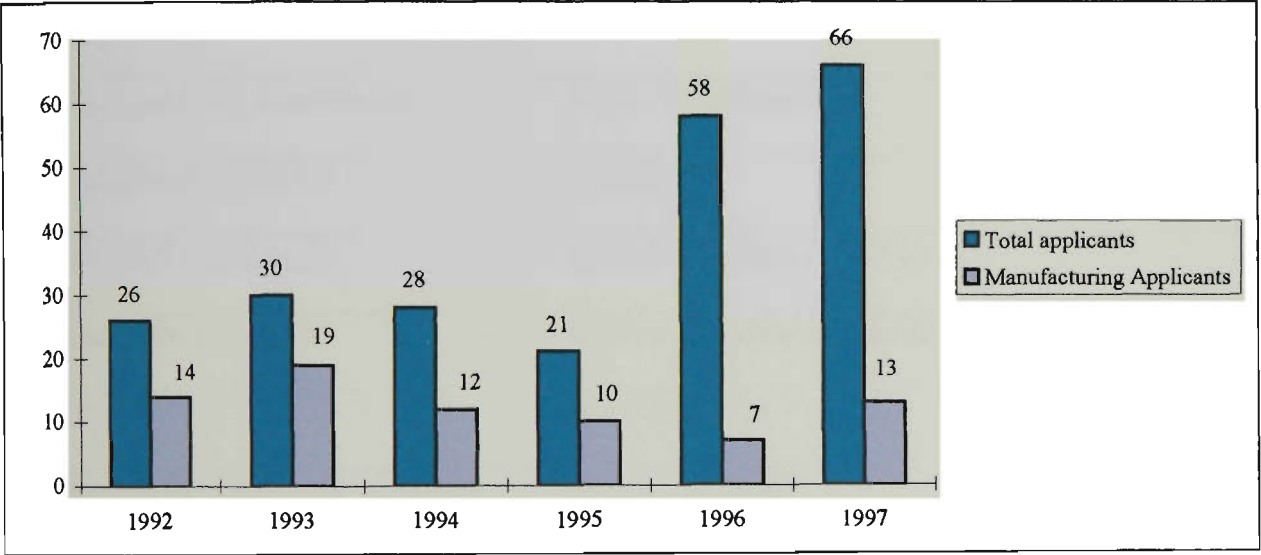


Figure 16: Applicants of the AQA

Table 7 lists the 34 different industries in which the 53 manufacturing applicants (75 applications in total) of the last six years (between 1992 and 1997) were operating:

Table 7 The 34 Industry Sectors Represented in the Underlying Population of Manufacturers

(Numbers in brackets = number of companies in this industry sector)

▪ Air-conditioning/Refrigeration (2),	▪ Gas Cylinders (1)
▪ Aircraft (1)	▪ Household cleaning products/Soaps (2)
▪ Automobiles (1)	▪ Industrial Containers/Packaging (1)
▪ Automotive (2)	▪ Optical Instruments (1)
✓ Bedding/Textiles (1)	▪ Petrol/Oil refining (2)
✓ Biological Laboratory/Agricultural Vaccines (1)	✓ Pharmaceutical/Prescription health care (3),
▪ Building products, metal/timber (2)	▪ Plastic Moulding (1)
✓ Chemicals/Adhesives (1)	✓ Printing (1)
✓ Chemicals/Fertilisers (2)	✓ Quarry Products/Cement (2)
✓ Chemicals/Pesticides (1)	▪ Rail vehicles/heavy engineering fabrications (1)
✓ Coal (1)	▪ Road works (1)
✓ Computers, Periphery and Networks (2)	✓ Sanitary ware (1)
▪ Electric motors (1)	✓ Ships/Vessels (1)
▪ Electric Appliances (1)	✓ Surface coating products (1)
✓ Electrical Switchgear (1)	✓ Telecommunication & Transmission systems/Networks/Phones
✓ Electronics (2)	▪ Metal components fabrication and light engineering (2)
✓ Elevators/Lifts (1)	
✓ Food/Dairy Products/Bakery/Catering (6)	

19 of the above 34 sectors (56%) which are marked with a tick (✓) are participating companies and are included in the further analysis of this study (see Chapter 5.1.2 for more details).

4.4 Justification of the Design Chosen

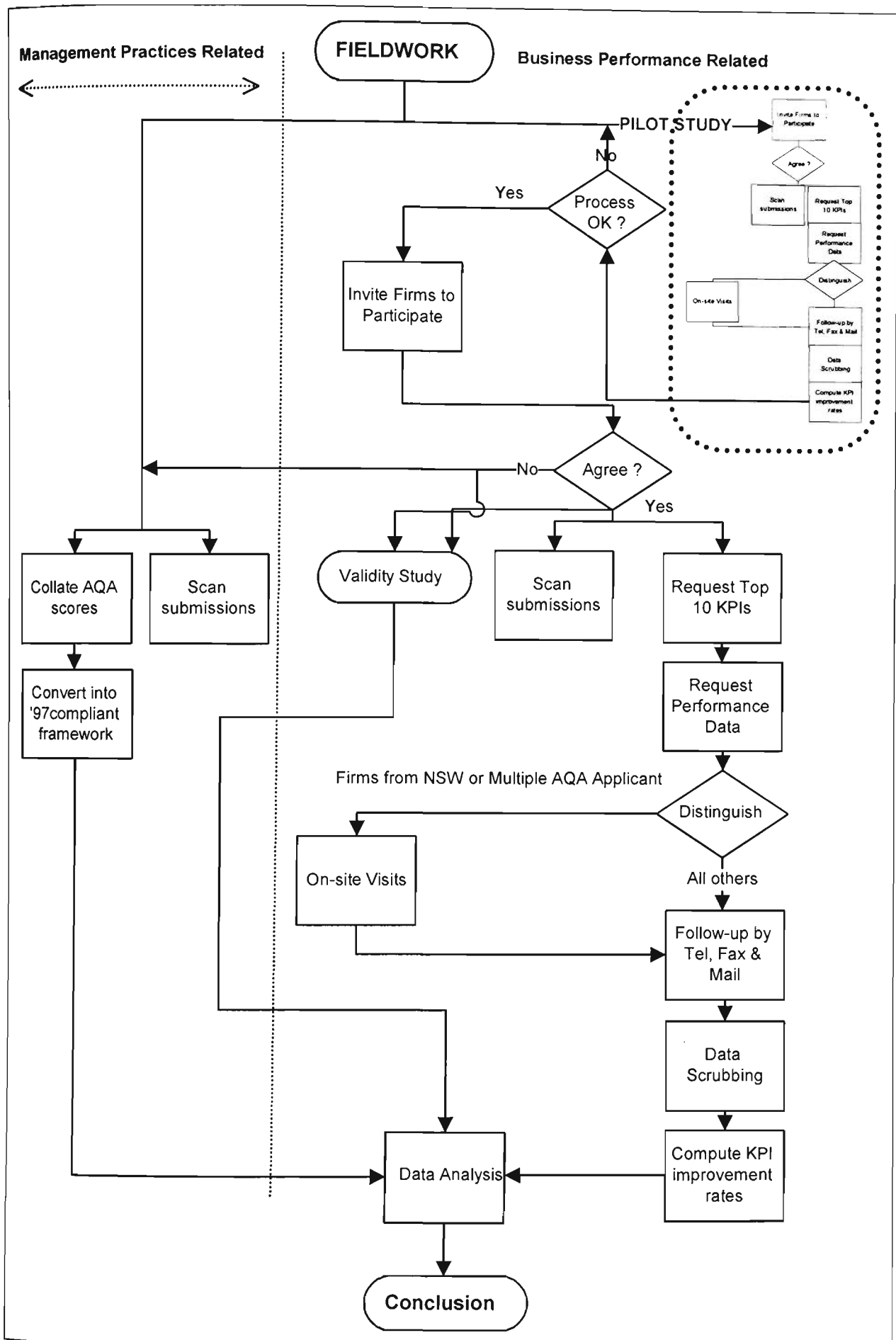
The design and methods described, although relatively basic, are well-suited to analyse the available data and transform it into meaningful information without stretching the limits beyond reliability and robustness. A simple basic system of correlation analysis based on a moderate number of cases available, provided the underlying data is reliable, is by far superior to large quantities of ‘questionable’ opinion data which is less likely to show true trends even if advanced multivariate and covariate analysis techniques (ANOVA, MANOVA) are used. The application of high level statistics is still limited to the quality of the overall design and data and the common sense applied when deciding to engage these methods.

A conscious effort has been made to ‘make do’ with simple techniques (e.g. averaging, linear trending etc.) so that practitioners can follow the processes and interpret their outcomes.

5 DATA COLLECTION PROCESS & RESULTS

5.1 Description of the Field Work Data Collection Process

Figure 17 shows a flowchart overview of the process of data collection which has been employed during the fieldwork of this research. The flowchart is a complete reflection of the overall scheme with the exception that it does not include any follow-up cycles when participation or other contribution (e.g. performance data) was requested from firms.



5.1.1 Description of the Methods Used to Collect Data

Various types of data have been collected and used in this study. The methods employed for collecting them were surveying, interviewing and observation. This was facilitated through numerous points of contacts and correspondence via Fax, Phone and mail (see Appendices 11.2 for details of the forms and letters used). The majority of participants received on-site visits conducted with face to face structured interviews.

In the following references are made concerning the origin of the data. Science distinguishes between primary sources which constitute first-hand knowledge, such as original reports, and secondary sources, which are second-hand information, such as a description of an event by someone other than an eyewitness (Gay 1992). Primary sources are admittedly harder to acquire but are generally more accurate and are to be preferred.

The data used is best grouped in classes of quantitative and qualitative types of information.

Quantitative Data

1. AQA Evaluation Scores

This data was made available by the Australian Quality Council and only had to be manually retrieved from the AQC's archive in which records are kept about past AQA applicants. The scores are determined as part of the evaluation process. Generally speaking, they are the only numeric records used to identify and to agree on the organisation's performance and recognition level in context with specific Items and Categories, which are part of the evaluation framework. They are for internal use only and are generally not shared with the applicant. Instead the applicant receives advice about whether, and at which level, official recognition for their achievement is given.

For this study, these scores are secondary data as they have been previously produced and kept on file in hardcopies. The method of collection was to retrieve the archived file and to copy down all relevant information about the evaluation results down, to convert them into electronic format and to record and categorise them in various matrices.

2. Business Results (Key Performance Indicators: KPIs)

All participating organisations were requested to identify their ten most important Business results, to list them and to prioritise them (see Appendix 11.2.5 for the letter used).

After this first step had been completed, actual data on performance records on all of the organisation's KPIs from 1991 to 1998 was requested with the aid of a pre-prepared table (11.2.6). Whilst the original request for this information had been made via Fax and mail, some data was collected during interviewing via phone or face-to-face during the on-site visit. Often data was not readily available but had to be extracted and prepared from past quarterly or annual reports and other official business records. This was usually jointly done in collaboration with the organisation concerned.

Both the top ten performance measures as well as the actual business performance data are of primary origin.

Qualitative Data:

1. AQA Application Submissions

This 50-page document contains all the information submitted to the AQA as part of the application. Its content is normally structured around the Categories and Items of the relevant AQA framework of the year in which the application occurred. Its 'story' normally describes the experiences and achievements made by the organisation in context with their Quality Management journey.

More than 35 of the folders containing the original application and evaluation were retrieved from the AQC archive, photocopied and then further processed. This includes data and information relevant to both, the investigation of the relationship between Quality Management and Business Performance as well as the supplementary "Best Management Practice study" (see Chapter 7.8)

Because this information had been originally put together by the organisations to support their applications, this data stems from secondary sources.

2. Industry Characteristics

The Industry Characteristics were surveyed by mainly using constructs validated by Powell (Powell 1995). Together with the actual request for numerical data on the businesses (see Appendix 11.2.7) an additional sheet (see Appendix 11.2.9) was attached. This part of the survey sought performance, relevant background information on the business environment, as well as a ranking of some particular industry characteristics on a 5 point Likert scale of aspects such as rivalry, entry barriers and agility (pace of change). It was requested to have this data provided by one of the most senior executives of the organisation, who supposedly had a better overview of the firm and its industry (11.2.9). The responses received contain data of primary origin, as nobody before had attempted to characterise their business environment in a similar manner.

3. Business Background Information

Information on Business performance, relevant events and actions was collected through a variety of means. The researcher found, in this context, much relevant information in the AQA submission documents. In those instances though where the time of the application was before the actual relevant business event (e.g. a merger with a competitor), other means of collecting this important information were utilised. Most of the surveying in this respect was concluded prior to the actual business performance data collection stage in order to reduce the risk of bias and the attempt to excuse spontaneously outlying or negative data points immediately after their identification.

The first time the participating firms were formally asked to indicate whether they saw a reason or special circumstances which should be taken into account when evaluating their performance records was on the “Industry Characteristics and Background Survey Response Form” (see Appendix 11.2.9). The response to this was frequently received significantly earlier than the delivery of the actual data, mainly because of the simplicity and ease in filling out the straightforward survey.

One of the other times when business relevant information was sought was during the on-site face-to-face structured interview, which was conducted for the majority of participants or alternatively during some of the many telephone contacts with each company.

4. Executive Interview Minutes

This part of the project which aimed at identifying Best Management Practice attributes common to successful organisations (see Chapter 7.8) involved interviews with senior-top executives. The minutes of these interviews, which had been conducted by a previous research team, were used for validation and enrichment purposes of the underlying data and helped to compile the database. They are information of secondary origin.

5.1.2 Sample Taken

5.1.2.1 Industry Sectors Involved

The 34 manufacturing industry sectors represented in the original population (previously introduced in Chapter 4.3.1, Table 7) are categorised into the major sub-manufacturing industry sectors as below, 12 participant sectors (86%) can be compared to the original 14 sectors (see Table 8 below) including the non-participants. This appears to be a healthy ratio and reduces the chances for distorted results because of industry bias and non-response error.

Table 8 Industry Sectors Represented by the Entire Population

1.	✓ AGRICULTURAL: Fertilisers, Pesticides, Biological Vaccines
2.	✓ CHEMICALS: Adhesives, Polymers, Plastics, Surface coating products, Household cleaning products, Soaps, Acids
3.	✓ CONSTRUCTION: Quarry Products/Cement/ Road Surfacing/ Metal and Timber Building products, Elevators/Lifts, Sanitary ware
4.	✓ ELECTRICAL GOODS: Appliances, Motors, Switchgear, Air-conditioning, Refrigeration
5.	✓ ELECTRONICS, COMPUTERS AND NETWORKS, Periphery, Telecommunication and Transmission systems/Phones
6.	▪ ENGINEERING FABRICATION: Metal components fabrication and light engineering, Gas Cylinders, Industrial Containers/Packaging
7.	✓ FOOD/Dairy Products/Bakery/Catering
8.	▪ OPTICAL: Spectroscopy, Instruments
9.	✓ PHARMACEUTICAL/Prescription health care
10.	✓ ENERGY RESOURCES: Coal mining, Petrol/Oil refining
11.	✓ PRINTING
12.	✓ TEXTILES: Bedding, Lining
13.	✓ TRANSPORT: Ships/Vessels, Aircraft, Automobiles, Automotive, Rail vehicles/heavy engineering fabrications
14.	✓ OTHERS

Figure 18 visualises the sectors and their representation in the underlying population and can be compared to Figure 19 which only shows the sample sectors.

The Industry Sectors represented in the Manufacturing Population

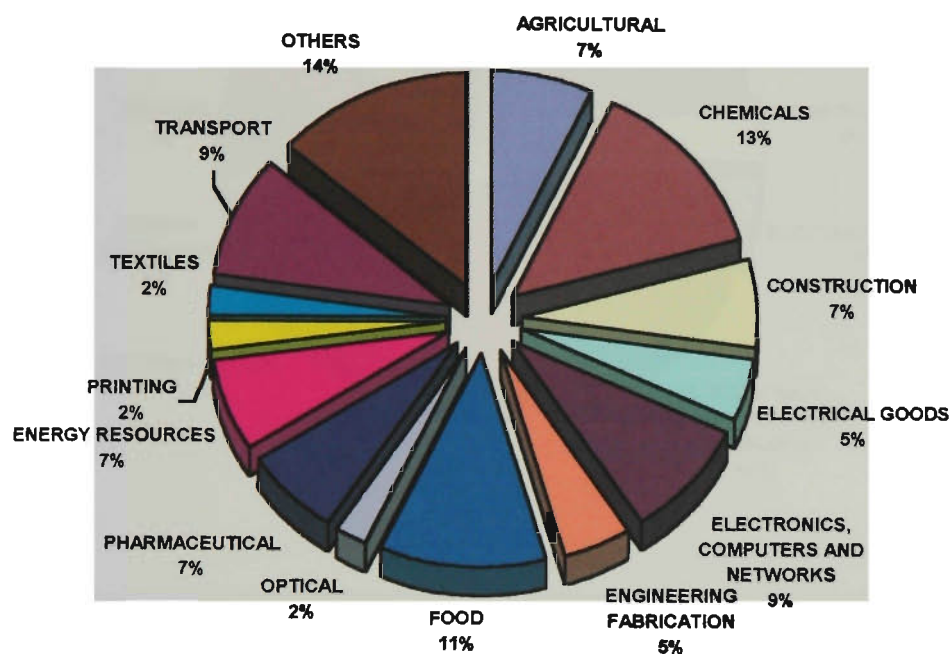


Figure 18: Manufacturing Sectors Represented by the Original Population

Figure 19 shows the remaining industries after selection of the samples has occurred.

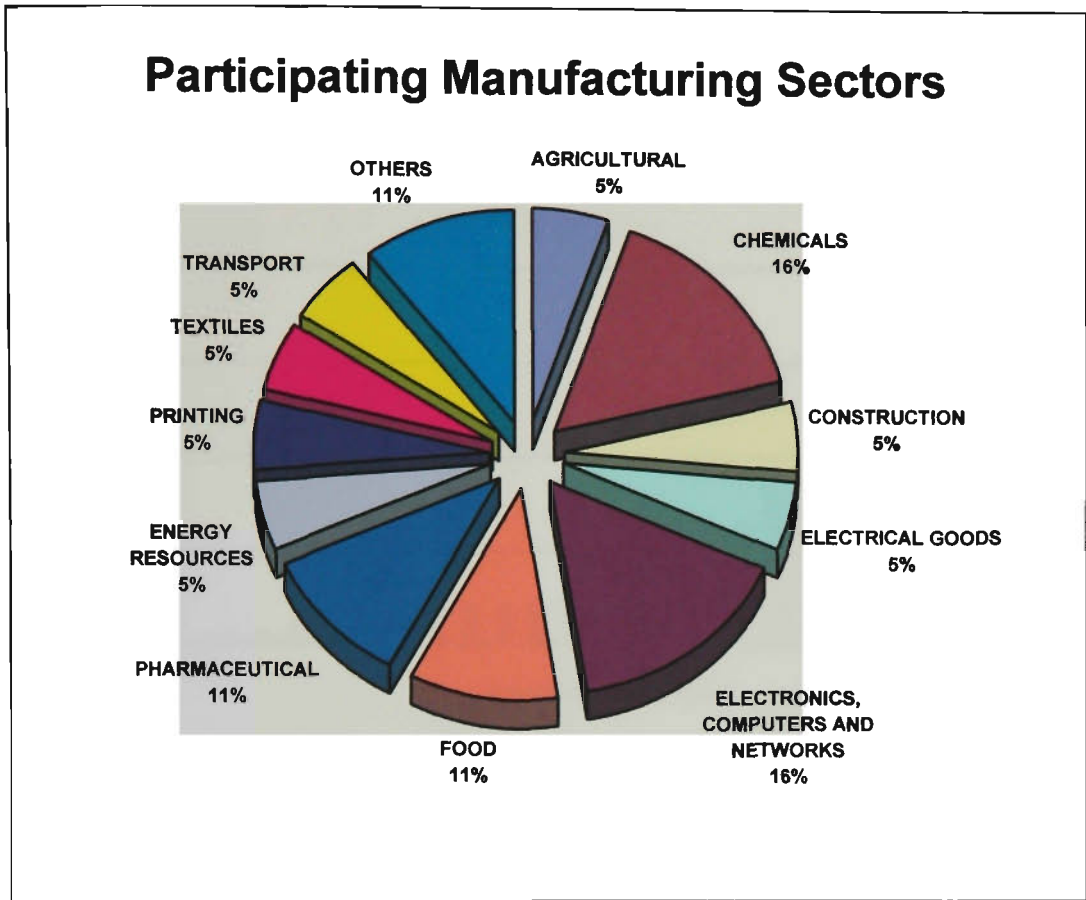


Figure 19: Manufacturing Sectors Represented After Selection of the Samples

5.1.2.2 Size of Companies Involved

Figure 20 shows the participating organisations in terms of the number employed by the division, which received an AQA evaluation. Nine companies had two hundred and less employees, whilst ten organisations employ between 200 and 1000 employees. Three very large firms employ between 1000 and 2200 people. This results in an arithmetic Mean of 529 and a Median value of 269 employees. The latter is less affected by those few very large organisations and is therefore more indicative of a ‘typical’ firm size for this sample. This is roughly comparable to Australia’s manufacturing industry as the bulk of companies are small and medium size enterprises. In any case it appears to be a fair mix of different size companies with no bias towards large enterprises, which is a phenomenon observed in most other studies. The important aspect for this study was to have all sizes included as participants.

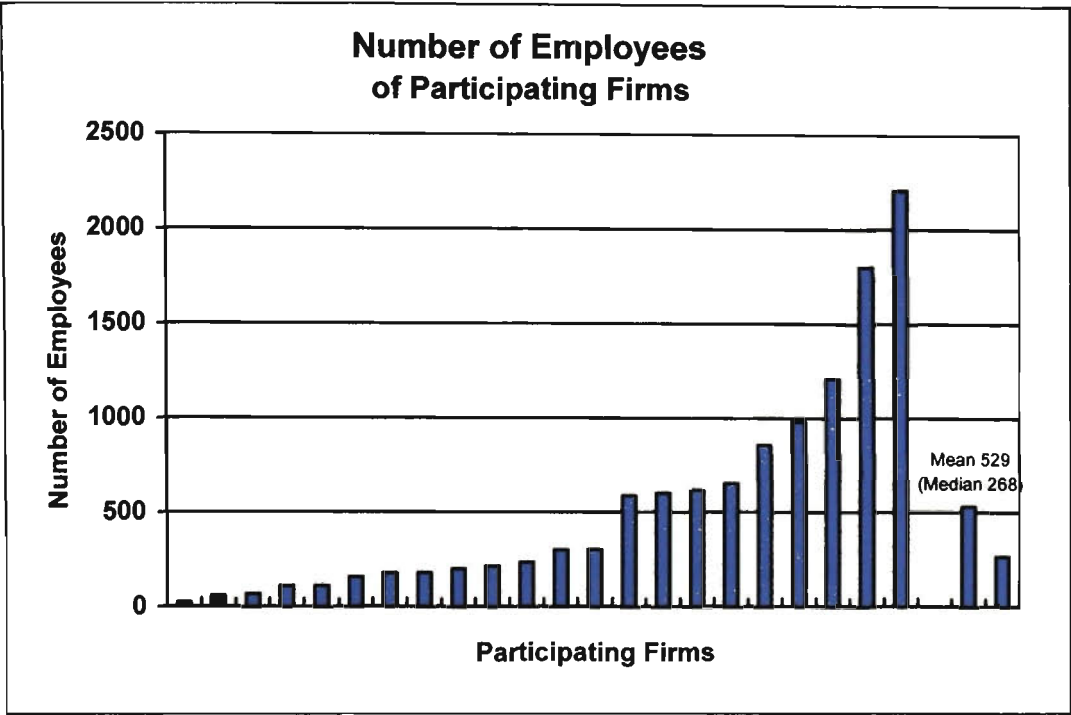


Figure 20 Participating Firm Size

5.1.2.3 Geographical Location of Firms Involved

As can be seen in Figure 21, the significance of manufacturers for the economy (i.e. GDP) varies significantly from state to state. By comparing this pattern with the geographical location of participating organisations (Figure 22 and Figure 23) it is recognisable that the number of participants from each state is largely in alignment with the size of the state’s manufacturing industry. Whilst firms from nearly all states with the exception of the Northern Territories (NT) and the Australian Capital Territory (ACT) are present, NSW and VIC make up for the majority. It can also be seen that a great deal of similarity exists between participating and non-participating companies. This is a satisfactory observation since even under this aspect a sample with no abnormalities when compared to the underlying manufacturing applicants or even Australia’s industry structure is desirable.



Figure 21 Manufacturing Industry of Each State

(Source: Australian Bureau of Statistics)

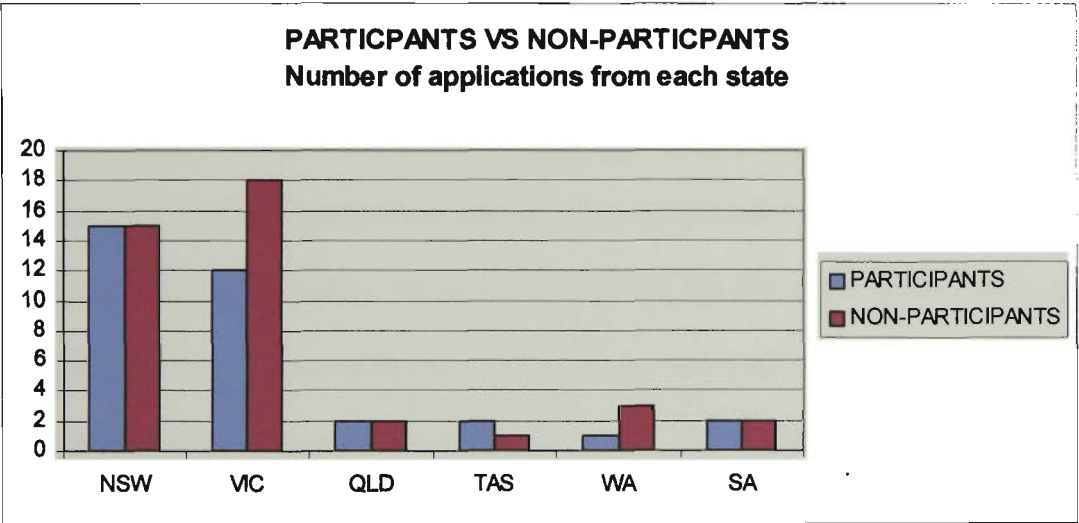


Figure 22 Number of Evaluations from Each State

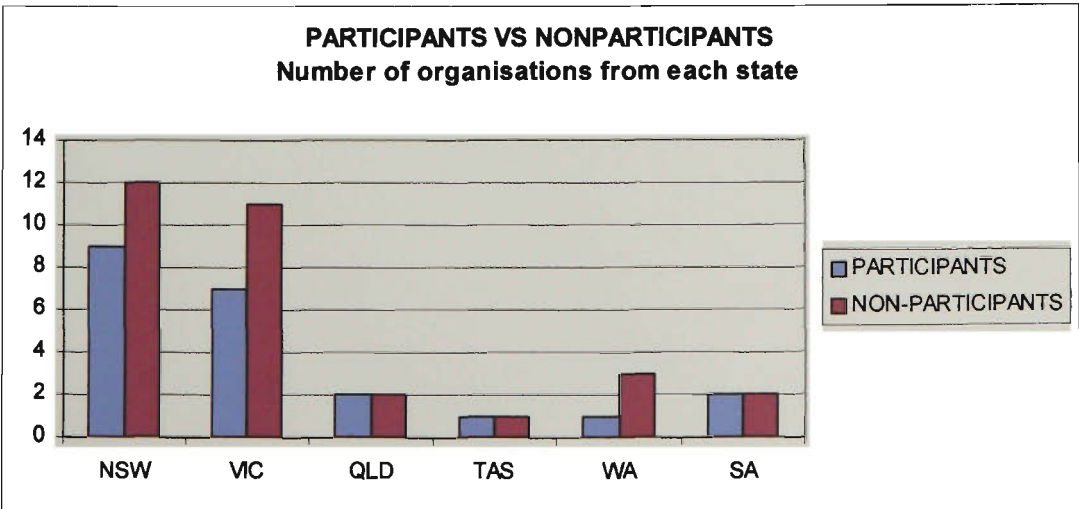


Figure 23 Number of Organisations From Each State

5.1.2.4 Response or Participation Rate

This study was carried out on 22 manufacturing companies who applied at least once for the AQA at any time during 1992 and 1997. Seven of these organisations applied several times (up to four times), which leads to 12 additional evaluation cases, so that in total 34 AQA evaluation cases are used. The original population consists of forty-four manufacturers who have gone through the AQA evaluation process in total 63 times. Hence the rate of participation is 50% for the organisations (and 54% for the evaluation cases) which is considerable.

So far it can be said that comparison between the sample taken and the underlying population revealed that the organisations included represent a fair mix of small to large enterprises, all privately owned, with their industry sectors ranging from Food and Coal to Building products and Electronics.

Trends for numbers of manufacturing applicants

Figure 24 shows a tendency for participating organisations to have applied in more recent years, whereas the non-participating organisations appear to have been involved in the Awards much earlier. This phenomenon is best explained by the recognition of the fact that more recent applicants are more likely to be still committed to the AQA than organisations who were involved many years back, and where the senior executive decision makers may have been replaced by now. This observation is of no further concern for this study especially since the collected business performance data is from more current years as well, which allows for a better match between the management approach and the consequent business results.

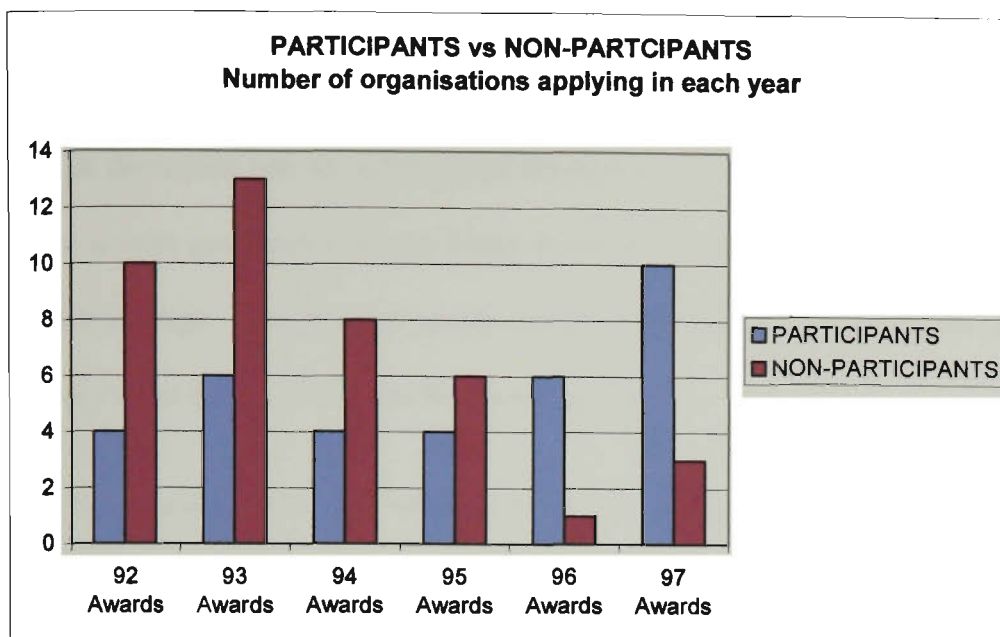


Figure 24 Number of Organisations Applying in Each Year

Multiple applicants

The number of participating organisations who pursued the AQA on a repetitive basis is as follows. In the sample of 22 participating firms, 8 organisations applied 20 times (between 2 and 4 times each) for the Award, which accounts for an average of 2.5 evaluations per multiple applicant or 1.6 applications per company for the entire group.

This compares with the group of non-participants as follows. Out of the 31 non-participating organisations only six were multiple applicants with an average of 2.7 evaluations per multiple applicant (versus 2.5 for participants) or 1.3 applications per company for the entire non-participating group (versus 1.6 for participants). Once again the great similarity between both groups is very satisfactory.

A repetitive entry for the awards is not only indicative of a certain persistence but also generally speaking a good indicator for a strong commitment to the Quality Management approach.

One other way of comparing both groups regarding their multiple applicants' achievements is to analyse the change of their evaluation results (i.e. scores) which could be observed from one application to the next. Ideally, if feedback had been taken on board, the score should rise from one

application to another. Indeed this is the case for 6 of the 8 multiple applicants who are participants and for 5 out of 6 of the non-participating multiple applicants. The actual extent to which the scores have increased or decreased can be summarised through the Median value of relative change per annum. Median is here preferred over the Mean because of a few extreme values, which tend to 'spoil' the overall average. The Median yearly improvement of the AQA score for participants is 18%, which is very close to the 15% of the Non-participants.

Overall, it can be concluded that the samples taken are highly representative of the underlying industry population. This is a satisfactory observation since generally speaking a degree of representation of the original population which is as high as possible is desirable.

5.1.3 Data Collected

5.1.3.1 Award Evaluation Results

After the raw data was received from the AQC's records of evaluated organisations it was recorded on specifically designed spreadsheets using Microsoft Excel 97 software. Since the availability of this data was given regardless of whether the invited companies agreed to participate in further surveying activities or not, their data was logged into three different spreadsheets, the evaluation results of participating organisations, the results of non-participating organisations, and the results of the entire population.

While the collection of the evaluation scores involved no further problems and was described above, there were a few instances in which no or only incomplete scores could be found.

One has to recognise that due to significant changes in the framework over time the specific scores obtained in different years are not comparable with each other without further preparation of this data. Fundamental to this is the decision about which framework to choose as the principal model, based on which data conversion can be carried out. The process of making all data compatible is introduced in Chapter 5.1.3.

Choice of the 1997 Framework

Rather than adopting the most current model available (i.e. 1999) it was preferred to use the one with the most significance for the underlying data and analysis. The majority of participants have been evaluated against the 1997 model (or the nearly identical 1996 model) which makes this particular framework the most relevant and the latest on which evaluation results are available.

5.1.3.2 Business Performance Data (KPIs)

The approach of asking participants for their own preferred set of KPIs was for a number of reasons found to be superior to the more common practice of imposing one's own set of measures. Firstly companies tend to manifest their purpose of existence by setting their own goals and measures. The areas in which measures are taken and recorded are obviously important to them and their improvement is actively pursued. It is then only fair to judge an organisation's success by those measures to which they committed themselves rather than another set put together externally, based on the assumption that they may be important measures. The other main reason is in the context of data availability. Organisations are much more likely to have comprehensive sets of data recorded on their own measures than on those suggested by someone external.

As a response to the first request made, all participating companies identified and prioritised their top ten Key Performance Indicators (KPIs). The 283 returned KPIs were grouped together into categories based on the type of business results which each measure is concerned with (see Figure 25). They contain a spread of measures relating to various stakeholder groups, with a clear dominance of financial performance measures (29%) followed by various aspects of operation efficiencies (25%). Employees and Customers are represented nearly equally (13% and 15%), while the remaining share is split between Supplier-related measures (6%) and the Public (4%). Not surprisingly, the KPIs concerned with the key stakeholder, the Business Owner, make up the largest bulk (62%).

MEASURES OF BUSINESS SUCCESS

Top Ten KPIs Categorised

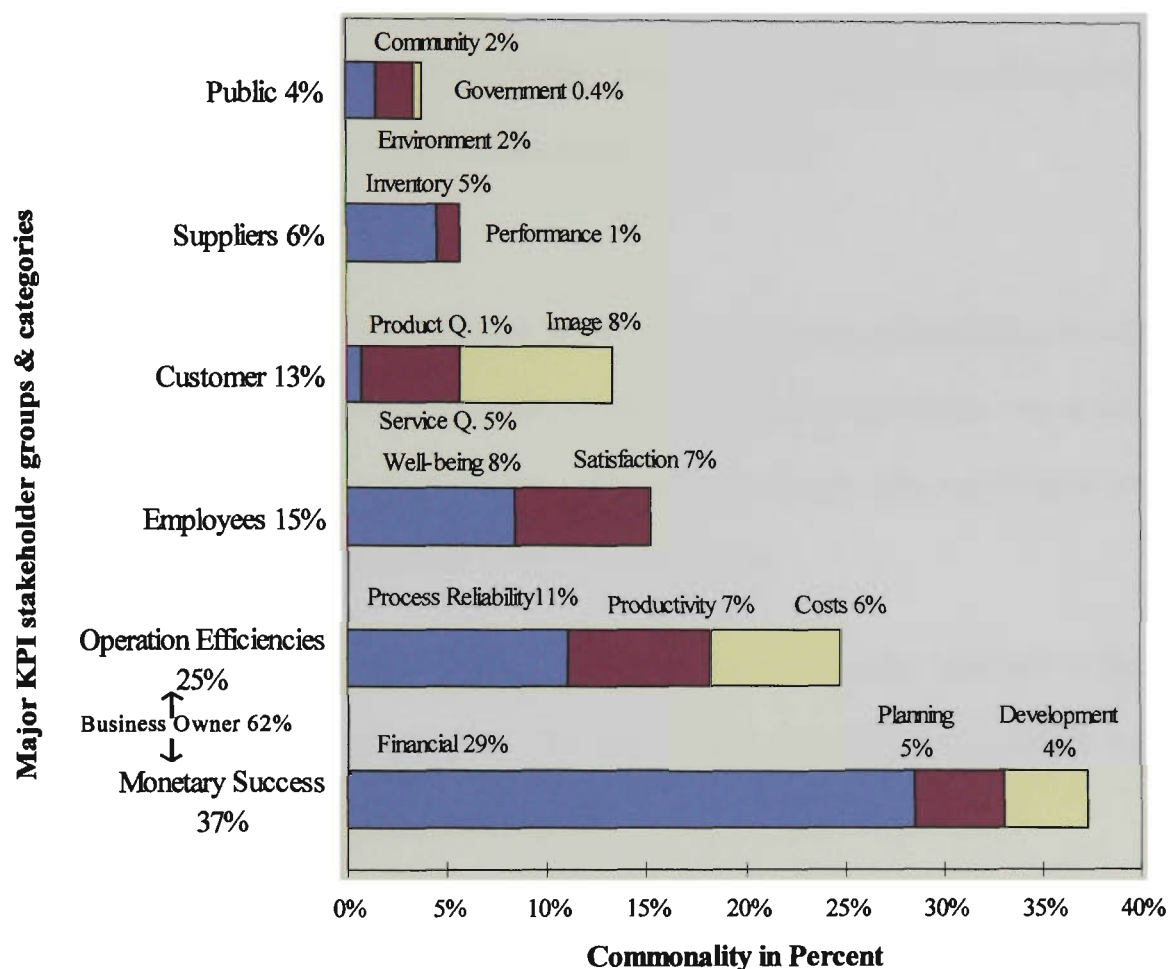


Figure 25: Measures of Business Success

The next step involved the collection of actual data of the participating companies. Generally speaking any available numerical data indicating the organisation’s performance in the selected individual KPIs between the time of 1991 and 1998 was sought. The majority of organisations (twelve firms from NSW, VIC and TAS) received an on-site visit for data collection (quantitative and qualitative) or other reasons including piloting, interviewing and data verification. The performance data collected are mainly absolute numbers (e.g. sales in \$), and is subsequently converted into relative annual performance improvement indices utilising a variety of techniques including linear trending.

5.1.3.3 Survey of Business-Performance-Relevant Background Factors

The first time a participant was asked to identify whether the company had experienced any extraordinary events which may have had some significant impact on the performance results was a question asked as part of the Industry Characteristics survey. These responses were then followed up by numerous phone calls or even on-site visits as deemed appropriate.

Event-based data scrubbing

In those cases where a situation was identified in which the business results reflected the impact of such an extraordinary event (e.g. natural disaster, merger etc) the most appropriate way to correct the data to filter out any such effects was discussed. This sometimes led to data scrubbing of individual time periods or even to parts or whole data series being eliminated.

Another data scrubbing exercise was carried out on time series which were identified as being very volatile or unsuitable for trend interpretation. This intervention was not based on certain events but on the nature of the data collected (e.g. safety records).

5.1.3.4 Survey of Industry Characteristics

Unlike the majority of data used in this study which is factual and numerical, this aspect had to be researched based on perceptions of individual firm representatives.

The survey of Industry Characteristics was designed and based on constructs which were previously developed and tested by Powell (Powell 1995). This survey was administered together with the request to collect business performance data. It was strategically decided to follow-up and collect this data before any business performance data was accepted in order to avoid the chances for biased perceptions. It was requested to have this survey filled in by one of the most senior managers available who had been with the company for long enough to know the industry in which it is operating.

The responses in the form of a ranking on a five point Likert type scale were commonly given by senior management executives like Managing Directors, Business Improvement or Quality directors and managers. None of them had been with the company for less than five years.

5.1.3.5 Best Management Practice Data

The minutes of research interviews conducted by a previous research team were put in context with the information given in the award applications and their evaluation results. The amount of data given in the 50-page documents (i.e. submissions) is not only too excessive to be reproduced here but also is against very strict confidentiality agreements which is why they cannot be part of this thesis. The same applies to the minutes of the structured interviews held with selected executives. Instead, the matrix which was produced to identify high-scoring elements in the 9 companies' submissions is shown in Appendix 11.3.2.

The Best Management Practice report as it is produced in Appendix 11.1 essentially presents a structured extract of the information found.

5.1.4 Difficulties Encountered

Based on the data collected the following issues were identified:

- Time lags exist between evaluation scores and the time of survey of business performance data. Consequently uncertainty exists about the accuracy with which the current management system's effectiveness is described through the latest available score.
- The data sets on business results are not always fully comprehensive and include significant gaps in both KPI measures and time periods for which no data was available. The overall trend is that more data is available for the more recent years. Another observation is that some more advanced measures (e.g. community attitude or supplier relationships) have only recently been introduced so that only short and medium term measurements (2-3 years) are available while the more traditional measures (e.g. profitability, sales, cost etc.) are normally available for significantly longer periods.
- The general growth and prosperity of certain booming Industry sectors (e.g. electronics) are believed to have also significant influence on business performance measures even though no methodology was designed to control this factor.

6 ANALYSIS AND FINDINGS

6.1 Initial Data Preparation and Analysis

6.1.1 Time Compliance of Award Scores

This section documents the most significant changes of the AQA framework in the time between 1992 and 1997. When comparing evaluation results i.e. scores from one year to another (here 1997 was chosen as the basis year) it is important that the results are modified in order to compare the same content. This is why all AQA evaluation data from different years has been made time-compliant through a conversion process which assumed the 1997 model as the base model. This data treatment process allows direct comparison and identification of specific items by their numbering which in their original constellation may have different content and headings. Table 9 illustrates evolutionary changes which have been captured between 1992 and 1997.

Minor changes to the content of items such as the introduction of new references to particular aspects are ignored.

Table 9 Tabular Overview of the Evolutionary Changes in the AQA Framework

	1992	92/93 CHANGES	93/94/95 CHANGES	95/96 CHANGES	96/97 CHANGES	1997= BASE MODEL	
1	LEADERSHIP	170		140		LEADERSHIP	140
1.1	Senior executive leadership	75		60		Senior executive leadership	60
1.2	Management involvement	55		40		Leadership throughout the organisation	40
1.3	Leadership in the community	40				Leadership in the community	40
2	POLICY AND PLANNING	80				STRATEGY, POLICY AND PLANNING	80
2.1	Quality values	30				Integration of values	30
2.2	The planning process	50				The planning process	50
3	INFORMATION AND ANALYSIS	130		80		INFORMATION AND ANALYSIS	80
3.1	Scope and collection of data and information	30		40		Scope and collection of data	40
3.2	Benchmarks and competitive comparisons	40	30	40		Analysis and use of data and information	40
3.3	Analysis and use of data and information	30	40				
3.4	Organisational performance indicators	30					
4	PEOPLE	200				PEOPLE	200
4.1	Human resource management planning	35			30	Human resource management planning	30
4.2	Employee involvement	40				Employee involvement	40
4.3	Performance Management	20			30	Performance Management	30
4.4	Education and training	35			30	Education and training	30
4.5	Well-being and morale	30				Communication	30
4.6	Communication	40				Well-being and satisfaction	40

...continued

5	CUSTOMER FOCUS	220						180	CUSTOMER FOCUS	180
5.1	Knowledge of customers' requirements and expectations	55	60			50		60	Knowledge of customers' needs and expectations	60
5.2	Customer relation management	40	50					60	Customer relationship management	60
5.3	Customer satisfaction	70				60			Customer satisfaction	60
5.4	Accreditation	30	40	Competitive comparisons		20	n/a			
5.5	Design and innovation	25		Design and innovation		40	n/a			
6	QUALITY OF PROCESS, PRODUCT AND SERVICE	200				180		200	PROCESS, PRODUCTS AND SERVICES	200
6.1	Improving process performance	80	30					40	Design and innovation	40
6.2	Supplier quality improvement	40	70			90		30	Supplier relationships	30
6.3	Quality of products and services	80	30	Quality of products and services		60		70	Management and improvement of processes	70
6.4			70	n/a		60			Quality of products and services	60
7				ORGANISATIONAL PERFORMANCE		100		120	ORGANISATIONAL PERFORMANCE	120
7.1							Measures of success	120	Measures of success	120

The changes made to the framework in the period between 1992 and 1997 as they are visualised in Table 9 are verbally documented below:

Documentation of architectural changes to the AQA Categories and their Items

Any changes made in the weighting structure are not documented here since for the actual analysis intended only relative achievements (in %) are being used rather than absolute points. Minor changes to the content of items such as the introduction of new references to particular aspects in the content of specific items but maintaining the same Item's heading are insignificant and could be ignored here.

From 1992 to 1993:

Category 3: There is a change to the order of Items. Item 3.2 Analysis and Use of Data and Information becomes 3.3 and the previous item 3.3 Competitive Comparisons and Benchmarking becomes 3.2.

Category 5: The previous item 5.4 Accreditation has been relocated and becomes 6.3 Compliance to External Requirements and Standards. As a consequence Item 5.5 Design and Innovation becomes 5.4.

Category 6: Items have been re-ordered to provide more logical sequencing and to incorporate the re-located 6.3. 6.2 Supplier Quality Improvement becomes 6.1. The former 6.1 Improving Process Performance becomes 6.2 and 6.3 Quality of Products and Services becomes 6.4. Some minor changes of content of category 6 items through incorporation into category 4 items are insignificant and can be ignored here.

From 1993 to 1994:

Category 3: Item 3.3 competitive comparisons and benchmarking is now incorporated into 5.4 Competitive Comparisons (new) and 6.2 Improving Processes. The previous item 3.4 is now incorporated into a new Category 7 Organisational Performance.

Category 5: One item is added: 5.4 Competitive Comparisons (formerly 3.3). Item 5.5 Design and Innovation was previously 5.4.

Category 6: The previous Item 6.3 Compliance to external requirements and standards is now incorporated in 6.2 Improvement of Processes. 6.2 now also incorporates the previous item 3.3. Through the deletion of 6.3 the previous item 6.4 Quality of Process and Products now becomes 6.3 again (=1992)

Category 7 has been newly introduced and replaces item 3.4.

From 1994 to 1995:

There have only been minor changes to the criteria following the year of major revisions in 1994.

From 1995 to 1996:

Category 2: The category was renamed and the words Strategy to Policy and Planning added. Item 2.1 was renamed to become Integration of values.

Category 3: Item 3.1 was renamed and is called merely Scope and collection of data.

Category 4: The previous Item 4.6 Communication is now 4.5. The previous item 4.5 has been renamed to Well-being and Satisfaction.

Category 5: Item 5.4 Competitive Comparisons has been discontinued and its intent spread right across all remaining items. The previous item 5.5 has been moved to category 6.

Category 6: Design and Innovation, previously item 5.5 has now become item 6.1. All other previous items of category 6 have therefore slipped down by one position. This together with some name changes makes item 6.2 Supplier relationships, 6.3 Management and Improvement of Processes and 6.4 Quality of Products and Services.

Category 7: One item which is 7.1 Measures of Success was now added to this previously itemless category.

From 1996 to 1997:

Category 6: The name was simplified by dropping the term “Quality of “ to simply Processes , Products and Services.

Time compliance conversion process

Appendix 11.3.1 gives details about the procedure by which any framework between 1992 and 1996 is made compliant to the base framework of 1997 so that relative achievements in a number of coded Items (e.g. 7.1 Measures of Success) are directly comparable between all frameworks. These amendments are producing compatible scores, which originally stem from slightly different frameworks.

The framework has evolved in every year of its existence. One of the more significant changes for example was the introduction of category 7 “Organisational Performance” in 1994, when like many other National Quality Awards, more emphasis was put on results, in terms of effectiveness of implementing quality principles. This better reflected the perceptions of the importance of results held by many business owners.

The continuous evolution of the framework is driven and facilitated by AQC staff and a number of volunteers such as experienced evaluators and distinguished business leaders. Changes which are made from one year to another, are the results of the attempt to embrace modern trends in management theory and practice in order to reflect what is most recently understood as ‘Best management practice’.

6.1.2 Conversion of Absolute Scores into Relative Achievements

The final step to make any evaluation results against the frameworks fully compatible is to transform the absolute scores into relative achievements expressed in percentages. For example if a company has received 40 points in Item 1.1 which has a maximum of 60 points then the equivalent is $40/60=66.7\%$. This transformation is necessary in order to allow for differences in the weighting structure that occurred over the time. The benefit is that these percentages express the same

information, i.e. the degree of achievement in a certain management aspect, as the original score represented, but with the advantage of allowing direct comparison between different scores given on various maximum bases.

Multiple AQA entries

This issue applies to those cases where companies received several evaluation scores because of multiple and independent AQA applications in previous years. The decision must be taken about which one of the available scores, or whether maybe a mean value, should be applied for the correlated study. Not surprisingly this question is of fundamental importance as it can produce significantly different results. Depending on which score is chosen e.g. whether the last, the middle or the first score of all evaluations, the resulting correlation coefficient varies by as much as $\pm 50\%$ (e.g. $R=0.8$ or 0.4) if all other factors are kept constant.

Given this study's principal underlying aim of finding the most accurate way of describing and explaining an organisation's effectiveness in its continuous improvement efforts, the use of the latest available AQA evaluation scores appears most appropriate. Interestingly, a separate analysis of only those organisations who applied several times for the Award found an even stronger association if compared to the overall group. Since there are only 8 organisations with multiple award entries though the number of cases is too small to produce an acceptable confidence level. The general rule above was exempted in two cases where a different procedure seemed more appropriate:

Organisation No 11

A mean score of 606 instead of the 94 score of 532 or the 96 score of 679 was chosen since the more comprehensive data series emphasises earlier years and centre around 1995.

Organisation No 15

The scores from 1993, 94, 95 & 96 respectively are 548, 476, 699 and 733, which because of their irregularity have been trended producing a linear equation of $Y=79.6x+416.5$. This procedure produces a trended score of 655 for 1995 which is approximately the centre around which most of the data was provided.

6.1.3 Transformation of Business Performance into Relative Improvement Data

The possession of absolute business results (e.g. dollars of net profit) as the participants delivered them allows no comparison between different companies, which are of different sizes and from different industry sectors. Every organisation aims for an improvement in the past business results no matter what absolute level they were. In fact it is mostly improvement figures, which are reported at high level to directors or shareholders since they are directly interpretable without the need of additional references. This is why it was decided to convert all performance data into improvement data expressing the relative change (in %) in the desired direction (e.g. increase in profits or decrease in costs) from one year to another.

This calculation of relative growth figures expressing the changes from one year to another, is first carried out through the simple comparison of two neighbouring values and expresses the difference by a percentage figure. An example is given in Table 10. The second row of the table shows the absolute raw data as it was received on one particular KPI. The third row illustrates how these absolute numbers have been converted into relative % increases. A positive value always stands for an improvement, a negative value stands for the opposite. This is important as some measures are to be minimised or decreased (e.g. cost), others are to be maximised or increased (e.g. profits). Regardless of this underlying relationship once the data has been converted a positive value always means improvement and vice versa.

Table 10 Sample calculation of relative improvement values

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Arithmetic	Median
(AQA appl)								Mean	
\$510,000	\$660,000	\$930,000	\$1,540,000	\$1,710,000	\$2,580,000	\$3,800,000	\$4,800,000		
% Increase	+29%	+41%	+66%	+11%	+51%	+47%	+26%	+39%	+41%

All data series for every KPI were initially plotted to gain a better understanding of its inhibiting quality and variation. The next step was to decide on an appropriate analysis technique. To produce a measure which is comparable to the aggregate AQA evaluation it was decided to generate one value only for each organisation which distinguishes high from low performing companies, based on their improvement records. This number was produced through the weighting and averaging of the individual organisation's performance measures. In the following section various alternative or optional analysis techniques are introduced, together with their overall effects on correlation values.

Averaging of annual improvement ratios

The next step is to summarise the individual improvements made from one year to another by averaging the yearly values using the Arithmetic Mean or a Median. The example in Table 10 has an average annual improvement of 39%. Using the Median is one of several attempts to control outlying data points but is found to be inefficient where data is not complete for most of the possible eight years.

This type of computation, even though in practice the most commonly used, is found to be quite susceptible to excessive variations of relatively small values, and has only limited suitability for highly volatile data. If, for example, an injury frequency rate jumped from one injury per annum to three then this would result in a 300% increase. A jump from two to four injuries would equal a 100% increase only, even though any practitioner would be equally concerned about either scenario.

In order to compute one single overall business-performance-improvement-index, the standard procedure is to apply the above technique to every data series of a company's ten KPIs. The final result is then computed by taking the average (i.e. Mean) with or without having employed various techniques and weighting procedures which are explained in the following chapter.

Statistical analysis techniques and their implications for results

One of the key assumptions of this study is that the perceived strength of relationships varies significantly with the choice of a suitable analysis technique. Different treatments of data can result

in different conclusions about the strengths of correlation. It is logical that the more ‘insider knowledge’ about the companies’ business environment utilised in processing the data i.e. the extraneous factors to be taken into consideration, the clearer the trends and the stronger the relationships are. In this study the degree to which variance in business performance is explained through a difference in AQA scores is largely dependent on the quality of the analysis. This assumption is supported by the literature review’s conclusion regarding a direct relationship between a study’s rigour and strength of correlation found (Hausner 1999).

In the following specific analysis techniques and options are introduced with reference made to their effect on the resulting correlation coefficients (Pearson’s Correlation Coefficients unless stated otherwise). As a general rule, where applicable the corresponding level of significance is 0.01, or better unless stated otherwise.

The correlation values are determined through matching of a company’s AQA evaluation score with the same company’s overall annual business performance improvement rate. The statistical computer software SPSS for Windows (Version 8.0) has been employed to compute the values.

Overall annual business performance improvement index

Whichever way the companies’ relative business performance improvement data is processed for every KPI, it will eventually converge into one single index which represents the overall annual improvement rate of the company’s mixed and averaged individual Key Performance Indicators. Table 11 shows an example of one participant’s improvement data in 10 KPIs which are then averaged (7% for KPI 1, 10% for KPI 2 etc) and combined (0% in this example) before correlated with this company’s AQA score (257 points).

Table 11 Performance Improvement Data Base Sample

Annual Business Performance Improvements								Average KPI Improvement over 7 years	Overall Company Average
Top 10 KPIs & ABC Priorities		Year						Correlation Coefficient for all companies	R=0.74
		1991	1992	1993	1994	1995	1996	1997	1998
1	A. Sales Revenue		-2%	10%	-1%	7%	0%	13%	18%
2	A. Contribution (\$)		-2%	10%	-1%	7%	0%	14%	42%
3	A. Contribution (%)		13%	24%	0%	-40%	-27%	23%	-31%
4	A. Net Profit		2%	-4%	-3%	12%	-1%	-9%	16%
5	B. Sales per direct manhour worked		16%	-5%	-3%	3%	5%	-4%	21%
6	B. Injury Frequency	***excluded from analysis***							
7	B. Absenteeism (%)		27%	0%	0%	-75%	-4%	34%	-37%
8	B. Factory Rejects		-27%	25%	14%	0%	-11%	0%	30%
9	B. Total Stocks (Raw Materials, WIP, Finished Goods)		21%	12%	9%	-34%	-27%	-1%	-68%
	C. Total number of employees		4%	-15%	-1%	4%	-1%	-24%	-2%
10									
<div><div><div>-0.4%=(7%+10%-5%+2%+5%+8%+4%-13%-5%)/9</div></div><div><div>-5%=(4%-15%-1%+4%-1%-24%-2%)/7</div></div></div>									-0.4%

Linear trending

An alternative, more robust way of determining the average annual increase is linear trending. The technique here is that a straight line is produced before the changes from one year to the next are expressed in percentages. This line is mathematically best defined in the form of a standard equation of a straight line with the variable being the slope and the constant being the intercept. This function is then used to compute a percentage expressing the relative improvement of this measure for the year in which the AQA evaluation occurred.

The example shown in Figure 26 produces a trended change of 34% for year 5 as opposed to a 51% jump in the original data or the arithmetic mean of all data, which is an overall 39%.

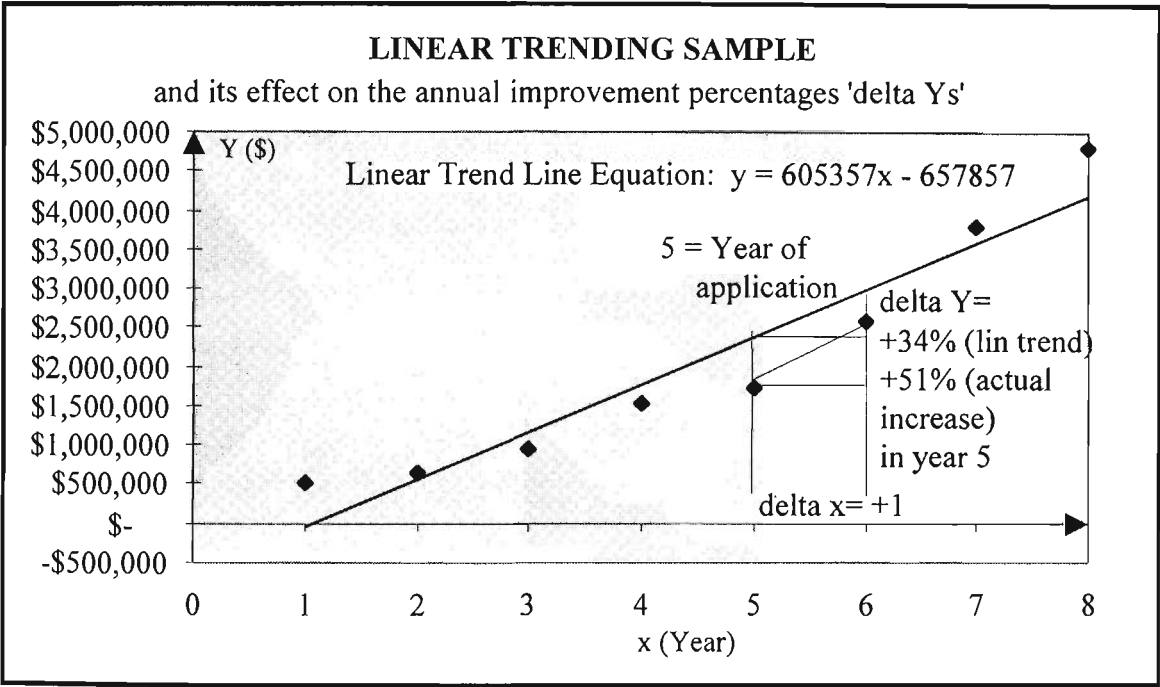


Figure 26 Linear Trending Sample

Table 12 shows the previously introduced example now with the trend line values added.

Table 12 Sample Calculation of Linear Trend Based Improvement Values

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Arithmetic Mean	Median
(AQA appl)									
\$510,000	\$660,00	\$930,000	\$1,540,000	\$1,710,000	\$2,580,000	\$3,800,000	\$4,800,000		
0									
%	+29%	+41%	+66%	+11%	+51%	+47%	+26%	+39%	+41%
Increase	<div>Relative change =(660k-510k)/510k</div>								
Linear Trend-Line	<div>+34%</div> <div>Relative change of trend line in year</div> <div>Equation: Y=Slope*x</div>							Slope = 605357	Intercept = -\$657,857

A linear trend line has the advantage of a smoothing effect, which makes it much more robust against individual outlying data points, or against excessive variation caused by a low starting value in the original data. Linear trending literally boosts the strength of correlation found in the original improvement data (without scrubbing) from R=0.1 to R=0.6.

Data scrubbing

A number of cases were identified in which external and irregular factors beyond the control of the business impacted on the organisation’s business results. This often meant that certain data was excluded from the analysis. Examples include the merger of two organisations or natural catastrophes like flood damage etc. All cases in which data scrubbing was applied are presented in Table 13. Any data exclusion was agreed to by the company concerned, and is fully documented below.

Table 13 Case-Wise Justification of Data Scrubbing

Org Id	Data treatment	Rationale
No 1	KPIs “Profit and Sales” had to be excluded because of the primary cause being the growth of the business operations since its establishment.	Business was only established in 1993 and grew since then from 57 employees to 390 employees which is reflected in the growth of profit from \$64K to \$3M and in growth of sales from \$2.6M to \$48M. This growth was primarily due to the initial expansion of the company since its establishment.
	The profit and sales data could be used if the figures were recalculated as ‘per employee’ ratios and if the first profit measurement after the foundation of the company were excluded.	The initial growth of the company is largely reflected by the increasing number of employees 57 to 390).
	The profit and sales data from sheet 1 absolute raw data has been converted to “per employee’ figures in sheet 2 absolute used data. This is despite the fact that the data was eventually excluded as is said above.	The profit in the first year was negligible because of the initial setup expenses (An initial increase of ca.300% would blur the overall results).
No 2	Of the two AQA evaluations received (334 in 96 and 224 in 97) the 1997 score (224) was used for the correlation study rather than a mean score.	To base profits and sales on the number of employees makes the data much more meaningful in this case where the company grew by factor 7.
	KPI No 4 (Quality measured in ppm, i.e. 446ppm, 142ppm, 54ppm) had to be excluded because sample audits revealed this measure as unreliable.	The data used stems from 1996, 1997 and 1998 and therefore centres around 1997.
	The data for 1996 of KPI No 5 (Staff satisfaction) had to be excluded since the survey method changed.	This method relied on counting the total number of soldering joints which turned to be out very difficult and unreliable and on these grounds the method has now been changed to total number of defects in the finished circuit boards. Example: an end of the line inspection audit revealed a 10% scrap rate while the ppm figures suggested a very low defect rate of only 54ppm.
No 3	All three Safety related KPIs (LTI, MIT, FAT) had to be excluded.	The 1996 survey was based on a very low sample size, it was internally conducted and it included different questions to the survey which was subsequently run through independent consultants in 97 and 98. The first data point (40% satisfaction) is therefore not comparable to the next two data points (72%, 76%).
	Exclude ROCE data on KPI No since ROS already includes this type of data and a second entry on the same KPI shifts the emphasis away from the original set of ten KPIs.	Too much variability.
	All data for 1998 had to be excluded.	One average should be built instead of several individual entries.
		Their financial year is still ahead of them and the data provided was based on rough (and ambitious) forecasts for 1998.

...continued

No 4	All Safety related data (KPI No 3) had to be excluded.	Too much variability.
No 5	<p>Exclude KPI No 8 Red Meat Yield.</p> <p>Exclude KPI No 9 Product Quality Index.</p> <p>KPI No1 Net profit after tax has to be excluded.</p> <p>Exclude KPI No 2 ROGI.</p> <p>Instead of excluding those series with large variation in the yearly improvement percentages maybe just a comparison between the data of the first and the last year would result in a more indicative observation.</p>	<p>The yield indicates a monetary measure for how much money is being made per unit above what industry standards suggest. Different Standards in every year plus different price levels make this measure unsuitable for historical comparison.</p> <p>This controversial measure is currently under review as it has been found unreliable and unsuitable.</p> <p>Over the past few years the company has just broken even or generated minor losses and profits which is because of a general turmoil in the industry. A very small result in 97 which has been used as the base year for indexing the results over the years produces very high and misleading growth (i.e. relative change) figures.</p> <p>Since the profit generated is part of this measure, the above rationale applies here as well.</p>
No 6	All Safety related data (LTI and TRC's had to be excluded.	Too much variability.
No 12	<p>The AQA score used should be the latest one from 95 (257) rather than the one from 1991 (unknown).</p> <p>Adjustments of 1997/98 data.</p>	<p>This would more adequately reflect the company's performance level as it is the middle value for the data provided between 91 and 98.</p> <p>Acquisition of a major competitor lead to some extraordinary growth in sales etc. Sales and Profit data has been deleted for 97 and 98.</p>
No 13	The latest AQA score from 1993 (569) rather than 1992 (435) is being used.	The data provided stems from 1996,97,98 which is closer to 93 than 92. Evidence seems to exist that the organisation is still at roughly the same level.
No 7	Exclude KPIs No 1, 2, 5 and 7 for 1998 (Profit related).	<p>The profit margins of 1998 were wiped out through a very unusual combination of three major uncontrollable events: 1. Natural disasters across the country even in normally very stable areas, 2. Dramatic drop in commodity prices, 3. A significant loss of plant turnaround (\$7 Mio over expenditure).</p> <p>Too much variability.</p>
No 8	All Safety related data (LTI) had to be excluded. KPI No 15 (ROA) may have to be excluded or a different method of observing change applied.	<p>Too much variability for a calculation of an average annual improvement. A single value of 468% disguises the overall negative trend.</p> <p>...continued</p>

No 9	<p>The data of 1996 for KPI No 4 (DIFOT) had to be excluded.</p> <p>All Safety related data (KPI No 7, # of injuries) had to be excluded.</p>	<p>A poor result of only 8% delivery IFOT under the 'old system' prior to 96 is not comparable with the instant improvement to 99% through implementation of a reformed system.</p> <p>too much variability.</p>
No 11	<p>All Safety related data (KPI No 4, MTFR) could have been excluded but is not since the data shows consistency and steady improvement.</p> <p>KPI No 9 (non-conformance costs) is unsuitable for calculating average annual improvement rates unless the data series is being manipulated.</p>	<p>To be consistent with other safety data exclusion despite Abbots consistent trend (not much variability at all).</p> <p>Is not excluded.</p> <p>The average rate equals zero although there is a very clear and positive trend existing.</p> <p>The last annual change of -100% wipes out the more consistent and continuous improvements of the previous years. A trend line would produce an average annual improvement of over 10%.</p> <p>Therefore the last absolute value of 1998'0.6' has been deleted.</p>
No 12	All Safety related data (KPI No 6, injury frequency rates) had to be excluded.	Too much variability.
No 17	The first entries of 1991 for KPI 7 and 8 are irregular and should be excluded if average annual changes in % are being computed.	<p>High negative values for 1991 blurs the very strong and positive trend in all subsequent years. Such an early data point is less relevant than the subsequent and in particular the ones around the last evaluation in 96.</p> <p>This data scrubbing turned out to be unnecessary if trending is applied rather than just arithmetic mean calculation.</p>
No 18	Use last AQA score from 95 (304) rather than the one from 92 (607) or the mean value. Exclude all data given for 1998.	<p>This significant negative trend which continued until present is best reflected in the latest available evaluation score.</p> <p>Since the number given related only for business made until 31 March whilst the financial year ends with the calendar year.</p>
No 19	<p>Exclude all data of KPI No 9 cash flow.</p> <p>Exclude all data of 1997 and 1998.</p> <p>All Safety related data (KPI No 4, LTFR) had to be excluded.</p>	<p>Apart from the fact that the organisation is not aiming at maximising this measure but only maintaining it positive, the data is too volatile and shows no clear trend which could be analysed.</p> <p>The organisation has changed significantly after the merger and is not comparable to previous years.</p> <p>To be consistent with other safety data exclusion despite its clarity of trends (not much variability at all).</p>

...continued

No 20	Exclude Safety data (KPI No 8).	Data jumps between 0 and 1 (injuries in one year): too volatile to be analysed.
No 21	Exclude Safety data (KPI No 8) unless trending is being used for all organisations.	To be consistent with other safety data exclusion despite the organisation's consistent trend (not much variability but steady improvement over three years).
No 22	Exclude all data of 1997 for KPIs No 1, 2, 3 and 5 or alternatively...see below. Alternatively exclude all data of 97 and 98.	<p>An unusual season leads to double sales of one. These extra sales affected all profit related measures.</p> <p>The reason being that the organisation changed significantly over these two years compared to the year of the AQA application in 1993.</p> <p>Issues which were identified back in 1993 were starting to be addressed in the subsequent years and were showing early improvements in 97/98. This is particularly relevant for waste discharges and emissions of running a chemical plant, consideration of the community as a stakeholder etc .The organisation has now clearly advanced since 1993 and it would be inappropriate to correlate the low AQA score from 1993 with dramatic improvements achieved in 1997/98 especially since enough data exists around the early years to draw an accurate picture of the organisation's performance at that time. The data from 1997/98 could be used for a qualitative case study on long term effects of taking feedback from the AQA evaluators on board.</p> <p>to be consistent with other safety data exclusion despite the organisation's more sophisticated method of measuring the injury rate which results in a less volatile data variation.</p> <p>This measure is not being targeted to be maximised or minimised but only measured for a better understanding of investments undertaken and the effect it may have on investment dependent performance measures (e.g. ROCE).</p>
	Exclude Safety data (KPI No 6, LTIR) unless trending is being used for all organisations.	
	Exclude all data of KPI No 3 (capital employed).	

Depending on the method used, ‘data scrubbing’ has a major effect ($R=0.65$ instead of $R=0.1$) on results which are produced using the traditional ‘mean yearly changes’ method, or only a moderately strengthening effect ($\approx 25\%$) on the correlation ($R=0.75$ instead of $R=0.6$) for data being analysed using the linear trending technique.

Combining and averaging of related measures

Sometimes several data series are provided for just one KPI. If, for example, safety is measured as the number of Medically Treated Injuries (MTI) and Lost Time Injuries (LTIs), it is important to combine, i.e. average, these numbers in order to avoid over-representation of data entries on this KPI to maintain the one-out-of-ten ratio. This procedure has a small positive effect of about 5% growth in correlation.

Weighting of KPIs

Weighting is being experimentally applied in three different scenarios.

Firstly each KPI is prioritised as a class A, B or C (most to least importance) measure which indicates the importance as perceived by the organisation. This can be reflected in appropriate weighting. An example of this is given in Table 14 which is an extract from one of the databases of this study.

Secondly, average values, which are based on a full data series with complete data since 1991, are more reliable than an incomplete data series with only two or three measurements. One company’s data is given in Table 15 as a sample for this procedure. `This weighting technique had only minor effects ($\leq \pm 3\%$) on the final correlation results as can be seen by the increase from $R=0.74$ to 0.75 . This increase can be interpreted as a positive effect of more reliable data through more measurements over time.

Other aspects investigated (without samples presented here) are

- The effect of whether an organisation has actually delivered data on each of their top ten KPIs or whether data was, for whatever reasons, not available on certain measures.

- The number of stakeholders concerned by the top ten chosen KPIs. A greater number is an indication for a more holistic approach which aims at satisfying stakeholders including employees, suppliers, the community, the customers and not only the business owner or shareholder.

All of these weighting aspects had similar effects on the above-illustrated examples ($\leq \pm 3\%$) and are therefore not again specifically illustrated by example.

As can be seen in Table 14, the overall correlation coefficient is $R=0.68$ when calculated with priority-weights which give more emphasis on ‘A rated ‘ KPIs, as opposed to a $R=0.74$ with no weighting. This can be explained by the observation that most of the high priority measures are financial KPIs which are typically those that are particularly susceptible to external ‘noise’ factors. Such an increased emphasis of measures with high noise factors has a general weakening effect on trends and associations.

Table 15 shows a marginal increase of the strength of correlation from $R=0.74$ to $R=0.75$. A greater emphasis on those KPI data series which are based on more measurements over a longer period of time adds additional reliability to the trend analysis, which is only marginally reflected in the slight increase of the coefficient R .

Table 14 Priority-based Weighting of KPIs

	Annual Business Performance Improvements								Average KPI Improvts (over 7 years)	ABC-Weighted Factor of Average KPI Improvements	KPI's ABC priorities	Overall company average	ABC Weighted Overall average
	Year												
	1991	1992	1993	1994	1995	1996	1997	1998					
Top 10 KPIs & ABC Priorities	Correlation Coeff. for all companies								R=0.41				
1 A. Sales Revenue		-2%	10%	-1%	7%	0%	13%	18%	7%	0.9%	21		
2 A. Contribution (\$)		-2%	10%	-1%	7%	0%	14%	42%	10%	1.4%	3		
3 A. Contribution (%)		13%	24%	0%	-40%	-27%	23%	-31%	-5%	-0.8%	3		
4 A. Net Profit		2%	-4%	-3%	12%	-1%	-9%	16%	2%	0.3%	3		
5 B. Sales per direct manhour worked		16%	-5%	-3%	3%	5%	-4%	21%	5%	0.4%	2		
6 B. Injury Frequency			***excluded from analysis***						-	0.0%	-		
7 B. Absenteeism (%)		27%	0%	0%	-75%	-4%	34%	-37%	-8%	-0.7%	2		
8 B. Factory Rejects		-27%	25%	14%	0%	-11%	0%	30%	4%	0.4%	2		
9 B. Total Stocks (Raw Materials, WIP, Finished Goods)		21%	12%	9%	-34%	-27%	-1%	-68%	-13%	-1.2%	2		
10 C. Total number of employees		4%	-15%	-1%	4%	-1%	-24%	-2%	-5%	-0.2%	1		
21= (3+3+3+3+2+2+2+1)													
R=0.74 R=0.68													
0.5% = (0.9%+1.4%-0.8%+0.3%+0.4%+0.0%-0.7%+0.4%-1.2%-0.2%)													
0.4% = (7%+10%-5%+2%+5%-8%+4%-13%-5%)/9													
0.5% = (0.9%+1.4%-0.8%+0.3%+0.4%+0.0%-0.7%+0.4%-1.2%-0.2%)													
0.2% = -5%x1/21													
1=Priority C or 2=B or 3=A													
-5% = (4%-15%-1%+4%-1%-24%-2%)/7													
A= highest priority KPI B= medium priority KPI C= lowest priority KPI													

Table 15 Data-completeness-based Weighting of KPIs

Annual Business Performance Improvements										Average KPI Improvts (over n years)	No of years- Weighted of Average KPI Improvts	KPI's weight counts	Overall company's average	No of years- Weighted Overall average)	
Year															
Top 10 KPIs & ABC Priorities	1991	1992	1993	1994	1995	1996	1997	1998	Correlation Coeff. for all companies					0.74	0.75
A. Customer Satisfaction Index								2%	2%	0.0%	48		24%	29%	
A. Customer Retention %								1%	1%	0.0%	1		new R=0.75	=Number of years on which data exists	
A. Sales		29%	41%	66%	11%	51%	47%	26%	39%	5.7%	7				
A. GP			5%	10%	3%	12%	5%	-17%	3%	0.4%	6				
A. EBIT % of sales			-52%	148%	-47%	150%	-1%	-55%	24%	3.0%	6				
B. Customer complaints %															
units sold															
B. New products sales of sales						38%	38%	20%	32%	2.0%	3				
B. Speed to market							33%	50%	42%	1.7%	2				
B. training/learning (%payroll)							29%	13%	21%	0.9%	2				
B. No of suggestions/employee/annum								33%	33%	0.7%	1				
B. employee satisfaction index							134%	1%	67%	2.8%	2				
B. IFOT (operations)								-1%	-1%	0.0%	1				
B. rework								-7%	-7%	-0.2%	1				
								48%	48%	1.0%	1				
B. return on total assets									-	-	-				
B. value added/employee/					-8%	72%	46%	-13%	24%	2.0%	4				
B. Share Price		31%	16%	228%	-54%	144%	84%	-23%	61%	8.9%	7				
C. R&D % sales						27%	-19%	-4%	2%	0.1%	3				

excluded from analysis

=Number of years on which data exists

6.2 Relationships between Business Success and the ABEF

6.2.1 Implication of Higher Aggregate Award Scores

Hypothesis 1, which is to be tested against the results presented in this section, is:

There is a clear, positive association between an organisation's aggregate evaluation scores and its overall improvement in key business performance results.

The Association with Stronger Business Performance Improvements

This section introduces the results of correlating the AQA evaluation scores with their overall business performance improvement indices of all 22 cases. Figure 27 plots the data presented in Table 16. This graph presents the main findings of this research with respect to the relationship between AQA scores and Business performance.

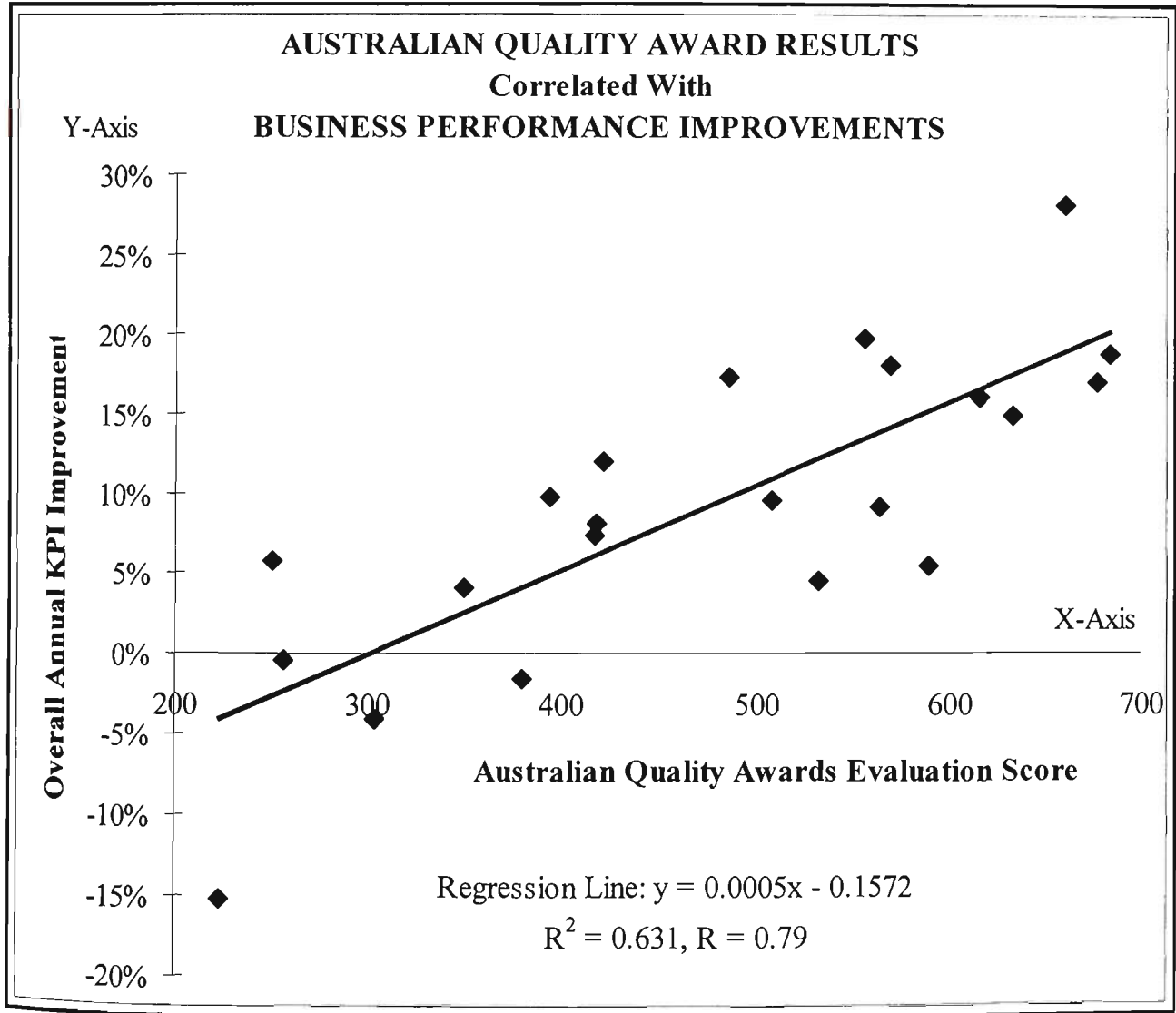


Figure 27 Principal Correlation Plot, R= 0.79

Table 16 The basic correlation data

Org No	AQA Score	KPI Index
1	224	-0.15
2	589	0.05
3	251	0.06
4	557	0.2
5	417	0.07
6	394	0.1
7	633	0.15
8	660	0.28
9	421	0.12
10	684	0.19
11	532	0.04
12	257	0
13	569	0.18
14	418	0.08
15	616	0.16
16	677	0.17
17	564	0.09
18	304	-0.04
19	508	0.1
20	486	0.17
21	380	-0.01
22	300	0.04

Other correlation plots

Various correlation plots are presented in the remainder of this section which are the results of different data treatments and analysis techniques, as previously described in chapter 6.1.3. The following list provides an overview of the graphs presented and those to be shown, and the reason for each.

- *Figure 27 Principal Correlation Plot, $R= 0.79$ (page 141)*

This graph shows the strongest association of all but is based on significant data scrubbing and arithmetic averaging of KPI data.

- *Figure 28 Linear Trend Based Correlation Plot (page 144)*

his graph has a nearly equally strong association but is produced with minimal data scrubbing intervention and the benefit of linear trending of the KPI data.

- *Figure 29 Mixed Non-Aggregate KPI Plot (page 145)*

This graph shows the plot for all of the 150 companies' KPIs prior to averaging but after selected data exclusion (scrubbing).

- Figure 30 Financial Correlation Plot (*page145*)

This graph shows a moderately strong positive association between the companies' overall averages of their financial KPIs only and AQA scores.

- Figure 31 Financial Non-Aggregate KPI plot (*page146*)

This graph shows a slightly lower moderately strong positive association between all of the 48 companies' financial KPIs (prior to averaging) and AQA scores.

- Figure 32 Count of Positive Improvement Plot (*page149*)

This graph is based on the share of KPI measurements in which companies managed to achieve positive improvement from one year to another.

- Figure 33 Exponential Correlation Plot (*page150*)

This graph is identical to Figure 27 except that it has had an exponential regression line fitted which gives a marginally better approximation of the relationship found.

- Figure 34 Single Applicants' Correlation Plot (*page153*)

This graph shows the plot for all those participating companies which entered the Awards on only one occasion.

- Figure 35 Multiple Applicants' Correlation Plot (*page153*)

This graph shows the plot for all those participating companies which entered the Awards on more than one occasion.

The main correlation results with relevance to Hypothesis 1 are presented in Figure 27 and Figure 28. While Figure 27 is the result of arithmetic averaging and full scale data scrubbing to filter out extreme or abnormal values, Figure 28 has been produced with much less manual intervention (data scrubbing) and mainly relies on the smoothing effects of linear trending.

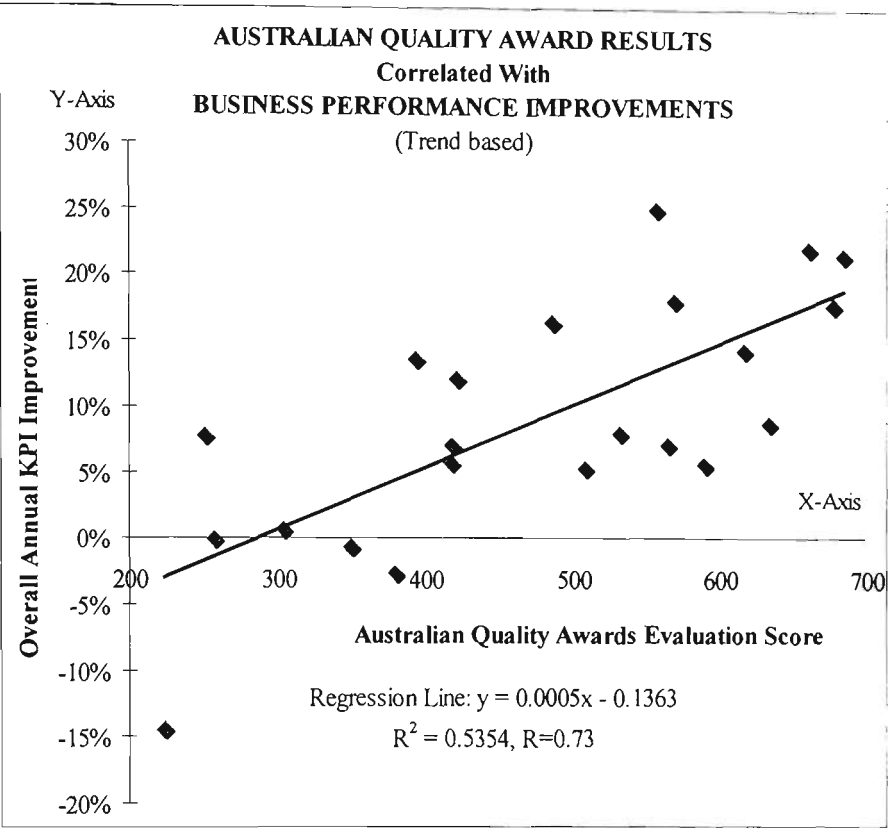


Figure 28 Linear Trend Based Correlation Plot

Even though the correlation coefficient value is slightly different ($R=0.79$ vs $R=0.73$) their interpretation leads to the same conclusion. A statistically significant and strong correlation ($R>0.7$) results from both methods of analysis. A significantly different overall annual performance improvement (from -15% to $+28\%$) can be expected, depending on the AQA evaluation (from 228 to 684 points). This empirical evidence is sufficient to accept Hypothesis 1: *There is a clear, positive association between an organisation's aggregate evaluation scores and its overall improvement in key business performance results.*

The practical implications of this strong positive relationship are described in more detail in Ch. 7.

Figure 29 illustrates how critical it is to combine all individual KPI averages into one aggregate index which is representative of the company's overall business performance level.

It is a step in which most of the extreme or abnormal values are smoothed out by combining them with the other values of the same company. Without this quality-enhancing process of data reduction only moderate correlation results ($R=0.38$) would be achieved. This graph visualises the spread of values across a large range depending on which KPI they are based on.

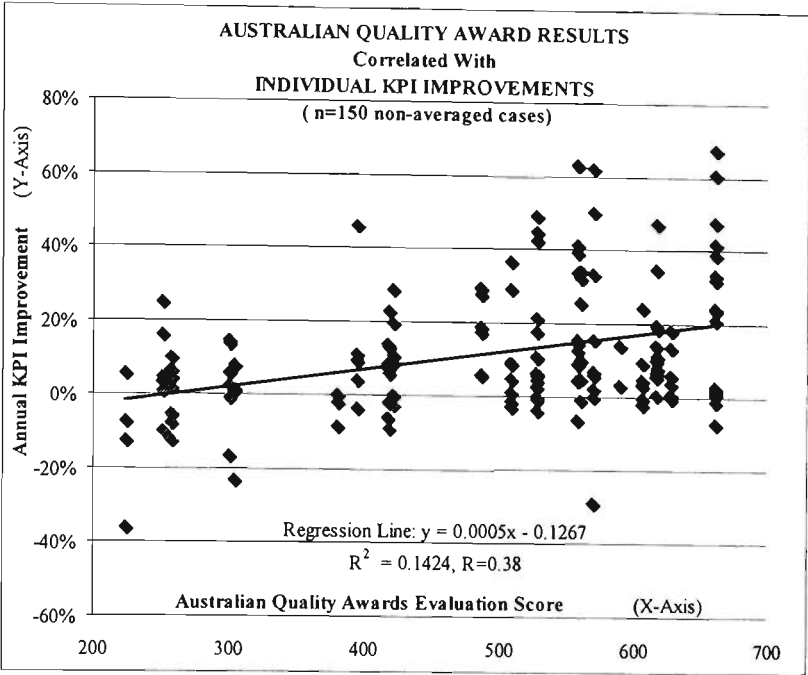


Figure 29 Mixed Non-Aggregate KPI Plot

Association with financial bottom line results

While a typical set of KPIs includes a variety of business performance aspects it is of interest whether a significant positive relationship could be confirmed if only financial results would be correlated with AQA scores and Figure 30 shows the results.

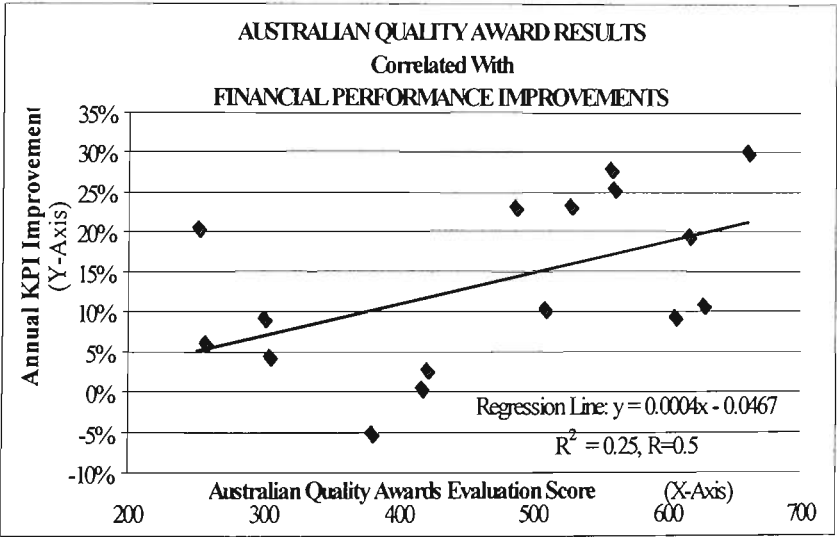


Figure 30 Financial Correlation Plot

Table 17 Financial Correlation Data

Case No	AQA Score	Financial KPI Index
1	251	0.20
2	557	0.28
3	417	0.01
4	527	0.23
5	660	0.30
6	421	0.03
7	605.5	0.09
8	257	0.06
9	616	0.20
10	560	0.25
11	627	0.11
12	304	0.05
13	508	0.10
14	486	0.23
15	380	-0.05
16	300	0.09

As can be seen, even if financial results only are used which, without any doubt, belong to the category which is the most susceptible against other extraneous factors, a significant positive correlation could be established.

Because only 16 cases were left after data scrubbing which had useable financial performance data, the size of sample was reduced from the original 22. This in fact is the reason why the sample can not be further divided into sub-groups (under other specific KPI categories) without falling below a critical size.

Figure 31 shows the graph for the non-averaged financial measures. This result is very similar to that shown in "Figure 29 Mixed Non-Aggregate KPI Plot" as can be seen by the same strength of correlation (R=0.38).

The interpretation of this is that unless individual KPI measures are combined through averaging, the AQA score has a very similar explanatory power for both financial KPIs and mixed KPIs.

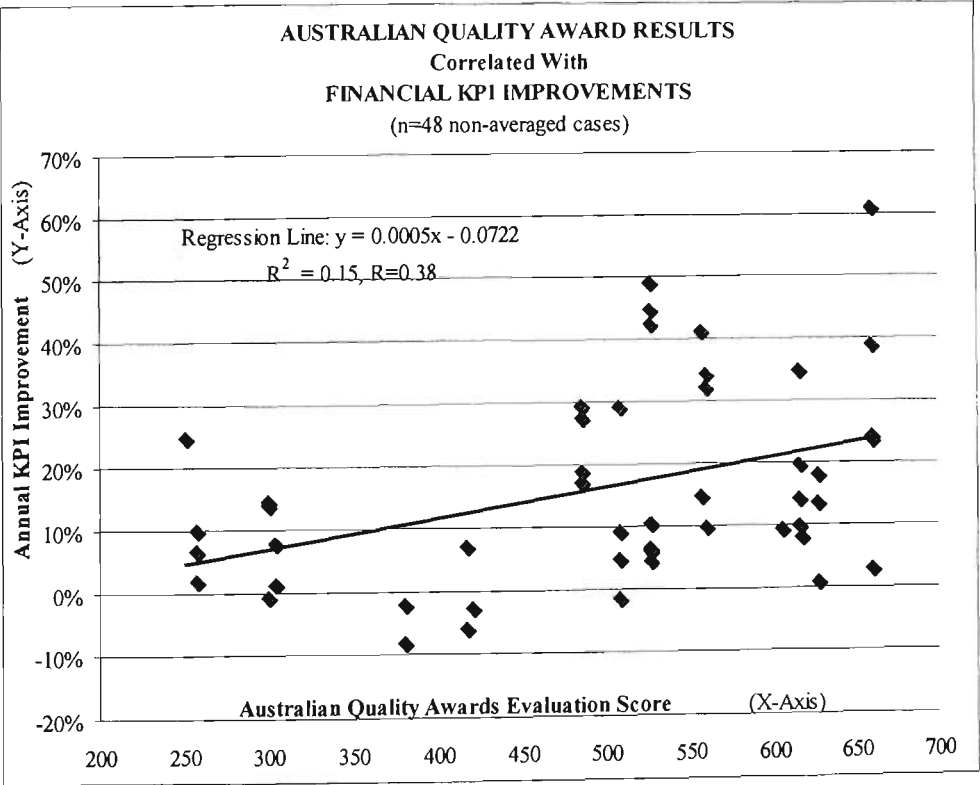


Figure 31 Financial Non-Aggregate KPI plot

The association with commonality of actual improvements in business results

Another way of measuring an organisation's success is to look simply at the commonality of positive improvements achieved, rather than at the actual strength of those improvements. Table 18 shows the previously used data sample and the result of counting all relative improvements from one year to another which are equal or greater than Nil.

In this example, only 44% of all data entries were actually positive improvements, the balance are cases in which the underlying performance data worsened from one year to another. This way of assessing the performance of an organisation appears to be particularly interesting since Quality Management is commonly perceived as a Continuous Improvement tool which aims at small step but consistent improvements.

Table 18 Count of Positive Annual KPI Improvements

	Annual Business Performance Improvements Positive vs. Negative or Nil								Count of Years with positive annual KPI Improvement	Share of KPIs with positive annual Improvement
Top 10 KPIs & ABC Priorities	Year								Correlation Coefficient for all companies	R=0.70
	1991	1992	1993	1994	1995	1996	1997	1998		
A. Sales Revenue		-2%	10%	-1%	7%	0%	13%	18%	Sum=28 of 63=44%	44% 28/63
A. Contribution (\$)		-2%	10%	-1%	7%	0%	14%	42%		
A. Contribution (%)		13%	24%	0%	-40%	-27%	23%	-31%		
A. Net Profit		2%	-4%	-3%	12%	-1%	-9%	16%		
B. Sales per direct manhour worked		16%	-5%	-3%	3%	5%	-4%	21%		
B. Injury Frequency	***excluded from analysis***									4= Count(10%, 7%, 13%, 18%)
B. Absenteeism (%)		27%	0%	0%	-75%	-4%	34%	-37%		
B. Factory Rejects		-27%	25%	14%	0%	-11%	0%	30%		
B. Total Stocks (Raw Materials, WIP, Finished Goods)		21%	12%	9%	-34%	-27%	-1%	-68%		
C. Total number of employees		4%	-15%	-1%	4%	-1%	-24%	-2%		

Figure 32 shows that organisations AQA evaluation scores are significantly and strong positive correlated with their overall share of positive improvement achievements. Some organisations have only 37% of their business performance records with positive improvements whilst others managed to enhance all (100%) of their past annual performance data. This ‘continuous improvement success-rate’ is strongly associated with the strength of the AQA evaluation score.

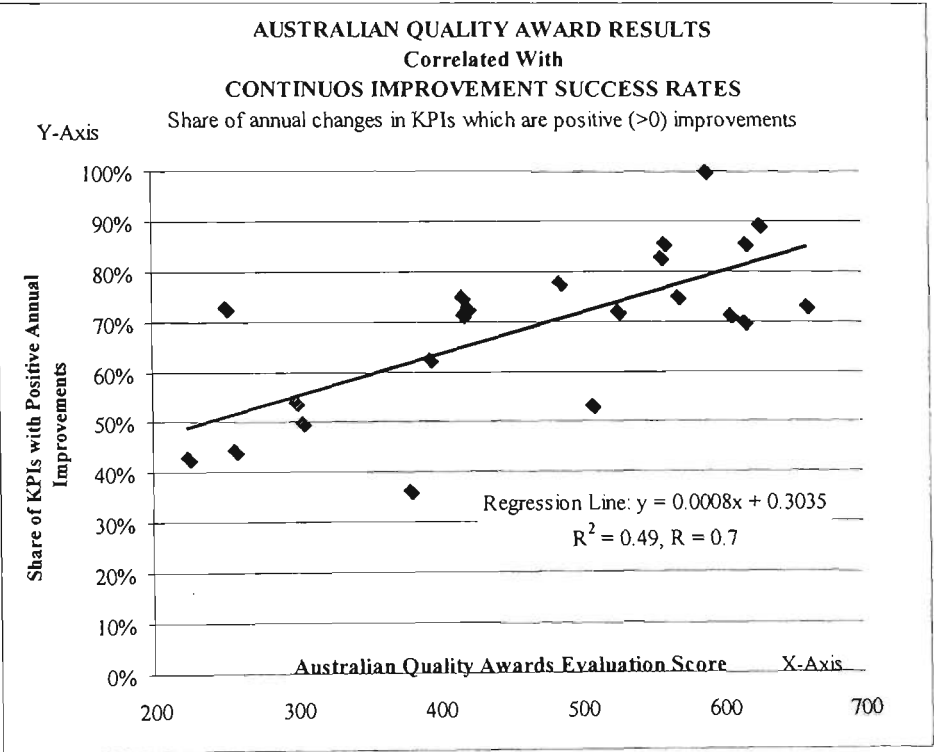


Figure 32 Count of Positive Improvement Plot

Linearity of the relationships found

The observation that the correlation coefficient based on a non-linear approximation (i.e. logarithmic) is slightly higher than in the case of a linear regression line (i.e. R=0.8 vs. R=0.7) suggests that the relationship between an organisation’s overall AQA evaluation scores and its business performance results is better described through an exponential curve rather than a straight line.

In practical terms this means that the marginal benefit experienced by an organisation which is improving from an already significant level (e.g. AQA 500) is lower than that of an improvement made by a company at a moderate level (e.g. AQA 300).

This assumption is supported by the theory of organisational learning (e.g. S-curve learning development) and the common practice of ‘harvesting low hanging fruits first’.

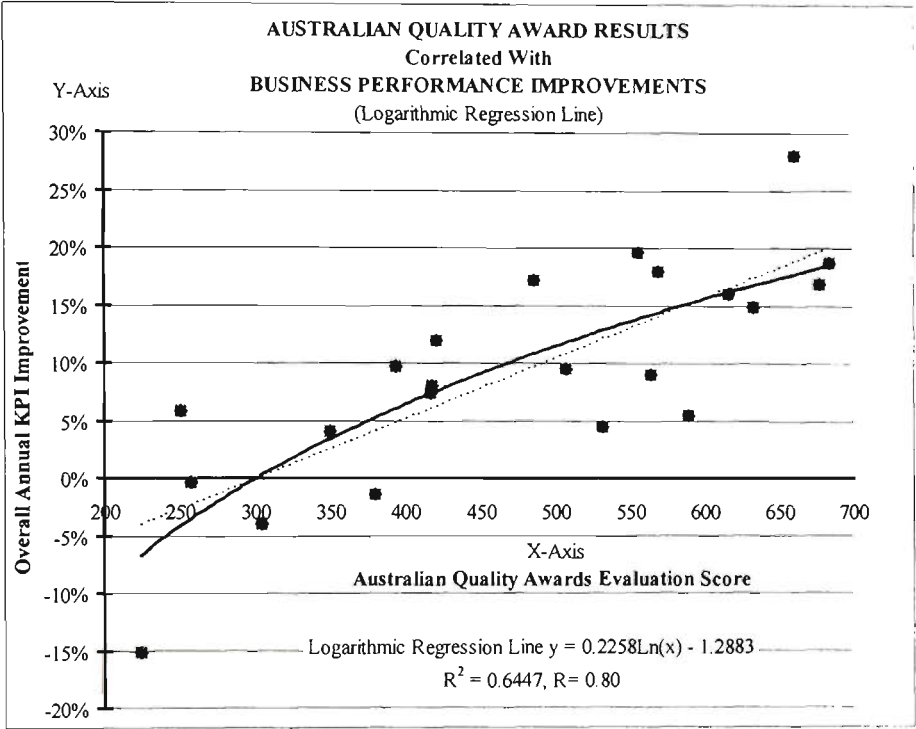


Figure 33 Exponential Correlation Plot

Conclusion of the implications of higher aggregate AQA scores

The key findings of this study are that companies with high AQA scores are much more likely to belong to the better-performing organisations. An increase in the Awards evaluation score is strongly associated with a stronger improvement in an organisation’s top ten business measures.

The data underlying this correlation study, even if of limited quantity (22 cases) has proven to be very suitable since a very wide range of high- and low-performing organisations, both with regard to the AQA scores and KPI improvements, participated. It is therefore not surprising to receive plots, which, in statistical terms, could be considered ‘well behaved’.

These relatively high correlation results were achieved through justifiable and logically rigorous improvements and corrections to the original raw data with the aid of qualitative studies, including in-depth interviewing. Even though all data scrubbing is carried out and fully justified with the consent

of the organisation concerned, it is felt beneficial if analysis techniques can be employed which require as little manual intervention as possible, while still capable of identifying any existing relationships at their full strength. Utilisation of the trending technique has delivered major advantages here and leads to similar results, but is based on very limited data scrubbing only. Other, more refined analysis techniques (i.e. weighting of selected KPI measures) have been applied with mainly marginal effects on the overall results of this study, i.e. strong positive and highly significant correlation. The technique which is found to be a significant factor in this study's findings is selected data exclusion ('data scrubbing') and inclusion ('combining of related measures').

6.2.2 Multiple Award Entrants

Hypothesis 2, which is to be tested against the results presented in this section, is:

Companies with a history of improved evaluation results outperform those with only single involvements in the Awards.

Table 19 allows for comparison between performances of Single award entrants versus Multiple applicants. Both, the Mean and Median AQA score of the Multiple award entrants are significantly higher than those of the group of one-off applicants. Also under the business performance aspect, the Median of multiple award applicants' is higher than that of the Singles. The large difference here between Median and Mean is because of two extremely outlying negative values in the group of multiple entrants. In the case of such a small sample size, which includes few outlying values, the Median is a far more suitable measure for computing a 'typical' value than the Mean-based average which is highly affected by outliers. Interestingly both are organisations who consistently worsened their AQA evaluation results and suffered under very poor organisational performance.

Table 19 Multiple versus Single Applicants' data

ALL			Multiples			Singles		
Org No	AQA Score	KPI Index	Org No	AQA Score	KPI Index	Org No	AQA Score	KPI Index
1	224	-0.15	1	224	-0.15			
2	589	0.05				2	589	0.05
3	251	0.06				3	251	0.06
4	557	0.2				4	557	0.2
5	417	0.07				5	417	0.07
6	394	0.1				6	394	0.1
7	633	0.15				7	633	0.15
8	660	0.28				8	660	0.28
9	421	0.12				9	421	0.12
10	684	0.19	10	684	0.19			
11	532	0.04	11	532	0.04			
12	257	0				12	257	0
13	569	0.18	13	569	0.18			
14	418	0.08				14	418	0.08
15	616	0.16	15	616	0.16			
16	677	0.17	16	677	0.17			
17	564	0.09	17	564	0.09			
18	304	-0.04	18	304	-0.04			
19	508	0.1				19	508	0.1
20	486	0.17				20	486	0.17
21	380	-0.01				21	380	-0.01
22	300	0.04				22	300	0.04
Mean	475	0.093	Mean	521	0.080	Mean	448	0.101
Median	497	0.095	Median	566.5	0.125	Median	419.5	0.09
Correl.	0.79		Correl.	0.96		Correl.	0.73	

Figure 34 shows a correlation plot established for ‘one-off Award applicants’ only. The result ($R = 0.73$) is very similar to the relationship established for the entire sample ($R=0.70$) which also included multiple applicants. Figure 35 shows the plot for only those organisations which applied several times. The relationship of these organisations is significantly stronger ($R= 0.96$) than any other previously identified association and could be considered a ‘near to perfect’ association.

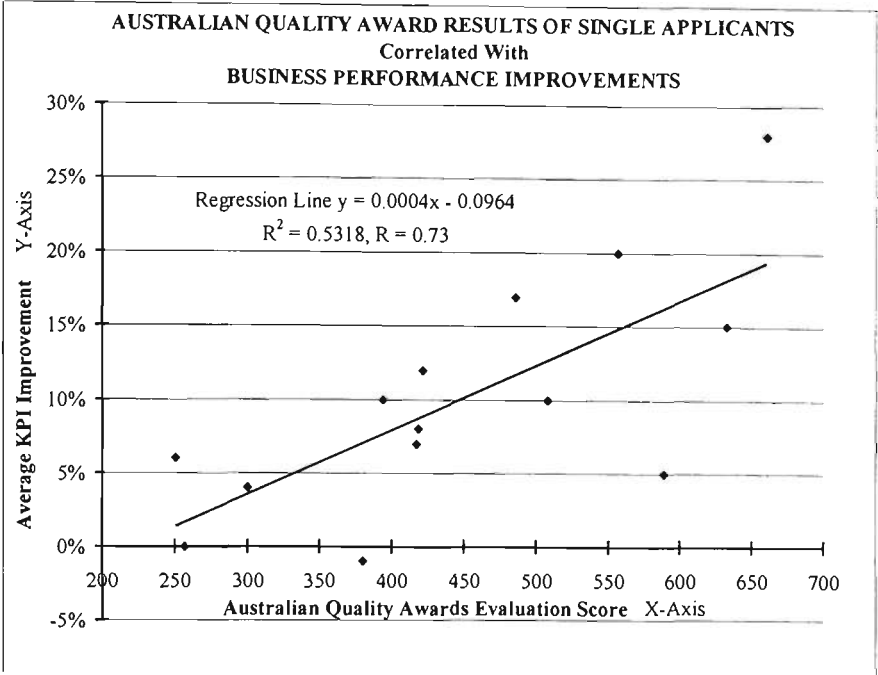


Figure 34 Single Applicants’ Correlation Plot

The relationship of multiple award entrants, when described by a linear regression line as is done in both figures, is significantly steeper (slope= $0.0007x$ vs $0.0004x$), which means that stronger associations with greater certainty are available to those who are pursuing the award through multiple entries. Concluding it can be said that enough evidence exists to confirm Hypothesis 2, which stated that “Companies with a history of improved evaluation results outperform those with only single involvements in the Awards”.

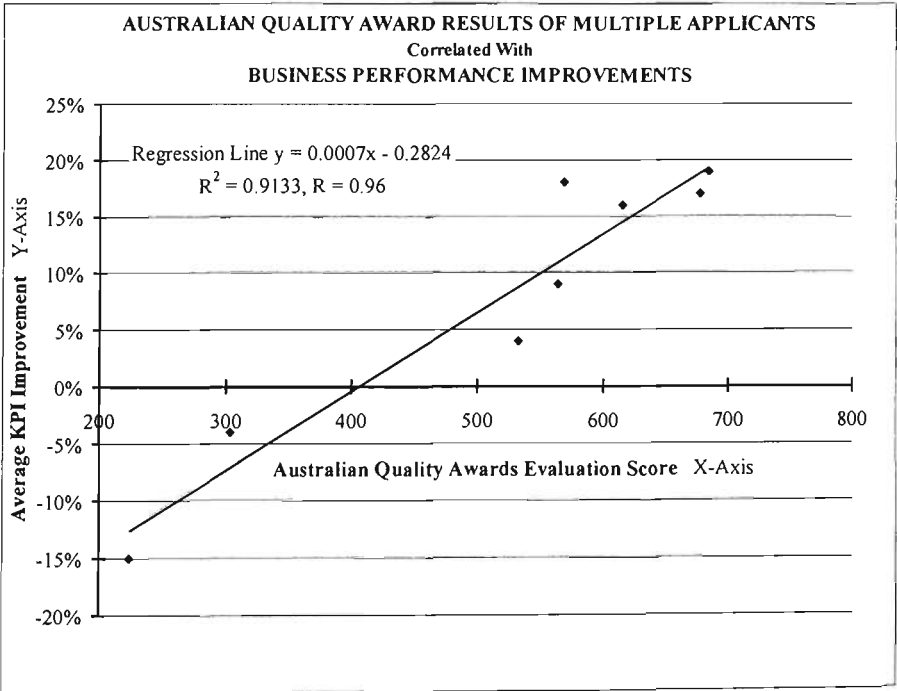


Figure 35 Multiple Applicants’ Correlation Plot

6.2.3 Importance of Specific Items and Categories

There are two relevant hypotheses for this research issue.

Hypothesis 3a, which is to be tested against the results presented in this section, is:

Some Items when assessed for their predictive power of the overall organisation's business result improvements can be identified as having a special role when compared to others.

Hypothesis 3b, which is also to be tested against the results presented in this section, is:

Some Items when assessed for their predictive power of the overall evaluation results can be identified as having a special role when compared to others.

Table 20 contains the correlation coefficient of specific AQA scores correlated with the same organisation's overall Business performance improvement index or with the aggregate AQA score. This data is graphically presented below in Figure 36 and Figure 37. Please note that the correlation coefficient with the aggregate score have been produced with 34 cases which is the total amount of evaluation results of the 22 participating organisations available, while the KPI correlations are only based on the 22 participants' cases. Where the specific AQA results have been matched (i.e. correlated) with the companies' overall KPI improvements, one single improvement rate per company has been used for correlation with all of the firm's existing evaluation results. This leads to 34 correlation cases as opposed to 22 cases used for the previously introduced correlation plots (e.g. Figure 27).

Table 20 AQA Item Scores Cross Correlations

	1.1	1.2	1.3	2.1	2.2	3.1	3.2	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2	5.3	6.1	6.2	6.3	6.4	7.1	Mean
Item-KPI	0.74	0.55	0.49	0.64	0.65	0.47	0.69	0.48	0.52	0.46	0.43	0.52	0.57	0.59	0.72	0.48	0.53	0.53	0.59	0.71	0.66	0.57
Item-AQA	0.88	0.85	0.77	0.76	0.92	0.87	0.92	0.81	0.83	0.74	0.76	0.83	0.83	0.78	0.80	0.72	0.69	0.69	0.85	0.78	0.92	0.81

Clearly some items have significantly stronger relationships with those higher level or overall results than others. Item 1.1 for example has the strongest correlation with the overall business performance improvement ($R=0.74$) as opposed to Item 4.4 which only moderately correlates with a coefficient of only $R=0.43$. Regarding their relationship with the aggregate AQA score similar observations are made even though at an overall slightly higher level. The highest correlation found here is Item 3.2 with $R=0.92$, the lowest is Item 6.1 with $R=0.69$. This has significant implications for practitioners as well as the potential re-design of the framework, both of which are discussed in more detail in Chapter 7.

Overall the differences found are substantial enough to allow for discrimination between specific Items based on these relationships which lead to confirmation of both of the above Hypotheses 3a and 3b.

Individual AQA item scores correlated with the Overall Score
 (Level of prediction from an individual item/category score to the overall score)

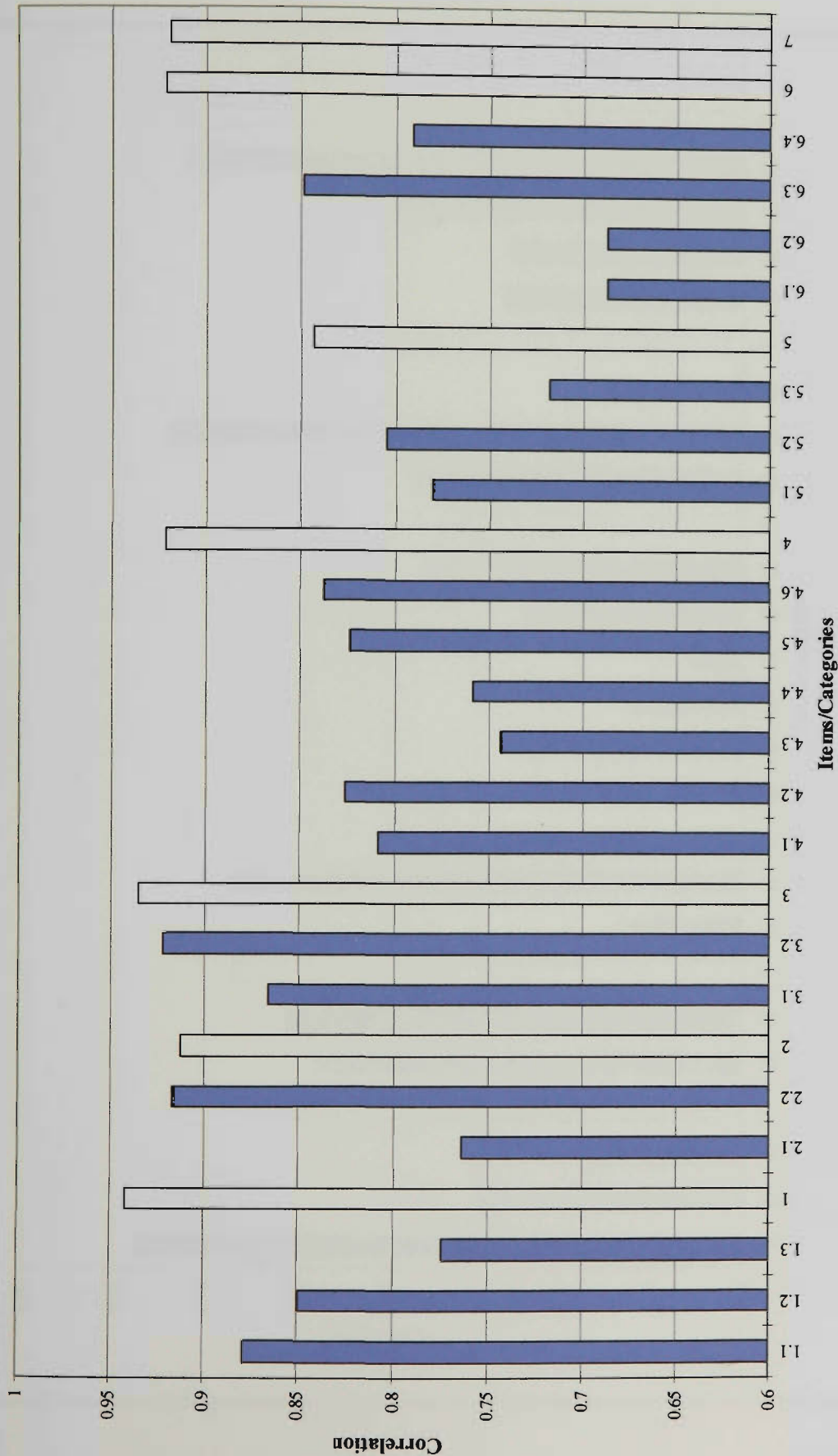


Figure 36 Individual Item Scores and Overall AQA results (n=34 participants)

Individual AQA item scores correlated with the overall KPI improvement rate
(Level of prediction from an individual item/category score to the annual KPI improvement)
(n=34 cases)

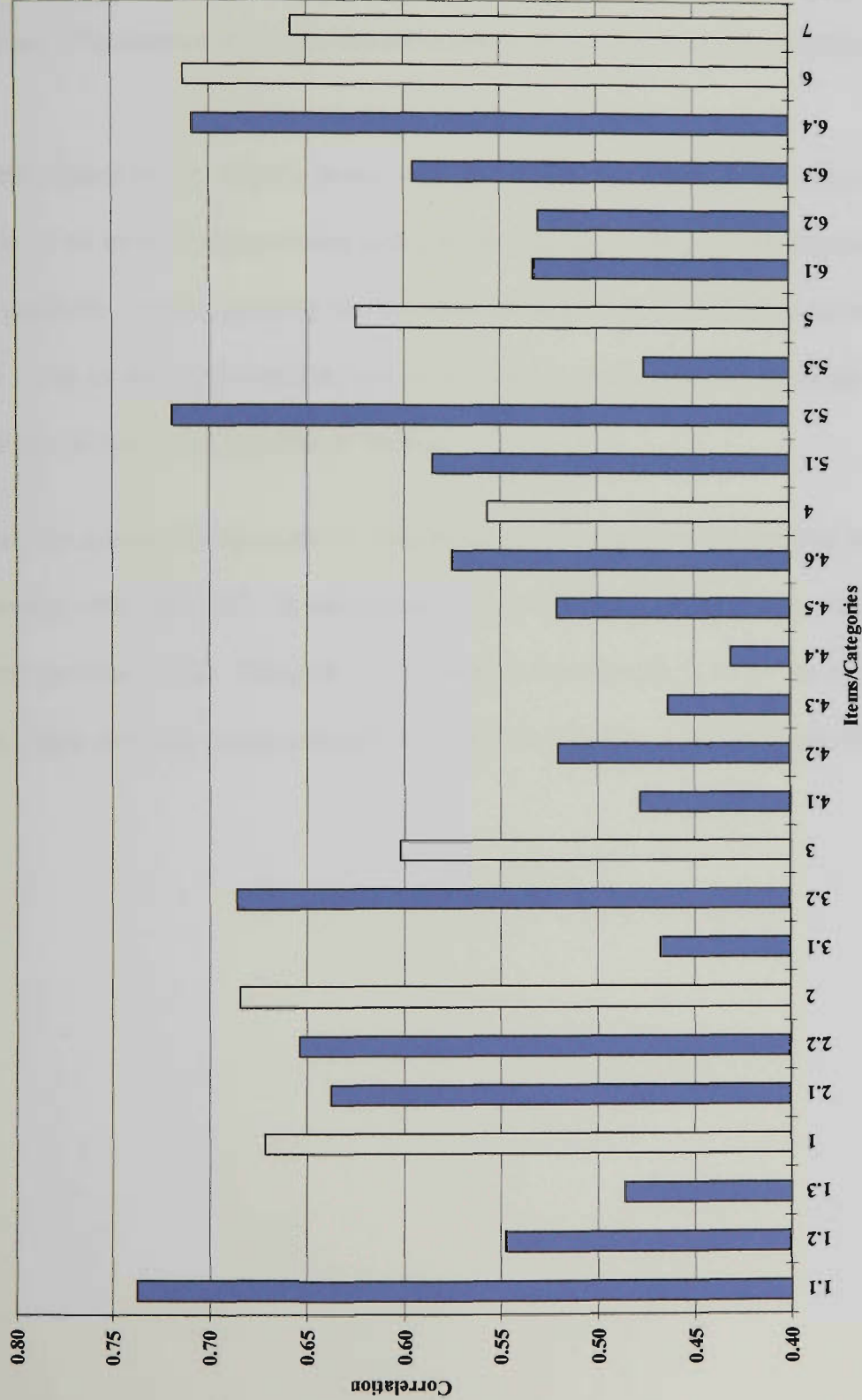


Figure 37 Individual Item Scores and Overall KPI improvements (Participants based)

Note on typical Award results

The results presented in this section are, unlike the overall correlation plots, which were introduced in the previous chapter (e.g. Figure 27) mainly based on the full size data base which consists of as many AQA evaluation results as available. This delivers a sample of 75 cases for the entire manufacturing population, 34 sets of evaluation results for the participants, and 41 sets of AQA scores for the Non-participants.

This is justifiably based on the AQA's policy that any evaluation, whether a previous application exists or not, is to be treated independently and without bias from the previous results. Since the analysis here primarily aims at studying the interdependencies and relationships between specific items it makes sense to utilise all available sets of AQA evaluation results as, generally speaking, a greater sample size delivers more significant findings.

Figure 38 shows the average scores of all 75 manufacturing organisations that applied for the Award in the time between 1992 and 1997. It shows that certain items and categories are, on the average, significantly stronger than others. Category 1 (Leadership), for example, is by far the best performing group of items, which stands in strong contrast with results in Category 3 (Information and Analysis).

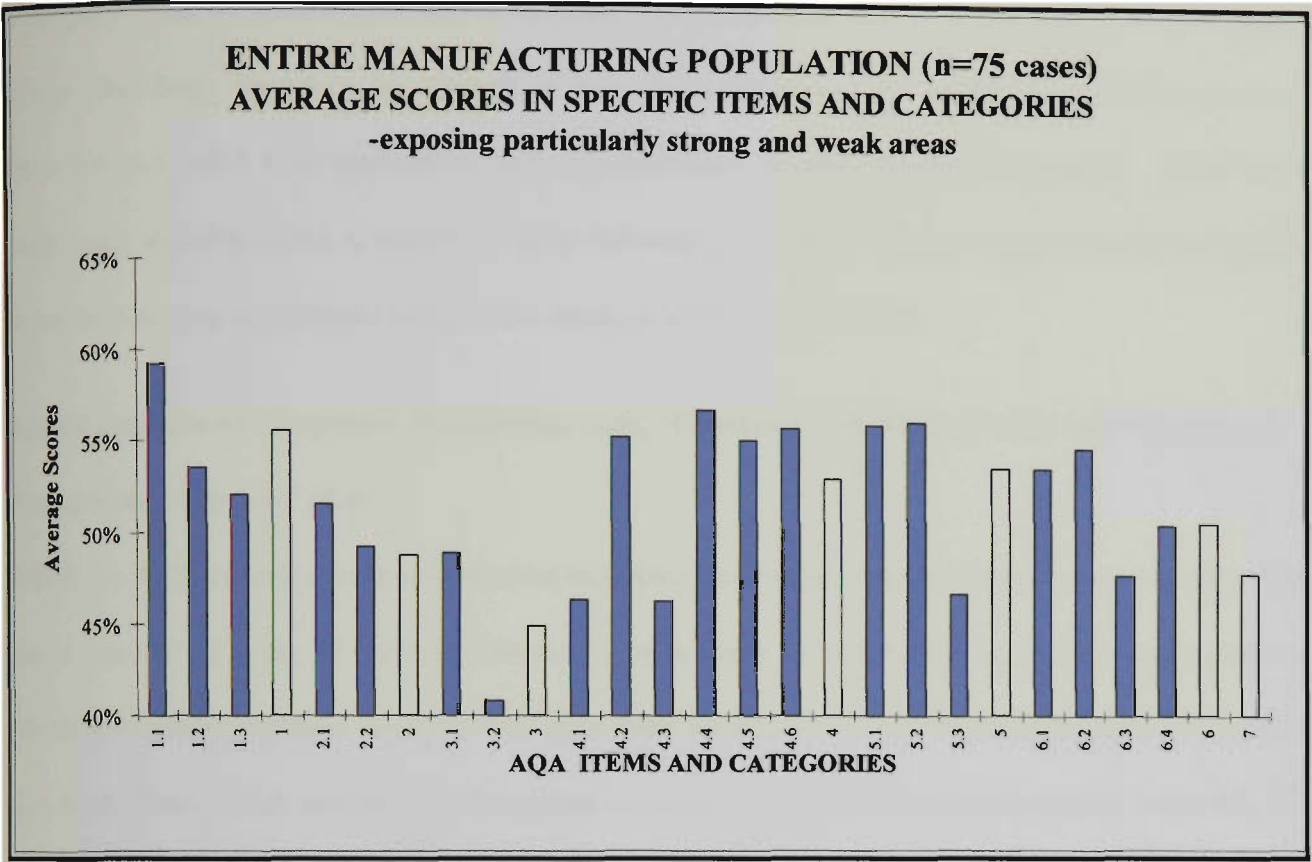


Figure 38 Entire Population’s average scores

The above shown graph can be used to identify the improvement potential of specific principles based on the average scores of the underlying AQA Items. A relatively low average score (e.g. Item 3.2 Data Analysis and Information) is seen as an area for particularly high improvement potential.

6.2.4 Interdependencies and Relationships within the Framework

Hypothesis 4, which is to be tested against the results presented in this section, is: *‘some items or categories when assessed for their association with others can be identified as having a special relationship in terms of having outstanding power to explain evaluation results in others’.*

Interdependencies between the criteria

The following analysis tests the relationships of three selected key items (i.e. 4.6, 5.3 and 6.4) which could be viewed as the direct outcomes of actions undertaken in the other items of the same category. These items are commonly viewed as the primary ‘means’ (items 4.1-4.5, 5.1-5.2 and 6.1-6.3) of

achieving the ‘ends’ (4.6, 5.3 and 6.4) if effectively implemented according to Quality Management principles. This, to some degree is an oversimplification as every item is in one way or another linked to any other item. However the strength of these links determines the degree to which the results of items 4.6, 5.4 and 6.4 are dependent on the performance in other items or categories. While there exist many theories about a variety of links between a number of items, only these three shall be tested here as they are perhaps some of the more plausible dependencies.

Special enablers of ‘Employee Satisfaction (4.6), ‘Customer Satisfaction’ (5.3) and ‘Quality of Products and Services’ (6.4)

Whilst the AQA criteria encompass process measures (the ‘means’ of business success) as well as the actual ‘results’ of some of these processes it is of interest as to whether the criteria suggested are effective in achieving these ‘ends’. If so then there should be a direct relationship between criteria (i.e. AQA items) which are designed to initiate certain processes for the contribution to Items 4.6, 5.3 & 6.4.

Table 21 shows the correlation coefficients of individual items correlated with these 3 specifically selected key Items. Outstanding relationships can be identified through comparison of the averaged correlations of all Items within Categories of the same row. A sample procedure is documented below Table 21.

Table 21 Special Relationships between Selected Key-Items

INTERDEPENDENCIES BETWEEN INDIVIDUAL ITEMS																
Identifying Key-Enablers of Employee Satisfaction (4.6), Customer Satisfaction (5.3) & Quality of processes, services and products (6.4)																
Items	1.1	1.2	1.3	1	2.1	2.2	2	3.1	3.2	3	4.1	4.2	4.3	4.4	4.5	4.6
6.4 centered	0.61	0.50	0.65	0.66	0.45	0.66	0.62	0.59	0.80	0.73	0.60	0.51	0.48	0.67	0.56	0.71
5.3 centered	0.62	0.59	0.42	0.63	0.52	0.68	0.66	0.59	0.60	0.62	0.44	0.46	0.53	0.39	0.58	0.53
4.6 centered	0.74	0.68	0.71	0.79	0.47	0.67	0.63	0.69	0.80	0.78	0.73	0.68	0.57	0.63	0.66	1

Ex.: All Items in this row are correlated with 6.4

All data in rows are correlation coefficients
Ex.: $r(1.2 \text{ with } 4.5) = 0.68$

Special relationship between 3.2 and 6.4 ($R=0.8$) identified

No particularly outstanding relationships between 4.1-4.5 with 4.6 identified ($\text{Avg. } R=0.65$)

Special relationships between 5.1 & 5.2 with 5.3 ($\text{Avg. } R=0.66$) identified

Special relationships between 6.1, 6.2 & 6.3 with 6.4 identified ($R.\text{Avg}=0.63$)

Sample Process Description of how to identify the special relationship between 5.1 and 5.2 with 5.3:

Step 1: Determine the Average of all correlations coefficients of the Items belonging to individual categories in the same row:

Category 1 Items: Mean = $(0.62+0.59+0.42)/3=0.54$

Category 2 Items: Mean = $(0.52+0.68)/2=0.60$

Category 3 Items: Mean = $(0.59+0.60)/2=0.60$

Category 4 Items: Mean = $(0.44+0.46+0.53+0.39+0.58+0.53)/6=0.49$

Category 5 Items: Mean = $(0.66+0.66)/2=0.66^*$

Category 6 Items: Mean = $(0.47+0.51+0.55+0.50)/4=0.51$

*These items were assumed to have the strongest relationship with Item 5.3 and indeed their average correlation coefficient of 0.66 is greater than any of the other Categories.

Step 2: Compare the Mean of the proposed category with its key enabling Items to other Means of other Categories: $0.66 > (0.54, 0.60, 0.60, 0.49, 0.51)$

Conclusion: Hence the assumption regarding a special relationship between 5.1 & 5.2 with 5.3 is confirmed.

Identification of outstanding relationships: Findings

The findings regarding special enablers of Employee and Customer Satisfaction as well as Quality of process, product and service are that:

- Well being and satisfaction (Item 4.6) is not significantly more associated with the average of the other People-category’s items (Items 4.1-4.5) than with the average of any other category’s Items.
- Customer satisfaction (Item 5.3) is more positively associated with the average of the other Customer Focus-category’s items (Items 5.1-5.2) than with the average of any other category’s Items.
- Quality of processes, products and services (Item 6.4) is more positively associated with the average of the other Processes, Products and Services (Items 6.1-6.3) than with the average of any other category’s Items. One other Item ‘Data Analysis and Information’ (Item 3.2) is also particularly associated with 6.4

Concluding the following statements can be made:

The assumptions made in context with Hypothesis 4 are evidently true with the only exception being ‘Employee well being and satisfaction’ (Item 4.6) which is not significantly more strongly associated with the average of the other People-category’s items than with the average of any other category. Overall the relationships established are significant and outstanding enough to accept the part of Hypothesis 4 which assumed special relationships between certain Items.

Special Linkages between certain Categories

It was also assumed that there are certain categories, which are more closely associated to the results of other categories. For example could be expected that people’s performance depends on effective leadership whilst leadership needs the support and trust of its people.

Table 22 Categories Cross-Correlations

Correlations								
	CAT_1	CAT_2	CAT_3	CAT_4	CAT_5	CAT_6	CAT_7	KPIS
CAT_1 Pearson Correlation								
Sig. (2-tailed)								
N								
CAT_2 Pearson Correlation	.883**							
Sig. (2-tailed)	.000							
N	31							
CAT_3 Pearson Correlation	.835**	.861**						
Sig. (2-tailed)	.000	.000						
N	31	31						
CAT_4 Pearson Correlation	.919**	.843**	.853**					
Sig. (2-tailed)	.000	.000	.000					
N	31	31	31					
CAT_5 Pearson Correlation	.765**	.766**	.737**	.669**				
Sig. (2-tailed)	.000	.000	.000	.000				
N	31	31	31	31				
CAT_6 Pearson Correlation	.791**	.768**	.881**	.778**	.748**			
Sig. (2-tailed)	.000	.000	.000	.000	.000			
N	31	31	31	31	31			
CAT_7 Pearson Correlation	.831**	.825**	.870**	.794**	.762**	.860**		
Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		
N	31	31	31	31	31	31		
KPIS Pearson Correlation	.663**	.671**	.596**	.542*	.611**	.719**	.653**	
Sig. (2-tailed)	.001	.001	.004	.011	.003	.000	.001	
N	21	21	21	21	21	21	21	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 22 shows the SPSS-produced output of cross-correlating all scores of all categories with each other. Those correlation coefficients which are in bold print are highlighted because of their outstanding strength.

Special linkages between certain categories: Findings

The following observations could be made:

- *Linkages 1-2-4: Category 1 is particular strongly associated with Category 4 and 2*

The performance in the ‘People’ category (Cat. 4) depends on effective leadership (Cat. 1) which in turn requires the support and trust of its people.

Strong leadership (Cat.1) requires clear directions supported by strong planning (Cat. 2).

- *Linkages 3-6-7: Category 3 is particularly strongly associated with Category 6 and 7*

The management of Improvements and the quality of processes, products and services (Cat. 6) heavily relies on information based on facts and data (Cat. 3).

Business success (Cat. 7) is dependent on effective performance measurement based on sound use of data and information (Cat. 3).

Interdependencies and Relationships within the Framework: Overall findings

The above establishments of several significant relationships are sufficient to confirm Hypothesis 4 which assumed that *‘some items or categories when assessed for their association with others can be identified as having a special relationship in terms of having outstanding power to explain evaluation results in others’*. This outcome may have significant implications for practitioners (e.g. who are contemplating fighting poor process quality with the specific addressing of Category 6 and 3.2 issues).

6.2.5 Re-Design of the ABEF

Hypothesis 5 which is to be tested against the results presented in this section, is:

The overall framework’s relationship with important aspects or organisational performance can be significantly strengthened through adoption of individual Items’ predictive power as a new pattern for redesigning the weighting structure.

The analysis necessary to test this hypothesis is borrowed from the findings previously made in Chapter 6.2.3 Importance of Specific Items and Categories where assumptions about the importance of specific items were made based on their correlations with two dimensions, the aggregate AQA score and the overall KPI improvements.

This study now takes these findings one step further by assuming that both results, the AQA evaluation score and the overall business performance improvement indices are important aspects of organisational performance. Their correlations to specific Items could therefore provide an ideal

rationale for giving a re-designed framework a new emphasis in its individual Items' weighting and thereby enhancing it.

Figure 39 below visualises the weighting of the 1997 framework at category level. These percentages are the aggregate result of adding up the weighting of all Items in each category.

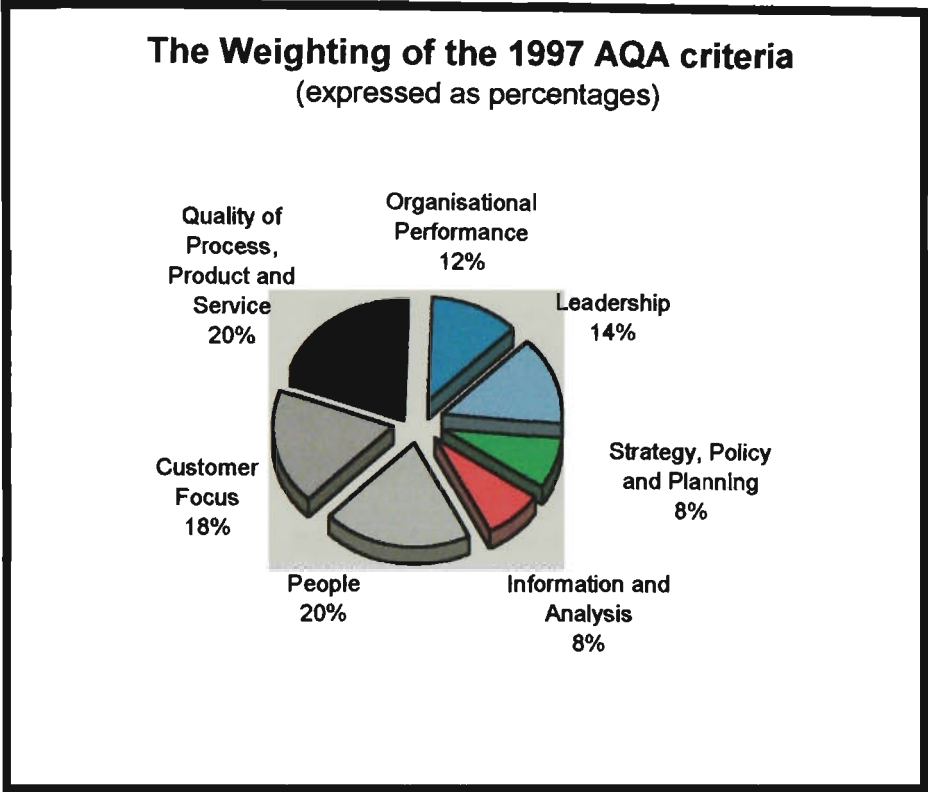


Figure 39 The Weighting of the AQA criteria

Table 23 shows for each item the findings in both of the ‘importance criteria’ (previously presented in Table 20) which, when combined through multiplication, results in the enhanced calculation basis for the new weighting factor.

Table 23 Overview of the Re-Weighting Data

Items	1.1	1.2	1.3	2.1	2.2	3.1	3.2	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2	6.3	6.1	6.2	6.3	6.4	7.1
AQA vs KPI Improvt	0.74	0.55	0.49	0.64	0.65	0.47	0.69	0.48	0.52	0.46	0.43	0.52	0.57	0.59	0.72	0.48	0.53	0.53	0.59	0.71	0.66
AQA vs Overall Score	0.88	0.85	0.77	0.76	0.92	0.87	0.92	0.81	0.83	0.74	0.76	0.83	0.83	0.78	0.80	0.72	0.69	0.69	0.85	0.78	0.92
KPIxAQA	0.85	0.47	0.38	0.49	0.60	0.41	0.63	0.39	0.43	0.35	0.33	0.43	0.48	0.46	0.58	0.34	0.37	0.36	0.50	0.55	0.60
New weights (KPIxAQA)	6.6%	4.8%	3.8%	5.0%	6.1%	4.1%	6.5%	4.0%	4.4%	3.5%	3.3%	4.4%	4.9%	4.7%	5.9%	3.5%	3.7%	3.7%	5.2%	5.6%	6.2%
Old weights (AQA 97)	6.0%	4.0%	4.0%	3.0%	5.0%	4.0%	4.0%	3.0%	4.0%	3.0%	3.0%	3.0%	4.0%	6.0%	6.0%	6.0%	4.0%	3.0%	7.0%	6.0%	12%

Figure 40 shows the details of a proposal for a re-weighting of the framework based on the above-explained calculations.

THE INDIVIDUAL AQA ITEMS : A PROPOSAL FOR NEW WEIGHTING FACTORS
Based on correlations with the overall AQA Score and the overall KPI improvement (n=34 cases)

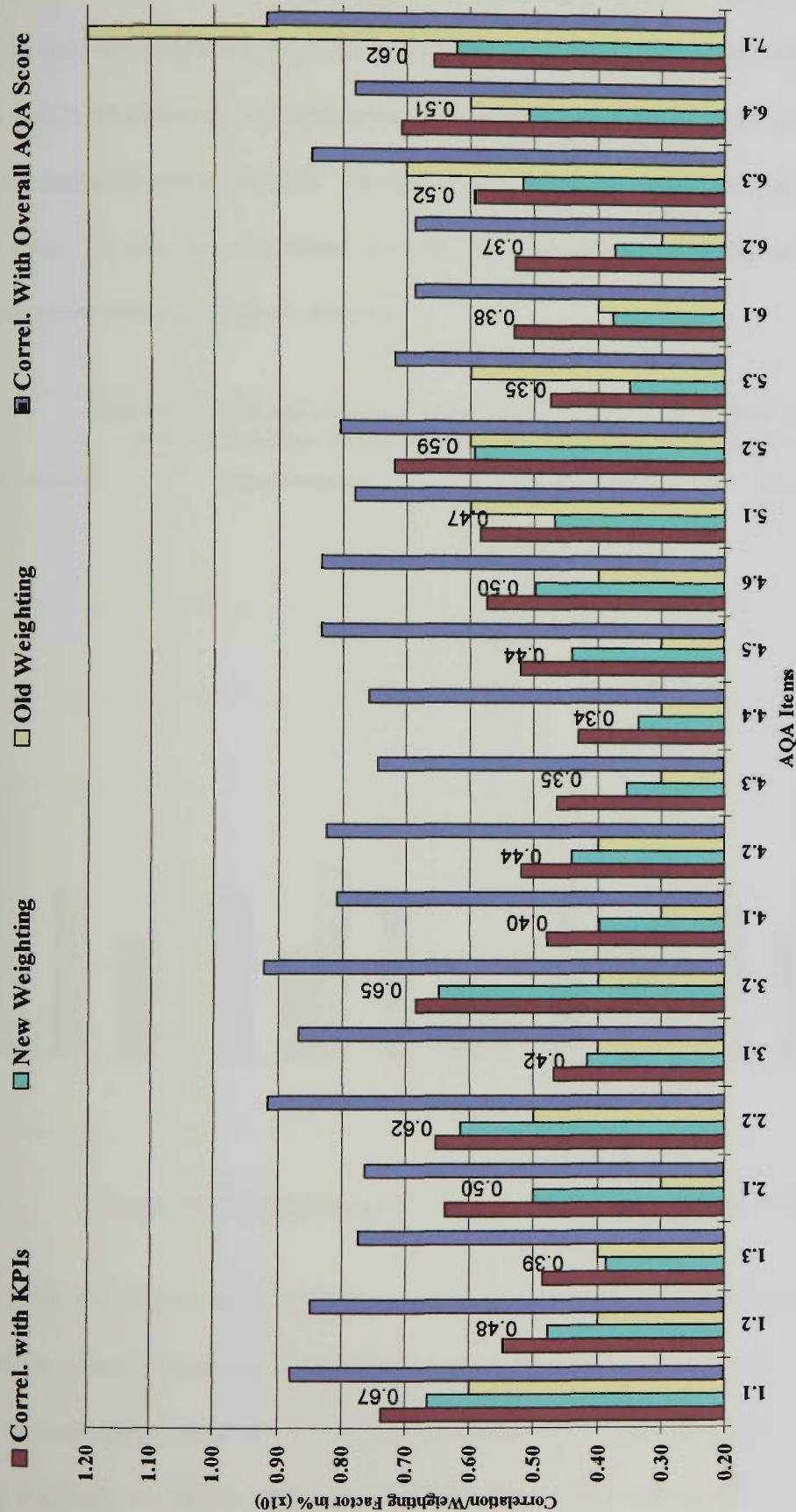


Figure 40 Item Based Proposal for a Redesign of the AQA Framework’s Weighting

The Effect of redesign on the AQA Framework Categories

Figure 41 shows the effects on the individual categories' weighting based on the recognition that their weighting is simply the result of the sum of the individual items' weighting. Even though the associations between categories and KPI improvements, or overall AQA scores (the two criteria used to assess an Item's importance), are represented, no attempt has been made to match these relationships with the allocation of certain weights. Design of weighting factors is being done at item level not at category level. It may also be noted here that no significant variation in terms of strengths of correlations exists from category to category.

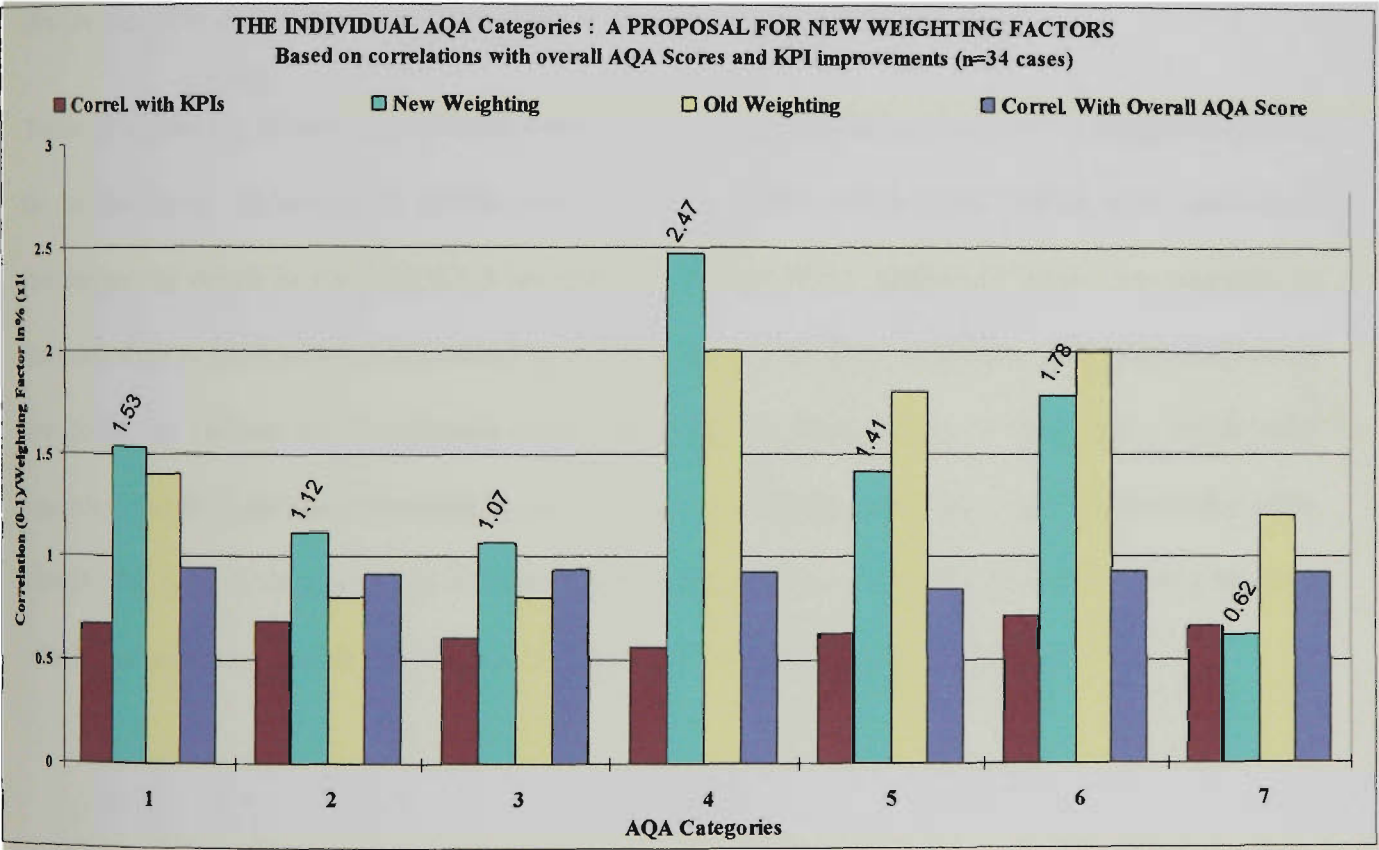


Figure 41 Consequences of redesigned items on categorical level

Given that the above procedure leads to a complete reweighting of the framework, as the specific Items' pattern of importance was not matched at all in the 1997 design, significant enhancements could be made through adoption of this template. The main benefit of this improved framework is that it now puts emphasis on exactly those Items which have been recognised by this research for their importance. The previous weighting structure had not been designed on this rationale.

Hypothesis 5 and the assumption that the framework’s relationship with important aspects of organisational performance can be significantly strengthened by adoption of the individual Items’ predictive power as a new pattern for redesigning the weighting structure are now proven.

6.3 Role of other Extraneous Factors in Explaining Business Excellence

6.3.1 Isolation of Noise

Hypothesis 6 which is to be tested against the results presented in this section, is: *‘The effect of systematically extracting data components with a high share of noise content is significant and can be demonstrated in direct strengthening effects in the relationships found’.*

Table 24 shows the effects which various data treatment techniques can have on the actual strength of the relationship (Correlation coefficient R) found. These techniques which were previously introduced in detail in Chapter 6.1.3 are directly related to the amount of noise (i.e. irregular or outlying data points) which is extracted from the original data base. Sample correlation coefficients are given for various data treatments (e.g. Scrubbing) for both groups of data, those which were smoothed out through linear trending or those which were simply averaged. The columns of this table identify the type of data which is correlated with ‘One Average Index per Company’ being the type which was used to establish the principal relationships as introduced in Chapter 6.2.

Table 24 Isolating Noise Effects on Correlation Coefficients

Effects of Various Data Treatments and the Type of Data Correlated on 'R'										
		Data Treatment Received	Type of Data Correlated	All single data points	One Average Index per Company	No of Years Weighted Average Index	ABC Weighted Average Index	No of years & ABC -Weighted Index		
Increasing Data Treatment	↑	Linear Trends	{	Full Data Scrubbing	↑	0.42	0.69	0.73	0.63	0.68
				Moderate Data Scrubbing	↑	0.08	0.63	0.67	0.55	0.65
				Combined and Averaged	↑	0.07	0.53	0.53	0.48	0.51
				Plain but Trended		0.07	0.46	0.49	0.39	0.43
Increasing Data Treatment	↑	Arithmetic Averages	{	Combined and Averaged	↑	0.21	0.74	0.75	0.68	0.72
				Full Data Scrubbing	↑	0.19	0.71	0.77	0.65	0.69
				Plain Improvement data	↑	0.06	0.09	0.15	0.07	0.08

Depending on which method is chosen, both factors can have marginal to very significant implications for the strength of correlation found. An extraction of noise through the exclusion of selected inappropriate data has in all cases a direct strengthening effects which leads to acceptance of Hypothesis 6. Concluding on this issue one could argue that the development and application of appropriate analysis techniques turned out to be vital to the success of this research.

6.3.2 Role of Industry Characteristics

Hypothesis 7 which is to be tested against the results presented in this section, is: *‘The characteristics of the industry in which a firm conducts business are a significant additional factor for explaining business success’.*

Correlation Analysis

A correlation matrix in which the 15 variables concerning ‘Rivalry’, ‘Entry barriers’ and ‘Agility’ are cross-correlated with KPI improvements leads to the following main findings (please refer to Appendix 11.2.9 for the survey form used and the complete list of the variables investigated).

Table 25 Industry Characteristics to Explain Business Results

Industry Characteristics to Explain Business Results: Overview of Correlation Results			
Characteristic/Issue		Correlation Coefficient R=	Significance Level p=
Rivalry	loyal customers	insignificant	
	price competition	insignificant	
	rivalry		
	advertising		
	growth		
	R&D	0.675	0.003
	profitability	0.598	0.011
	surplus capacity		
	infancy		
	high technology	0.672	0.004
Entry Barriers	difficult entry	0.605	0.01
	advantage of long existence	insignificant	
	advantage of large size		
	oligopoly		
	Agility		

Although the majority (11 out of 15) of the variables were not found to be significantly correlated with ‘KPI improvements’, the following four issues are moderately correlated with Business Results:

1. Estimated profitability relative to other industries (R=0.60, p=0.011).
2. Prevalence of R&D activities (R=0.68, p=0.003)
3. High-Tech characteristic of the industry (R=0.67, p=0.004).
4. Difficulty to enter this industry as a newcomer (R= 0.61, p=0.01).

While this shows that some Industry Characteristic variables are individually related to KPI improvements, it does not imply their suitability for individually or jointly strengthening the principal relationship between AQA scores and KPIs.

Factor analysis (Principal component analysis)

The attempt of extracting variables suitable for summarising the overall data delivered very modest results, as no particularly strong pattern or trend could be identified from the responses received. For example a Principal Component Analysis of the ten criteria in the category ‘Rivalry’ with SPSS (see Appendix 11.4.1.1 for the SPSS output) resulted in the extraction of the following four variables to summarise the underlying data:

- 1. Loyalty of Customers (37% of all variation)
- 2. Price competition (15.5%)
- 3. Rivalry (13.5%)
- 4. Advertising (13.1%)

These four factors jointly explain 79.1% but are not found to have an association with ‘KPI Improvements’ that exceeds the above individual correlations if investigated through Multiple Regression Analysis. The primary reason for why Factor Analysis in this respect did not deliver any considerable findings is believed to be the fact that too few cases (only 22 organisations) exist for relatively many variables (15).

Multiple regression analysis

Due to the failed attempt of employing Factor Analysis further Regression Analysis is conducted with those variables which were previously identified and shortlisted as having a significant relationship with KPI improvements (in Table 25). As can be seen in Table 26, although an overall Adjusted R^2 of over 0.6 is achieved, only the variable ‘Diff’ (Difficulty to enter the industry) is significant at a 95% confidence interval and thereby the only real contributor. All three other variables have little power of explaining KPI improvements as their confidence level is by far insignificant. The conclusion of this is that the variables tested have little suitability for jointly explaining KPI improvements. In other words although they are individually correlated to KPIs at a significant level, the relationship can not be strengthened through their joint application.

Table 26 SPSS Output Regression of 4 Industry Characteristics

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	HITECH, DIFF, PROFIT, RD		Enter

a. All requested variables entered.

b. Dependent Variable: KPI

Legend: HITECH= High-Tech characteristic of the Industry

DIFF= Difficulty to enter this industry as a newcomer

PROFIT= Estimated profitability relative to other industries

RD= Prevalence of R&D activities

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					R Square Change	F Change	df1	df2
1	.843 ^a	.711	.606	6.602E-02	.711	6.778	4	11
								Sig. F Change
								.005

a. Predictors: (Constant), HITECH, DIFF, PROFIT, RD

b. Dependent Variable: KPI

Coefficients^a

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Collinearity Statistics	
	B	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)		-3.117	.010	-.372	-.064		
	DIFF	.466	2.482	.030	.006	.098	.746	1.341
	RD	-.019	-.059	.954	-.053	.051	.245	4.088
	PROFIT	.319	1.318	.214	-.019	.076	.449	2.227
	HITECH	.331	1.305	.219	-.016	.063	.406	2.460

a. Dependent Variable: KPI

Relationship between KPIs and AQA scores together with Industry Characteristics

This next step of analysis tests whether the information contained in the four variables which were previously found to be correlated to KPIs can strengthen the power of predicting Business Results of AQA scores.

Table 27 contains the SPSS output of Multiple Regression Analysis which includes the previous four variables plus the ‘AQA score’ variable. The ‘Adjusted R Square’ has now risen from 0.60 to 0.743 which at first glance indicates a significantly stronger relationship. However the significance levels of all five variables reveal that all variables except ‘AQA score’ are insignificant at the 95% confidence level (only ‘Difficulty to enter’ is marginally significant with $p=0.087$). In other words, the strength of the relationship is mostly the merit of AQA scores. The information contained in the four Industry Characteristic variables do not significantly add to the very strong explanatory power of AQA scores.

Even the only marginally significant variable ‘Difficulty to enter’ when included in another regression analysis as the only additional factor to ‘AQA scores’ (Table 28) turns out as insignificant ($p=0.193$).

These results clearly show that the explanatory power of AQA scores cannot be significantly enhanced through incorporation of the Industry Characteristics. Moreover, rather than the assumed supplementary relationship between information contained in Industry Characteristics and AQA scores, the variable ‘AQA score’ seems to contain information which literally replaces all other variables.

Table 27 SPSS Output Regression Industry Characteristics with AQA scores

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	AQA, DIFF, PROFIT, HITECH, RD		Enter

a. All requested variables entered.
b. Dependent Variable: KPI

Legend:

AQA= AQA evaluation score
HITECH= High-Tech characteristic of the Industry
DIFF= Difficulty to enter this industry as a newcomer
PROFIT= Estimated profitability relative to other industries
RD= Prevalence of R&D activities

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					R Square Change	F Change	df1	Sig. F Change
1	.910 ^a	.829	.743	5.335E-02	.829	9.673	5	.001

a. Predictors: (Constant), AQA, DIFF, PROFIT, HITECH, RD

b. Dependent Variable: KPI

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	-.261		-4.432	.001	-.392	-.130		
	DIFF	3.437E-02	.309	1.897	.087	-.006	.075	.645	1.550
	RD	-9.04E-03	-.126	-.469	.649	-.052	.034	.239	4.184
	PROFIT	1.281E-02	.144	.698	.501	-.028	.054	.402	2.486
	HITECH	7.331E-03	.103	.463	.653	-.028	.043	.344	2.904
	AQA	4.472E-04	.634	2.616	.026	.000	.001	.292	3.430

a. Dependent Variable: KPI

Table 28 SPSS Output Regression ‘Difficulty to Enter’ with AQA scores

Variables Entered/Removed ^b			
Model	Variables Entered	Variables Removed	Method
1	DIFF, AQA	.	Enter

a. All requested variables entered.

b. Dependent Variable: KPI

Legend:

AQA= AQA evaluation score

DIFF= Difficulty to enter this industry as a newcomer

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.881^a	.776	.744	5.163E-02

a. Predictors: (Constant), DIFF, AQA

Coefficients^a						
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
1	(Constant)	-.223	.050		-4.411	.001
	AQA	5.304E-04	.000	.755	5.060	.000
	DIFF	2.148E-02	.016	.204	1.369	.193

a. Dependent Variable: KPI

Role of Industry Characteristics: Overall findings

The above results clearly show the superiority of AQA scores in predicting KPI improvements when compared with a variety of Industry Characteristics even if they are jointly compared. Only four out of fifteen Industry Characteristics were identified of having a moderate relationship with KPI improvements. Most others were, for no explained reason, incapable of predicting Business Results which overall identifies Industry Characteristics as a variable which is not suitable as a reliable stand-alone or supplementary predictor of Business Results.

Due to little evidence found, Hypothesis 7, which assumed Industry Characteristics as a significant factor in strengthening the principal relationship between AQA scores and KPIs, is rejected.

6.4 Post-Analysis Validity Issues

A pro-active approach regarding the validity of this study's findings has been adopted in this study through enhanced study design, aimed at addressing all relevant issues around internal and external validity. The specific actions undertaken have been previously discussed in Chapter 4.2.

The only other validity testing which makes use of the results presented in this chapter are introduced below.

Comparison of participants with non-participants: 'Non-response error' issue assessment

This section specifically deals with validity regarding whether the companies investigated in more detail (i.e. the participants) have different or even abnormal performance characteristics when compared to those who have not participated.

This problem may apply because of the abnormal characteristics of participating companies when compared with non-participating firms. It may be that the respondent's decision when deciding whether to participate or not may be influenced by their own perception of how their performance in the AQA application compares to their average KPI improvements. Since the initial cover letter in which companies were invited to participate made it clear which relationship was going to be investigated, the respondent may have made their decision dependent on whether they thought their case could be supportive of a positive association (or vice versa).

The way by which the significance of this potential limitation is assessed is based on the assumption that higher AQA score, which is normally indicative of high key performance results achieved through high maturity implementing Quality Management, is more likely to be found among the participants than among Non-participants.

Figure 42 shows that the absolute performance level in specific items between participants and non-participants varies only insignificantly. The non-participants' overall average is 53% as opposed to 50% for participants. Their spread of values for non-participants ranges from a minimum of 40%

(42% for participants) to a maximum of 62% (57% for participants). The relative standing of all items is very similar.

The comparison of both the performance spectra for non-participants versus participants suggests that no difference exists and any bias for different performance characteristics under the sample of participating organisations can be ignored.

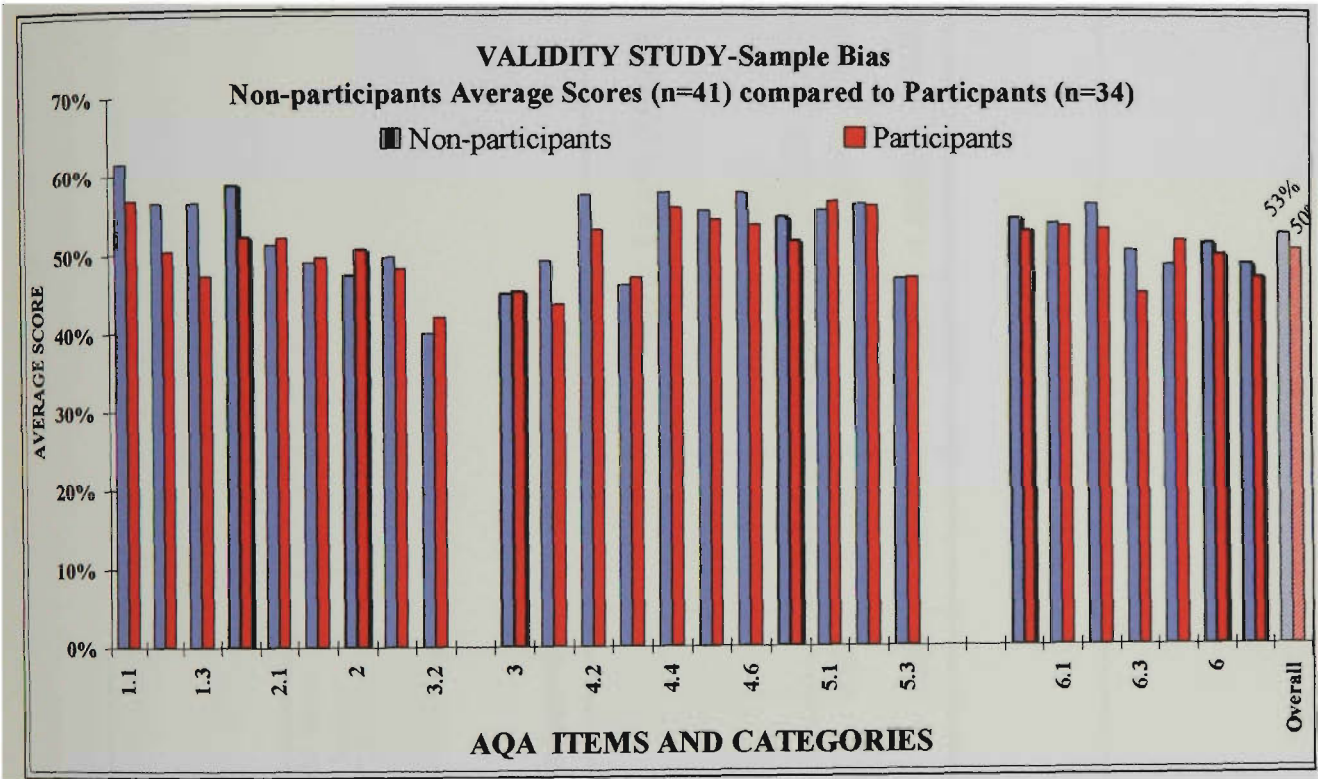


Figure 42 Participants' Average Scores

Comparison of both groups with the t-Test

The t test, which is used to see if there is a significant difference between the means and the variances of the two participating and non-participating groups, produced the results shown in Table 29.

Since the Levene's test has a probability greater than 0.05, one can assume that the groups' variances are relatively equal. Therefore the 2-tail significance level of 0.719 indicates $p > 0.05$ and thus not significant. The null hypothesis of no significant differences is therefore accepted.

Table 29 Comparison of Participants with Non-participants: t-test

T-Test

Group Statistics

GROUP		N	Mean	Std. Deviation	Std. Error Mean
AQAPOP	1	31	.5055	.1435	2.577E-02
	0	32	.5175	.1201	2.122E-02

Independent Samples Test

		Levene's Test for Equality of Variances		t	df	Sig. (2-tailed)	t-test for Equality of Means			
		F	Sig.				Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
AQAPOP	Equal variances assumed	.864	.356	-.361	61	.719	-1.202E-02	3.329E-02	-7.86E-02	5.454E-02
	Equal variances not assumed			-.360	58.471	.720	-1.202E-02	3.338E-02	-7.88E-02	5.479E-02

7 DISCUSSION OF RESULTS

7.1 Association Between Business Results and the Framework of the Awards

7.1.1 Benefit of Higher ABEF Scores

The key findings of this study are that companies with high AQA scores benefit from a number of substantial advantages when compared with lower-scoring organisations. They are much more likely to belong to the better-performing organisations. An increase in the Award evaluation score is strongly associated with an improvement in an organisation's most important business measures. Furthermore higher scoring companies are more likely to achieve positive improvements in a greater share of their top KPIs.

An organisation has therefore substantial incentive to aim for evaluation scores against the ABEF that are as high as possible.

Use of the model and its algorithm

The implication of the above is that the model which links enhanced Business Performance results with the successful implementation of the Quality Management approach, as defined through the Australian Quality Awards Framework for Business Excellence, is now empirically validated.

The model may serve as a strategic base when targeting business success, while the algorithm may serve as a planning, benchmarking or auditing tool.

Quantitative predictions of expected returns

The relationship is strong enough to support its use for predictive purposes. An organisation's overall business performance improvement, whether by strength or by commonality, can now be predicted merely by basing it on the evaluation results against the framework.

Based on the slope of the linear regression line with which the plot was approximated, one can see that for every incremental improvement (e.g. by 5%) made in the AQA score an average increase of twice that much (e.g. by 10%) of business performance improvement rates can be predicted. If for

example a company with an average annual business performance improvement rate of 10% increases their AQA score from 500 to 550 points (by 10%), then this development is expected to be accompanied with a jump of the 10% annual rate to a 12% annual business performance improvement rate (by 20%). This is the equivalent to a 200% return rate.

With regards to the relationship to the commonality of positive business performance improvements, a return rate of only 75% is expected. If for example a company doubles its AQA score (e.g. from 300 to 600) then the share of positive business improvements is expected to rise from 50% to 89%.

The expected accuracy of a relationship with a correlation coefficient of $R=0.7$ to $R=0.8$ is between 50% and 65% (i.e. 65% of the variation in business performance results can be explained through the variation in AQA evaluation scores). Further enhancements are possible through the inclusion of other variables, which were found to play a significant role (i.e. industry characteristics) in determining business success.

Supporting the idea of causality

One could argue that the strength of the findings and the confidence with which they were arrived at, supports the assumption of a cause-effect relationship. Such causality could at best be considered tenuous or even tentative. Caution must therefore be taken with this interpretation.

The non-linearity of the relationships found

Management science and ‘organisational learning’ in particular suggest that any learning and competency enhancement process follows an “S”-curve rather than a straight line. The underlying assumption is essentially that after a successful start has been made, a beginner’s learning is relatively easily achieved while at an advanced level any further incremental effect requires more effort than initially. The same theory is believed to apply in the relationship found between AQA scores and Business results. It is indeed more likely to have a polynomial or exponential nature rather than just be linear. Foley took this insight further and expresses “there may be times in the life of an enterprise where, to satisfy its survival (profit) criterion it will be necessary to discontinue or slow down the rate

of quality improvement activity”. He continues with “even before reaching the point where quality-enhancing activity meets the profit constraint, these activities may need to be stopped because the point of diminishing return has been reached” (Foley 1997 pp61). This slightly extreme belief of a point at which any Quality-Management-based efforts can actually be detrimental to business success is highly controversial and this study did not produce any empirical support for such a theory. However one should realise that improvement rates depend on the absolute level at which improvement occurs. A lower starting platform will result in higher benefits and vice versa.

7.1.1.1 Best Practice Tool for Performance Diagnostics

In this section a practical diagnosis instrument is developed which can be applied to measure or benchmark the success (i.e. KPI improvements) of an organisation using the ABEF. This instrument should assist in diagnosing whether or not a Business Excellence Framework-based improvement program has the desired effect. The following quotations, taken from the literature, specify some of the challenges such a diagnostic tool will have to satisfy:

A diagnostic measurement instrument should be distinguished from classical planning, screening and control by being universally applicable to organisations with different maturity levels (Cupello 1994)

The measurement of success is that it is factual, objective and not negotiable. Performance measurement is not just a means of observing the past; it is a tool for leading an organisation into a better future (Rose 1995).

Quality is an investment option, susceptible to quantitative analysis, just as every other investment decision. (Keiningham T., 1994)

Transformation of the theoretical ABEF scale into a Best Practice scale

While the ABEF allows for scoring on a scale between 0 and 1000, all organisations assessed so far have been scattered across a much narrower band, viz between 200 and 700. The sample investigated in this study is very similar to this spectrum as it commences at 224 and reaches 684, with all other scores somewhere in-between. Organisations when assessing or benchmarking themselves, or being

evaluated by a third party, usually have a strong interest in their standing in comparison with the achievements of other organisations. This is why, in the following diagnosis, the theoretical band of 1000 points is being reduced to a scale for which practical examples and thereby benchmarks exist.

Figure 43 illustrates how the spectrum within which the sampled organisations performed is determined for both the X- and Y-axis. In analogy with all previously shown correlation plots, the X-axis is the score obtained by the evaluated organisations while the Y-axis stands for the average annual improvement of those organisations' top KPIs.

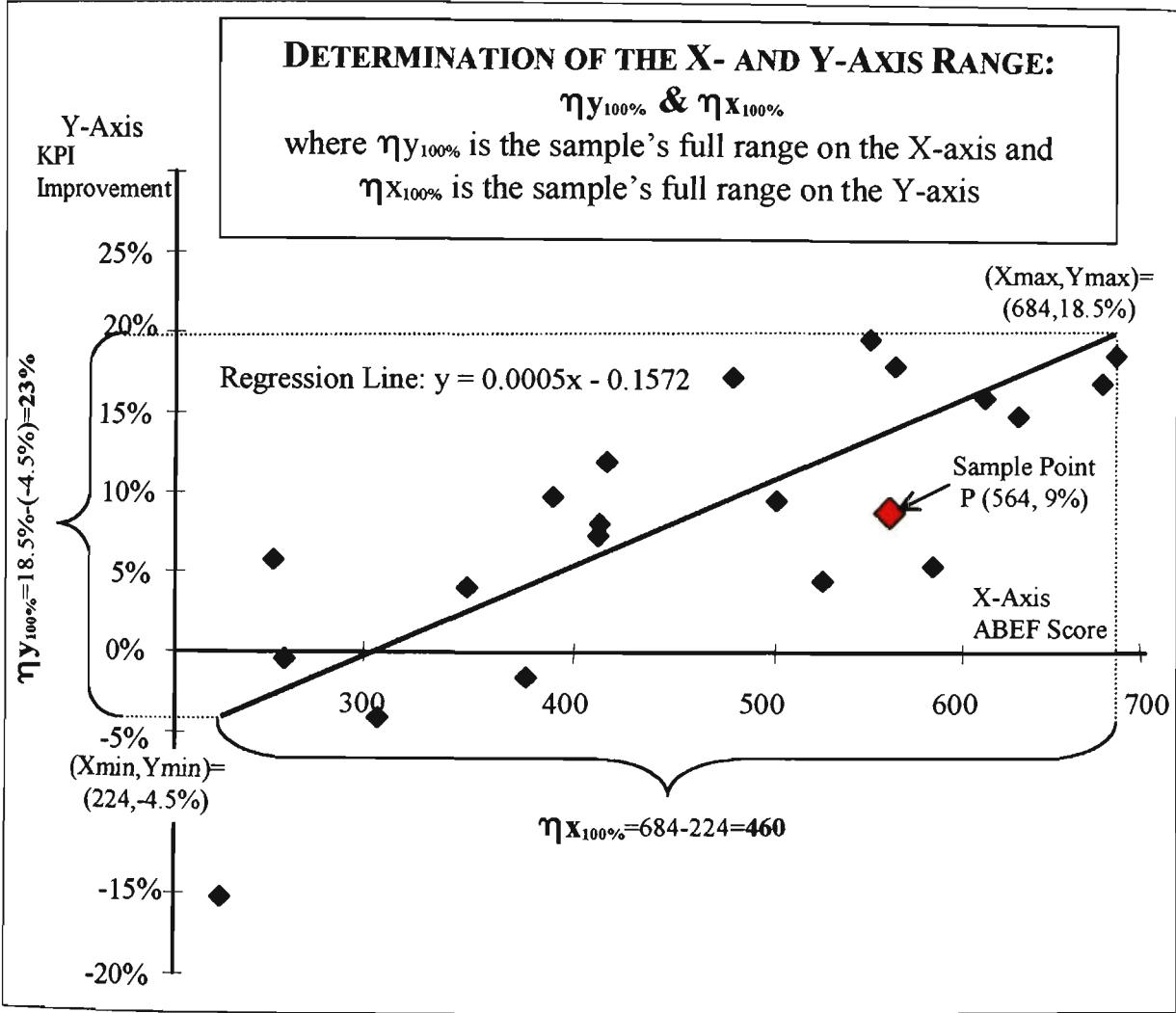


Figure 43 Determination of X and Y Ranges

(based on Figure 27 Principal Correlation Plot, R= 0.79)

Both ranges can be perceived as a ‘Best Practice’ scale against which organisations can benchmark their own achievements. It is assumed that this scale is far more practical and realistic than for example the entire ABEF scale of 1-1000 points. The top right hand end of the regression line in the

plot shows that the best scoring company achieved 684 points. This stands in contrast with 224 points of the lowest scoring organisation. The band of 684-224=460 points in-between becomes the new scale of ‘Best Practice-management’ for the X-axis while 18.5%-(-4.5%)=23% becomes the ‘Best Practice-KPIs’ range against which the current performance levels of any organisation can be assessed as well as its potential for further improvements.

For example any other organisation which scored 684 points could be considered a 100% Best Practice achieving company as far as their AQA scores are concerned. It is important to realise that these ‘Best Practice’ and ‘Best Results’ scales are established based on the extreme values of the regression line and not actually on individual outlying samples.

The following equations are used for transforming X- and Y-axis related performance characteristics into equivalents on this reduced Best Practice scale. Subsequently a variety of coefficients are defined which are indicative of a company’s actual and potential performance levels. For illustration purposes sample calculations are being shown for the sample point ‘P’ which is identified in Figure 43.

Transformation of absolute performances

To transform the performance characteristics of an individual organisation to its equivalent on the reduced Best Practice scale one can write

$$\begin{aligned} Y' &= Y - Y_{\min} \\ X' &= X - X_{\min} \end{aligned} \qquad \text{(Eq 1)}$$

For point P, this equation produces

$$Y' = 9\% - (-4.5\%) = \underline{13.5\%}, \quad X' = 564 - 224 = \underline{340}$$

meaning that on the new Best Practice scale a KPI improvement rate of formerly 9% is now 13.5% and that an ABEF score of 564 becomes 340.

Determination of Best Practice performance utilisation measure ‘Eta’ (η)

The transformed values Y' and X' can then be compared with the maximum Best Practice values $y_{100\%} = 23\%$ and $\eta_{x100\%} = 460$ using (Eq 2) & (Eq 3) below which reveal the relative performance of point P in relation to its maximum possible potential:

$$\text{Actual KPI – Efficiency Rate : } \eta_{Y'} = \frac{Y - Y \text{ min}}{Y \text{ max} - Y \text{ min}} = \frac{Y - Y \text{ min}}{\eta_{Y100\%}} = \frac{Y'}{\eta_{Y100\%}} \quad (\text{Eq 2})$$

$$\text{Actual Mgmt – Effectiveness Rate : } \eta_{X'} = \frac{X - X \text{ min}}{X \text{ max} - X \text{ min}} = \frac{X - X \text{ min}}{\eta_{X100\%}} = \frac{X'}{\eta_{X100\%}} \quad (\text{Eq 3})$$

both expressed against Best Practice standards, and where $\eta_{Y'}$ is the extent to which the Best Practice level in KPI efficiency is achieved and $\eta_{X'}$ is the extent to which the Best Practice level in Management Effectiveness is achieved.

Using (Eq 2) and (Eq 3), point P with 564 points and only 9% average KPI improvement produces

$$\eta_{Y'} = \frac{13.5\%}{23\%} = 59\% \quad \text{and} \quad \eta_{X'} = \frac{340}{460} = 74\%.$$

These results can be interpreted as follows. While the organisation originally scored 564 points, which on the Best Practice Benchmark scale is the equivalent to 74% ($\eta_{X'}$), its KPI-Best Results Coefficient is significantly inferior with only 59% ($\eta_{Y'}$). The implications of this finding are that the sample organisation (point P) is not only significantly below achieving Best Practice level, it is also not completely capitalising on its relatively high management effectiveness level (74%) as it only performs at 59% KPI efficiency. Such a scenario is not likely to be uncommon as only those points with X and Y values which lie directly on the regression line produce equal values for their $\eta_{X'}$ and $\eta_{Y'}$. For all other cases which are either above (over-performing) or below (under-performing) the

regression line, the level at which the organisation is deviating (residuals) from what the linear relationship of the regression line suggests can be expressed mathematically by

$$\text{KPI Capitalisation Rate : } \beta_{Y'} = \frac{\eta_{Y'} - \eta_{\tilde{Y}}}{\eta_{\tilde{Y}}} = \frac{\eta_{Y'} - \eta_{X'}}{\eta_{X'}} \tag{Eq 4}$$

with

$$\text{Expected KPI Efficiency Rate } (\eta_{\tilde{Y}}) = \text{Actual Management Effectiveness Rate } (\eta_{X'})$$

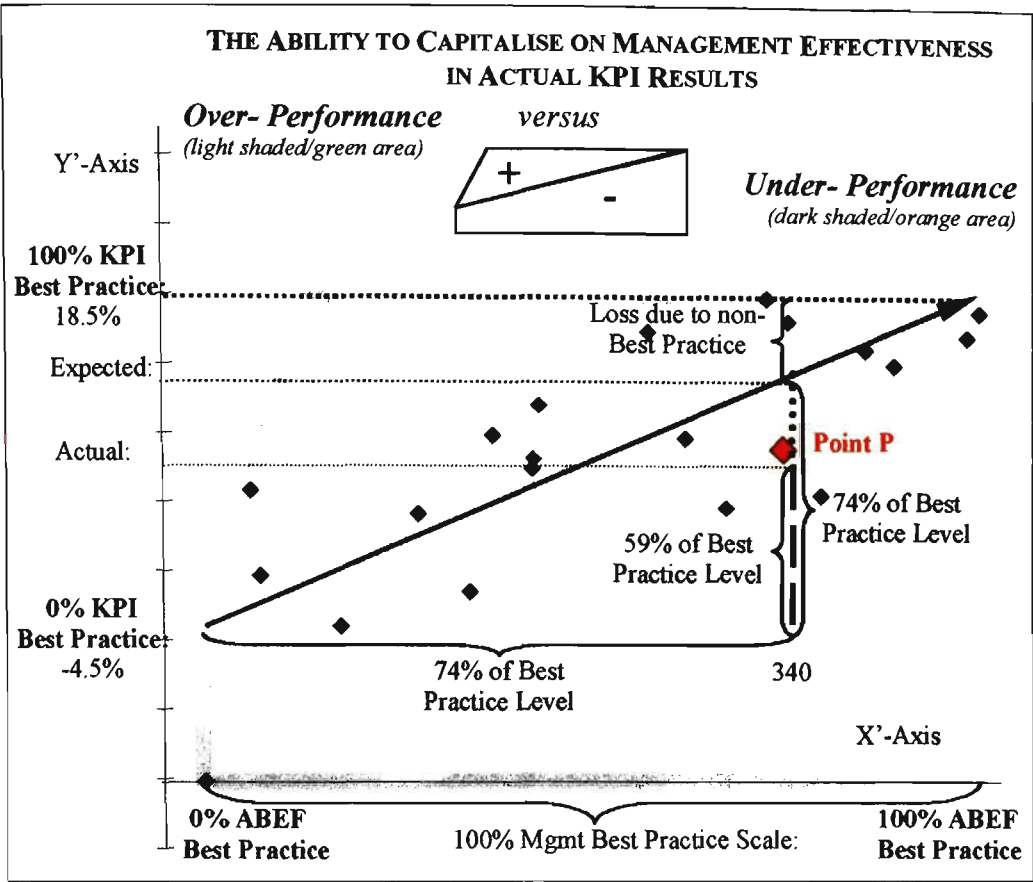
where $\beta_{Y'}$ is the ability to capitalise on the managerial effectiveness of an organisation, as expressed through an organisation’s KPI performance level.

For point P this leads to:

$$\beta_{Y'} = \frac{\eta_{Y'} - \eta_{\tilde{Y}}}{\eta_{\tilde{Y}}} = \frac{59\% - 74\%}{74\%} = \underline{-20\%}, \text{ suggesting that the sample company (point P) with}$$

its management practices which are 74% of what is constituted to be Best Practice, versus 59% in terms of its KPI results, is ‘under-performing’ by 20% when its actual KPI results are compared with its expected level.

Figure 44 divides any deviation from the path along the regression line into an ‘Under-performing’ area versus an ‘Over-performing’ area. The sample company (point P) is essentially suffering two kinds of losses, the first being the distance from the 100% Best Practice level (non-Best Practice loss), the second through its inability to capitalise fully on what could be expected based on its level of management effectiveness. The dotted line above point P is representative of this under-performance of 20%.



Although the pathway towards ‘Best Practice’ (i.e. the regression line) is based on this study’s empirical findings, and was constructed on minimising residuals, most companies when advancing from left to right would be expected to progress outside the pathway. Figure 45 highlights that an organisation consequently may be over- or under-rewarded. It is suggested that this might have significant implications for morale and motivation during the implementation of improvement programs. The models introduced may be useful for organisations wanting to establish whether they are currently over- or under-rewarded as it suggests a typical pattern for improvement effects. Frequent benchmarking and plotting of the results may also be a useful tool for monitoring advancements and its effects. However the key conclusion is that any organisation is subject to at least two sources of variation in their KPI efficiency, one being the ‘catch-all’ factor which is responsible for over- or under-performing situations, the other being the pursuit and partial achievement of Best Practice. It is the latter that matters most as there is no uncertainty about its positive effect which if recognised can be a substantial source of energy and motivation. Efficiency is

wasted until 100% Best Practice is achieved which is, almost needless to say, a continuously moving target.

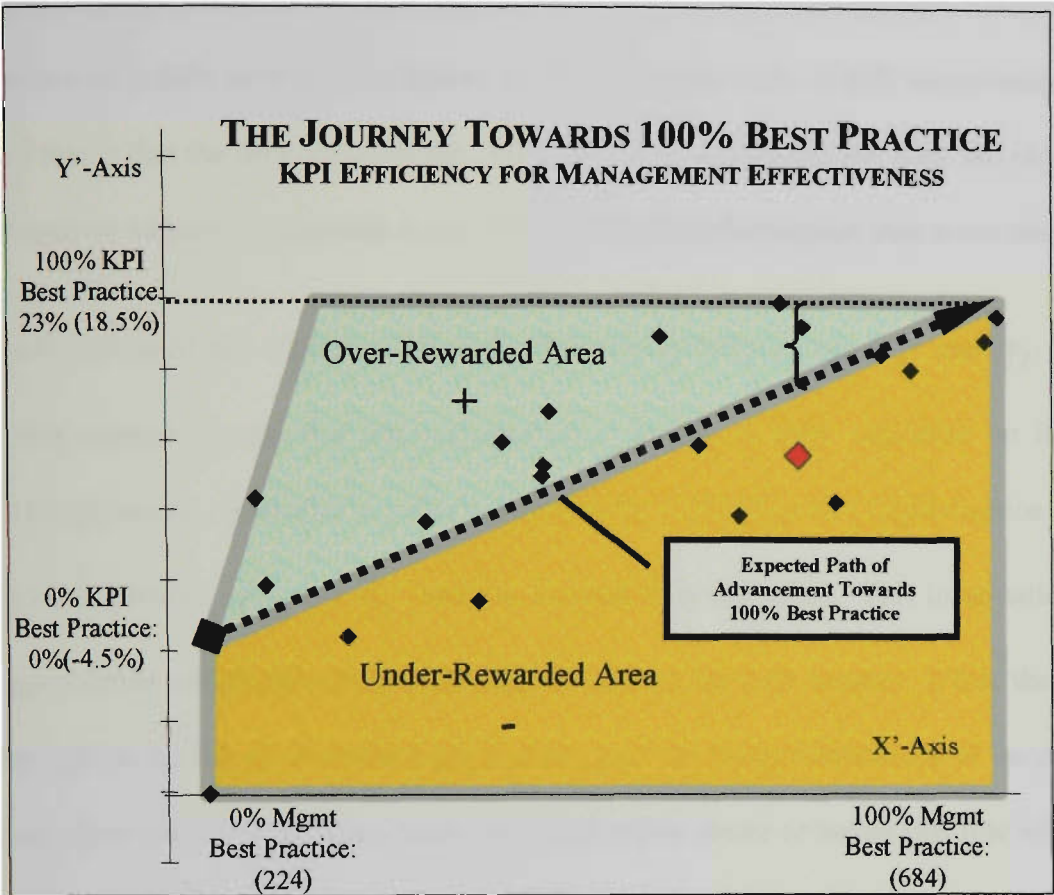


Figure 45 KPI Efficiency for Management Effectiveness

Performance diagnostic tool

Table 30 is an aid with which organisations can identify their own position and the resulting potential for improvement as well as the extent to which they may be over-rewarded or under-rewarded. An organisation which has obtained an ABEF evaluation score, and which has also computed its overall Annual KPI Improvement Rate (this must be done in analogy to how the performance data was processed, combined, and averaged in this research), can match its own data with the numbers listed in the table to diagnose its performance. There are two dimensions of performance to such a diagnosis. The first is based on the assumption of a linear progression between advancements against Best Practice Values of the ABEF and KPI improvements. All variables which are used in the table were defined in the last section (e.g. X' , Y' , η , β).

The previously discussed example of point P (564,9%) is diagnosed if matched with its closest values of the X (550) and Y series (9%). The corresponding values of $\eta_{X'}$ (71%) and $\eta_{Y'}$ (60%) suggest that the sample organisation performs at a level of 71% as far as its Management Effectiveness is concerned, versus only 60% performance against the Best Practice scale of KPI improvements. The implication of this is that the differences to the 100% Best Practice Values are what the organisation lacks in performance which could provide a reasonable target for achievement over some time.

The second information of this diagnosis lies in the discrepancy between the $\eta_{X'}$ and $\eta_{Y'}$ which in the case of this example means that the organisation is failing to fully capitalise on its current Management Effectiveness. Instead it is under-performing by -15% (The KPI Capitalisation Rate β is the matching value between $\eta_{X'}$ and $\eta_{Y'}$ and can be read from the table). This information can be useful for organisations which are perhaps seeking explanation for their results. While the diagonal line of 0% through the middle of the table is the equivalent of the linear relationship of the previously introduced regression line all other value combination are either above or below this line which stand for under- or over-performance. The further away the matching values are from the diagonal line (0%) the more extreme is the existing discrepancy (over- or under-performance). Although this diagnostic tool has been constructed specifically through this study's principal relationship (which was established for a mix of top-ten KPI records) other tables could be produced for benchmarking more specific business records (e.g. financial success) or performance aspects (e.g. commonality of positive improvements).

Further studies are required to investigate other interesting issues such as the long-term sustainability of such privileged positions. As with many laws of natural science one could expect to find a tendency for the self-establishment of well-balanced positions in which companies are getting precisely what their effectiveness allows them to receive, neither more nor less.

Table 30 Performance Diagnostic Tool

ORGANISATIONAL PERFORMANCE DIAGNOSTIC TOOL

"Assessing The Ability To Capitalise on Management Effectiveness (ABEF Score) in Business Results (KPIs)"
Based on Seven Years of Australian Best Manufacturing Practice (1992-98)

KPI Capitalisation Rate "Beta" (in +/-%)			ABEF Score												Actual			
			X	300	350	400	450	500	550	600	650	700	750					
			X'	76	126	176	226	276	326	376	426	476	526					
Average Annual KPI Improvement*	Y	Y'	Eta X'		Eta Y'	16%	+3.8%	16.0%	27%	38%	49%	60%	71%	82%	93%	103%	114%	Mgt Effectiveness Best Practice Scale
	-1%	+3.8%				0%	-40%	-57%	-67%	-73%	-77%	-80%	-82%	-84%	-86%			
	+2%	+6.3%				+71%	0%	-29%	-44%	-54%	-61%	-67%	-71%	-74%	-76%			
	+4%	+8.8%				+139%	+39%	0%	-22%	-36%	-46%	-53%	-59%	-63%	-67%			
	+7%	+11.3%				+207%	+79%	+28%	0%	-18%	-31%	-40%	-47%	-53%	-57%			
	+9%	+13.8%				+274%	+119%	+57%	+22%	0%	-15%	-27%	-35%	-42%	-48%			
	+12%	+16.3%				+342%	+158%	+85%	+44%	+18%	0%	-13%	-24%	-32%	-38%			
	+14%	+18.8%				+410%	+198%	+113%	+66%	+36%	+15%	0%	-12%	-21%	-29%			
	+17%	+21.3%				+478%	+238%	+142%	+88%	+54%	+31%	+13%	0%	-11%	-19%			
	+19%	+23.8%				+546%	+277%	+170%	+110%	+72%	+46%	+26%	+12%	0%	-10%			
	+22%	+26.3%				+614%	+317%	+199%	+133%	+90%	+61%	+40%	+23%	+10%	0%			
			KPI Efficiency Best Practice Scale	Over-Performance														
Actual	Transformed																	

* Please note that for accurate performance diagnostic results, it is important that the overall Average Annual KPI Improvement rate of an organisation is determined with techniques which are identical to those originally applied in this research, when the fundamental correlations were established.

7.1.2 Advantage of Multiple Award Entries

There are two main implications of the findings made. The first is that a significant benefit is likely to be experienced by an organisation which pursues the award on a repetitive basis. Such organisations are more likely to achieve higher AQA scores and greater business improvements.

Recognising that the relationship which connects AQA scores with business success is much more progressive for multiple award winners a substantially stronger benefit from an increase in the score may be realised. For example, a multiple award applicant which increases its score from say 500 to 600 (by 20%) is expected to experience an increase in their business improvement rates in the amount of four times the increase in the AQA score ($20\% \times 4 = 80\%$). If before the rise the company had an average annual business improvement rate of 10% they should then experience a new rate of 18%. This 400% return rate is approximately double the gain to be expected by a single award applicant (200% return rate).

7.1.3 Role of Industry Characteristics

The assumption that Industry Characteristics are a key factor in explaining business results (Hypothesis 7) was rejected in spite of the fact that one variable ('Difficulty to enter the industry as a newcomer') was found to be a marginally significant ($p=0.087$) factor which, in combination with AQA scores, results in an even more powerful relationship than AQA scores only ($R^2=0.74$ vs. $R^2=0.62$).

One could argue that this outcome is likely to be directly related to the limitations of the methodology applied in this particular aspect of the study. This specifically refers to the small size of the sample taken, the high number of variables considered, the surveying of subjective perceptions and that the constructs were originally designed and validated by another researcher (Powell 1995) in slightly different settings. Fact is however, that previous studies by other researchers including (Schmalansee 1985), (Rumelt 1991) and Powell (1995) have all concluded along the same line saying that "about 80-85% of variance in bottom-line success is unrelated to industry effects". Schmalansee also argued

that “while industry differences matter, they are clearly not all that matters” (Schmalansee 1985, p 165). Rumelt drew his conclusion and found that “the most important sources of economic rents are business-specific” (Rumelt 1991, p 167) which Powell’s research also strongly supports.

The author highlights that these conclusions are in alignment with the findings of this study. The key learning is that the predictive power of AQA scores is not significantly complimented or strengthened through incorporation of Industry Characteristics. Industry Characteristics are likely to be already considered in the AQA evaluation process which perhaps explains why additional information about Industry Characteristics does not help to make up for the missing balance of the AQA score’s ability to explain variance in business results. Clearly, further study is required to learn more about such links.

7.2 Implications of Criteria-Specific Results

7.2.1 Interdependencies and Relationships within the Framework

Please refer to the foldout page in Appendix 11.7.1 for a complete listing of the names of the items dealt with in this section.

The special relationships found for results-oriented items such as 6.4 and 5.3 can be used if management specifically targets improvement in these two items. The evidence available suggests that if performance against Items 6.1 to 6.3 improves, 6.4 is more likely to benefit from this than any other Item. Likewise if Item 5.3 is to be enhanced, this can be done most effectively via improvements in Items 5.1 and 5.2.

Given that this relationship could not be established for Item 4.6 one could argue that success in this aspect is apparently more complex than through 4.1-4.5 and perhaps could be achieved through improvements in other Items or Categories. In this context those special relationships found to exist between whole categories (e.g. Category 1 & 3 & 7) could be used for the development of highly effective improvement strategies which are designed to tap into benefits of dynamics and interdependencies within the framework.

7.3 Organisational Improvement Opportunities

7.3.1 Ranking of Opportunities in Order of Priority

Most organisations have some Items in which they perform particularly poorly, which gives rise to the opportunity of using this information for identifying and prioritising improvement opportunities.

Table 31 shows all categories and items in order (from left to right) ranked by their average results achieved in AQA evaluations. The significant variation of average performances ranging from 41% to 59% allows a fair classification into particularly strong and weak areas (i.e. Leading and Lagging third). It shows those areas where Australian manufacturing AQA applicants typically perform particularly well or, if read from right to left, have the most significant potential for improvement (i.e. gap to a score of 100%). These results are based on the evaluation results of the entire population of manufacturing applicants with 75 evaluation cases.

Table 31 Categories and Items Ranked by their Average Score (n=75)

Categories ranked by strength																					
Category	1	5	4	6	2	7	3														
Average %	56	54	53	51	49	48	45														
Items ranked by strength																					
Item	1.1	4.4	5.2	5.1	4.6	4.2	4.5	6.2	1.2	6.1	1.3	2.1	6.4	2.2	3.1	7.1	6.3	5.3	4.1	4.3	3.2
Average %	59	57	56	56	56	55	55	55	54	54	52	52	50	49	49	48	48	47	46	46	41
LEADING THIRD														LAGGING THIRD							

It is not very surprising that Leadership is typically performed particularly well. It has been long recognised as a very success-critical factor and has been addressed as an area of priority in many organisations. A large share of the most recent bestselling publications are dedicated to Leadership management practices and contemporary Leadership gurus including Covey, Peters and Senge are frequently receiving huge interest in their seminars or publications.³

³ The “Best of the Minds” event, a combined seminar held in Australia in 1998 attracted more than 1000 attendees (mostly business managers in leading positions.

The popularity of such heavily marketed concepts stands in strong contrast to the often-neglected skills and needs in disciplines around category 3 (3.2 Analysis and Use of Information and 3.1 Scope and collection of data). The concept of supporting planning and decision making through facts and data is frequently observed to be the weakest point in management of Australian enterprises (AQA 1998). This phenomena can probably be partly linked to the fact that education and training of statistical concepts and thinking is normally less desired and receives often no significant attention at all when compared with such mystified effects of charismatic leadership and motivation.

Overall, as can be seen by the highlighted top and bottom third (6.2 and 2.2 are included because of equal value to the rest in their group), People practices including (4.4 Education & Training, 4.6 Employee Satisfaction, 4.2 Employee Involvement and 4.5 Communication belong to the best performing items. The same applies to Customer Focus practices including 5.1 Knowledge of customers' needs and expectations and 5.2 Customer relationship management.

On the contrary, 4.1 Human Resource management planning and 4.3 Performance Management are equally poor performed. 5.3 Customer Satisfaction, 6.3 Management and Improvement of Processes, 7.1 Measures of Success and 2.2 Planning Processes are complementing the already mentioned poor performance in category 3.

Importance of specific Items and Categories

When assessing the significance of specific items through their relative comparison with each other two performance dimensions have been considered.

Importance criterion No 1

The first criterion is the relationship between individual item-scores and the overall score that was achieved by the same organisation in the same evaluation case. The “predictive power’ of such a relationship can be interpreted as the importance of a specific item. If, for example, there is a high association between 1.1 (Senior Executive Leadership) scores and the overall AQA results, one could

argue that this item deserves particular attention as it seems to be highly indicative of the overall performance level of an organisation when assessed against a framework such as the AQA.

The theory underlying Quality Management has partly recognised some of these relationships and for example distinguishes between Drivers of the management system (i.e. categories 1 & 5) and Enablers that mobilise the full potential of the organisation to achieve its objectives (i.e. categories 2,3 & 4) (AQC 1997). Rather than testing the validity of these theories, it is of more interest to see whether the correlation coefficients, which are describing the relationships between specific items and the overall AQA results, are suitable to discriminate between certain items.

Table 32 or Figure 46 suggest that with respect to this criterion, items 3.2 (Analysis and Use of Data and Information), 7.1 (Measures of Success), 2.2 (Planning Processes), and 1.1 (Senior Executive Leadership) are by far the most important items (i.e. better predictors of the overall performance). They are closely followed by the remaining items of the top third namely 3.1 (Scope and collection of data), 1.2 (Leadership throughout the Organisation and 6.3 (Management and Improvement of Processes).

Table 32 Items ranked by their Overall AQA score correlation (n=34)

		Items ranked by Overall AQA Correlation																				
Item	AQA Corr	3.2	7.1	2.2	1.1	3.1	1.2	6.3	4.6	4.5	4.2	4.1	5.2	5.1	6.4	1.3	2.1	4.4	4.3	5.3	6.2	6.1
		0.92	0.92	0.92	0.88	0.87	0.85	0.85	0.83	0.83	0.83	0.81	0.80	0.78	0.78	0.77	0.76	0.76	0.74	0.72	0.69	0.69
LEADING THIRD																LAGGING THIRD						

Interestingly on the other side of the scale, items 6.1 (Design and Innovation), 6.2 (Supplier Relationships), 5.3 (Customer Satisfaction), 4.3 (Performance management), 4.4 (Education and Training, 2.1 (Integration of Values) and 1.3 (Leadership in the Community) are those with the least predictive power and could therefore be considered less critical or important. A final decision on the items' importance was only being made after consideration of a second criterion.

It should be noted here that the actual size of items or even categories (i.e. relative weighting in points per 1000) has a significant influence in these results as a relatively large item (e.g. 7.1 with 120

points) automatically determines the overall score by its own relative weighting (e.g. $120/1000=12\%$) which in the case of a large item brings it closer to an overall result in the proximity of the item's result. This is why comparison between items only is recommended rather than between categories whose relative weighting varies significantly more (min=80, max=200) as they are greatly dependent on the number of items they contain.

Given that item 2.2 (with 50 points) and especially 3.2, 3.1, and 1.2 (with only 40 points) are relatively small items the above-stated findings are particularly valid for this group and perhaps less applicable to 7.1 given the extraordinary size of this single item category (i.e. 120 points).

Analysis and use of data and information (3.2) is therefore a significantly better predictor of the overall AQA result (and thereby the more important item) than what Customer Satisfaction (5.3) is. Interestingly, recent insights into the implications of management practice have led to a review of the desirability of 'customer satisfaction' per se and has ultimately given preference to the formulation of a goal by the name of 'Customer's perception of value' as the fundamental driver of a continuous improvement strategy. In fact 'Customer's perception of value' has replaced the 'Customer satisfaction' item in the latest 1999 AQA criteria.

Importance criterion No 2

The second criterion by which the importance of individual items is judged is the relationship with the average annual improvements in an organisation's KPIs. This, in fact is the same variable, which was used for establishing the principal relationship between overall AQA results and KPI improvements as plotted in Figure 27. The difference here though is that the independent variables are individual items and categories rather than the overall AQA result. Another difference is that like all AQA score specific analysis in this chapter the underlying sample also includes those evaluation results which were achieved by the multiple AQA applicants which increases the number of cases from the original 22 to 34. The correlation coefficients, which describe the relationships to each item, are represented below in Table 33 and Figure 37. The differences found here, whilst generally speaking on a lower

level (0.43 to 0.74 as opposed to 0.69 to 0.92 in Table 32) are equally significant and therefore suitable to distinguish between individual items.

Table 33 Overall AQA result and KPI improvement correlation coefficients

		Items ranked by KPI Correlation																					
Item	KPI Correl	1.1	5.2	6.4	3.2	7.1	2.2	2.1	6.3	5.1	4.6	1.2	6.1	6.2	4.5	4.2	1.3	4.1	5.3	3.1	4.3	4.4	
		0.74	0.72	0.71	0.69	0.66	0.65	0.64	0.59	0.59	0.57	0.55	0.53	0.53	0.52	0.52	0.49	0.48	0.48	0.47	0.46	0.43	
LEADING THIRD															LAGGING THIRD								

Items 1.1, 3.2, 7.1 and 2.2 are again, as they were under the previous criterion, identified as highly predictive and thereby especially important aspects of the AQA framework. In addition 6.2, 6.4 and 2.1 were found to be part of the leading third. At the other end, items 1.3, 6.2 and 4.4 are clearly and repeatedly confirmed as inferior predictors of KPI improvements. All items of category 4 People with the only exception of 4.6 are found to be part of the least powerful predictors of organisational performance. Surprisingly this list also includes items 3.1 Scope and Collection of data even though its partner items 3.2 was found highly predictive at the other extreme of this scale. One plausible explanation is that merely collecting data delivers no significant benefit at all in terms of KPI results improvement unless it is being effectively processed and used for decision making and planning purposes.

Table 34 below shows the result if the individual correlation coefficients of both criteria (i.e. KPI improvements and Overall AQA scores) are combined through multiplication. This compound measure is the ultimate indicator of importance as it combines both criteria and treats them as equally important. In the grey-marked fields those items are highlighted which were previously consistently found to belong to the top or bottom third values.

Concluding it can be said that Senior Executive Leadership (1.1), Analysis and Use of Data and Information (3.2), Measures of Success (7.1) and Planning Process (2.2) are found to be the most important items because of their outstanding association with both the overall AQA results as well as the KPI improvements. It is those items which seem to play a particularly critical role when

ultimately performance is sought regardless of whether in achieving an Award or in bottom-line improvements.

Table 34 Items and their Multiplied Correlation Coefficients (KPIs and AQA Score)

Items ranked by product of KPIxOverall AQA Correlation																					
Item	1.1	3.2	7.1	2.2	5.2	6.3	6.4	2.1	4.6	1.2	5.1	4.5	4.2	3.1	4.1	1.3	6.1	6.2	4.3	5.3	4.4
KPIxOverall	0.67	0.65	0.62	0.62	0.59	0.52	0.51	0.50	0.50	0.48	0.47	0.44	0.44	0.42	0.40	0.39	0.38	0.37	0.35	0.35	0.34
LEADING THIRD														LAGGING THIRD							

7.3.2 Commonly Neglected Management Subjects with Significant Potential

While certain items (i.e. management disciplines) have created a lot of interest and are relatively popular and commonly targeted for improvement, other items are traditionally underestimated and their full potential has never been recognised. The AQA framework’s content and its weighting has significant responsibility for setting the right emphasis or directions.

Leadership management practices are fully recognised as critical to an organisation’s success while Analysis and Use of data and information as well as Planning are commonly neglected subjects. The consistently poor evaluation scores achieved by most companies suggest that the current misbalance in these subjects could be responsible for some of the neglect.

Items with heavy planning content (2.2 & 4.1) belong to the group with the biggest improvement potential but also to the most important items in terms of their association with KPI and AQA results.

Items with heavy data analysis and performance measurement content (3.2 & 7.1 & 4.3 & 5.3) belong to the group with the biggest improvement potential but also to the most important items in terms of their association with KPI and AQA results.

The data of Table 34 can be put into context with the insights gained on certain items typically having a greater potential for improvement because of their being a particular weakness in most organisations. The total information regarding the importance of specific Items then becomes threefold:

- Aggregate AQA results (X-Axis),
- KPI Improvement (Y-Axis), and
- Improvement Opportunity (Diameter of bubble).

In this context the average score (as previously shown in Figure 38 Entire Population’s average scores) is mathematically transformed through the application of the following equation:

Eq 5 Average Item Score-Improvement Potential Transformation

$$Y'' = (1 - \overline{Y})^2 \text{ with } Y'' = \text{Typical Improvement Potential of a specific Item and}$$

$$\overline{Y} = \text{Average Score.}$$

‘Squaring’ amplifies the differences which results in more distinguished differences in its graphical visualisation

Figure 46 summarises the importance of specific principles based on the three above listed types of information. Any organisation could use this information to identify and prioritise their own improvement initiatives, which best suit their preferences in terms of preferred importance or benefit to be experienced.

IMPORTANCE OF SPECIFIC AQA ITEMS VS THEIR TYPICAL POTENTIAL FOR IMPROVEMENT

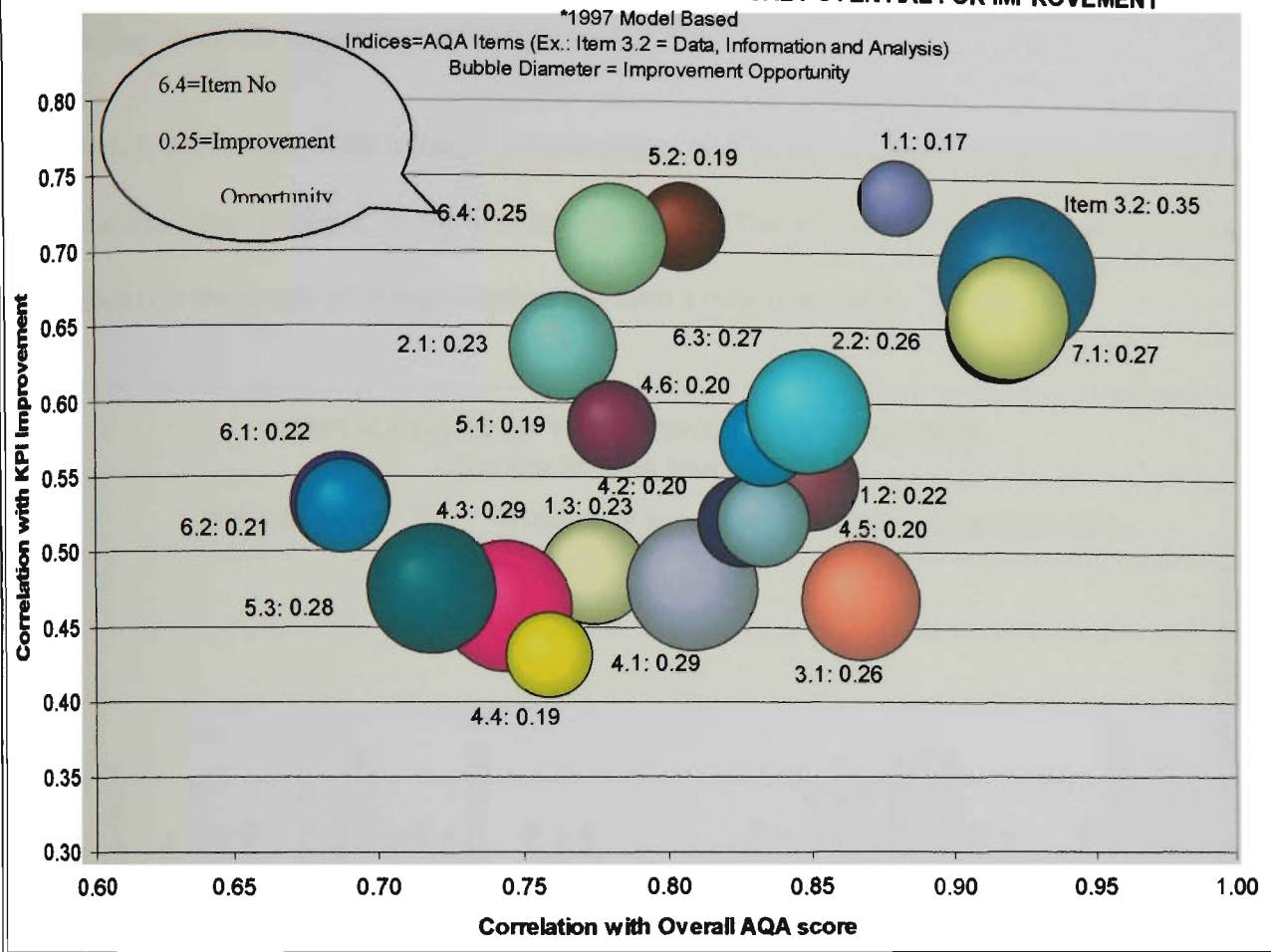


Figure 46 Highlighting Items by their Importance and Average Improvement Potential

Note: Different shades of grey (colours) have been used merely for the purpose of differentiation between different Items

7.4 Redesign of the ABEF Based on the Importance of its Criteria

The previous section has demonstrated that certain items can be identified by their outstanding association with KPI and overall AQA results. The importance of specific items and categories as in their relationship with bottomline results and the overall AQA assessment score is not reflected in the AQA framework's current weighting. A new weighting which gives appropriate recognition to the established relationship has been proposed (Chapter 6.2.5).

The AQA framework like all other national Quality Awards or Business Excellence Frameworks has never had a scientific rationale applied for the weighting of their categories and items. Instead

emphasis on certain aspects was put arbitrarily, based on political decisions or at best based on an agreed feeling about the importance of certain items.

An enhanced framework with stronger relationships and more emphasis to Items of outstanding importance has been designed in the previous Chapter. The following chart illustrates the specific implications (i.e. the scope of change required) of such a new framework.



Figure 47 Highlighting the proposed changes to the AQA framework at item level

Figure 48 highlights the required changes at Category level. As one can see they are significant but not extreme.

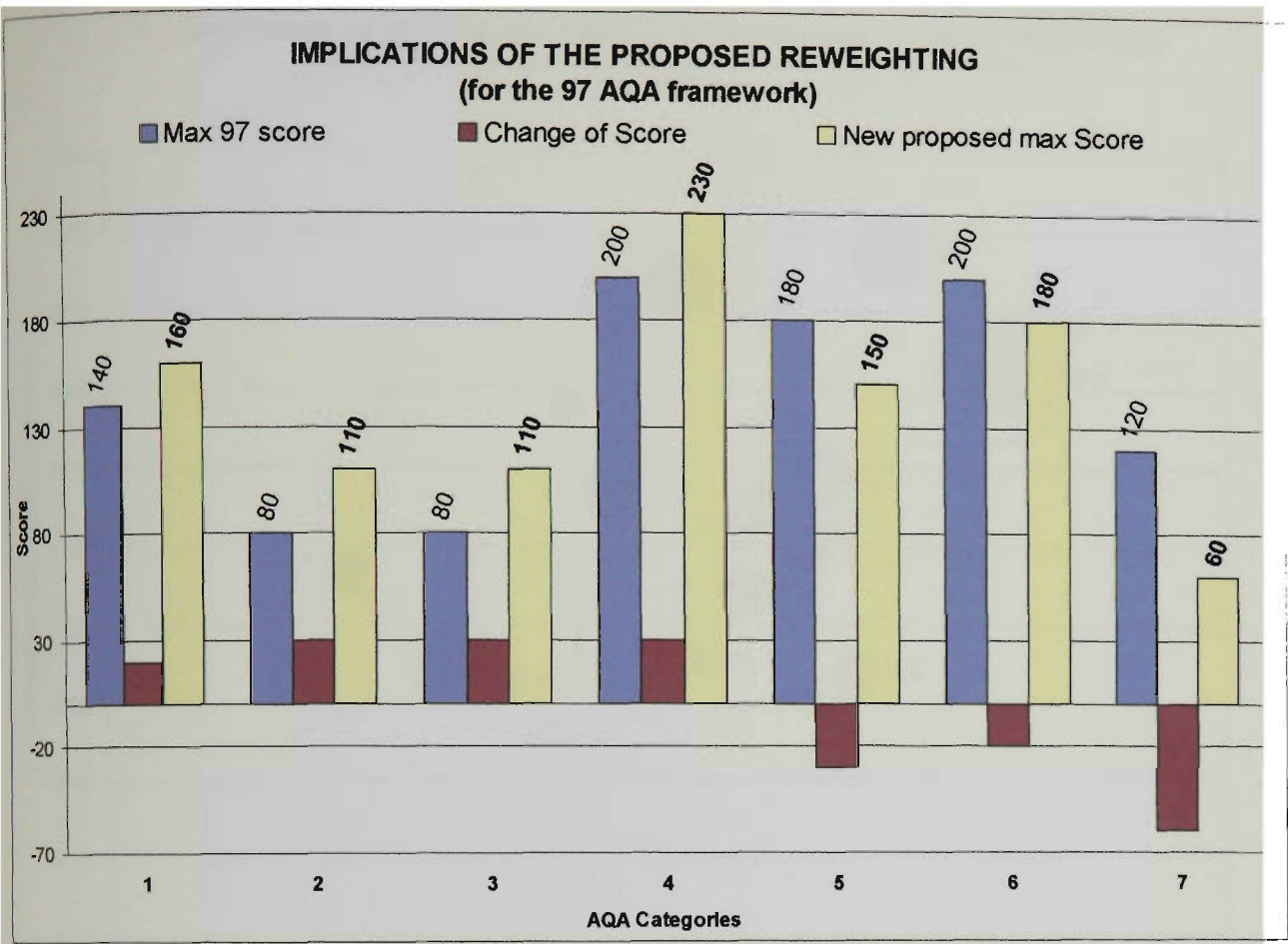


Figure 48 Highlighting the proposed changes to the AQA framework at category level

This study’s findings (i.e. 7.2 Criteria-Specific Results) provided an ideal basis for a review and the proposition of a redesign of the framework’s weighting based on the rationale of empirical research findings. The bubble chart below (Figure 49) shows the official weighting of the criteria (the bubble width is proportional to the weighting in points) put in context with the newly gained information about the importance of individual items based on an assessment against two criteria, the association with the overall AQA score on the horizontal axis and the relationship with annual KPI improvements on the vertical axis.

This chart visualises inconsistencies revealed by some bubbles having a relatively large size (i.e. high weighting) but being relatively close to the origin of the coordinate system (e.g. 5.3) and vice versa (e.g. 1.1). These misalignments highlight the need for a redesign of the weighting structure of the AQA framework.

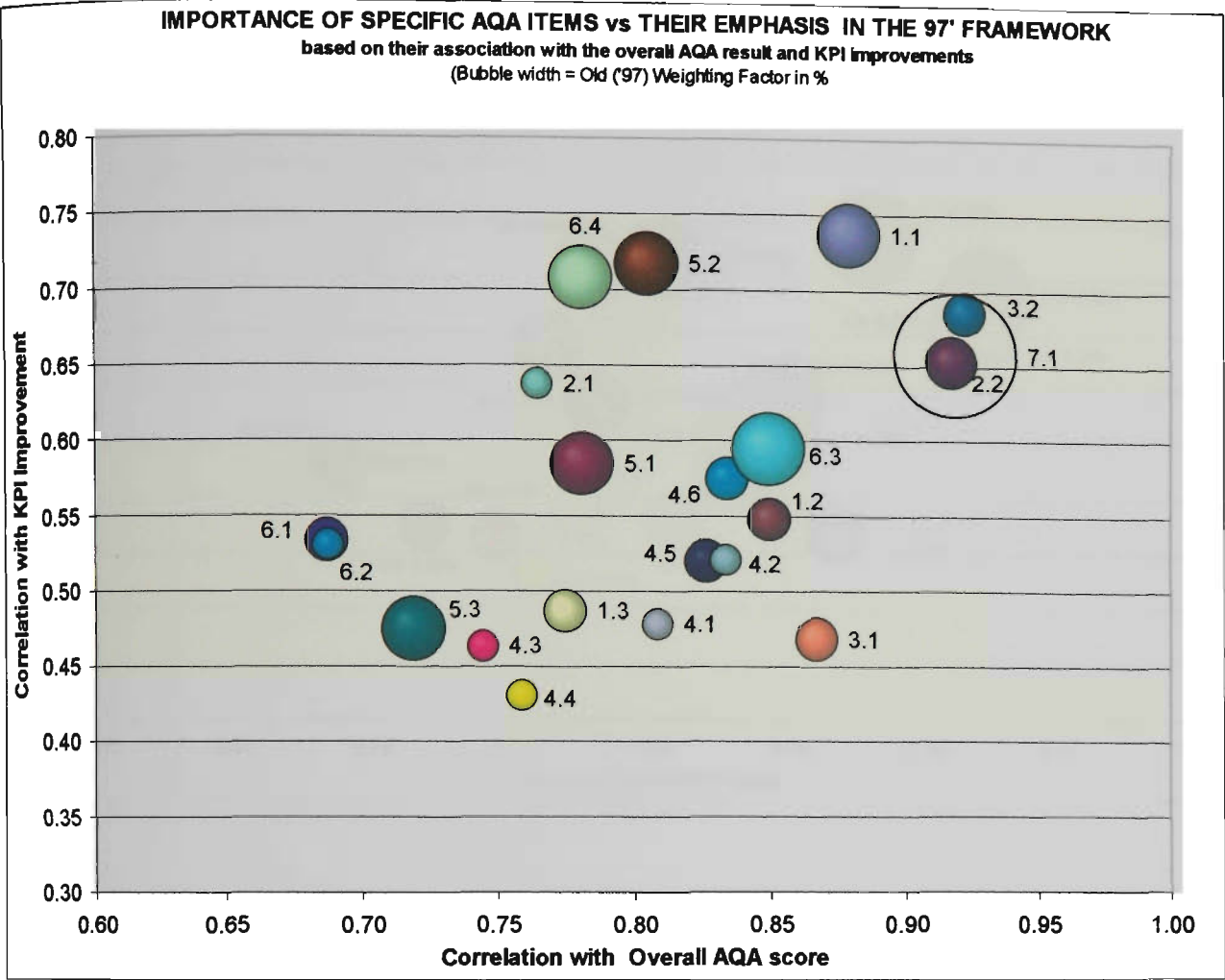


Figure 49 Inconsistencies of the weighting structure of the 1997 framework

The effects of a new framework which directly reflects the Items' importance can be realised in Figure 50 when comparing to Figure 49. Figure 50 below clearly shows the overall effect of the redesign which leads to a framework in which the actual size of items is directly aligned and consistent with their items actual importance.

THE IMPORTANCE OF SPECIFIC AQA ITEMS
based on their association with the overall AQA result and KPI improvements
(Bubble width = Proposed Weighting Factor in % (KPI x AQA))

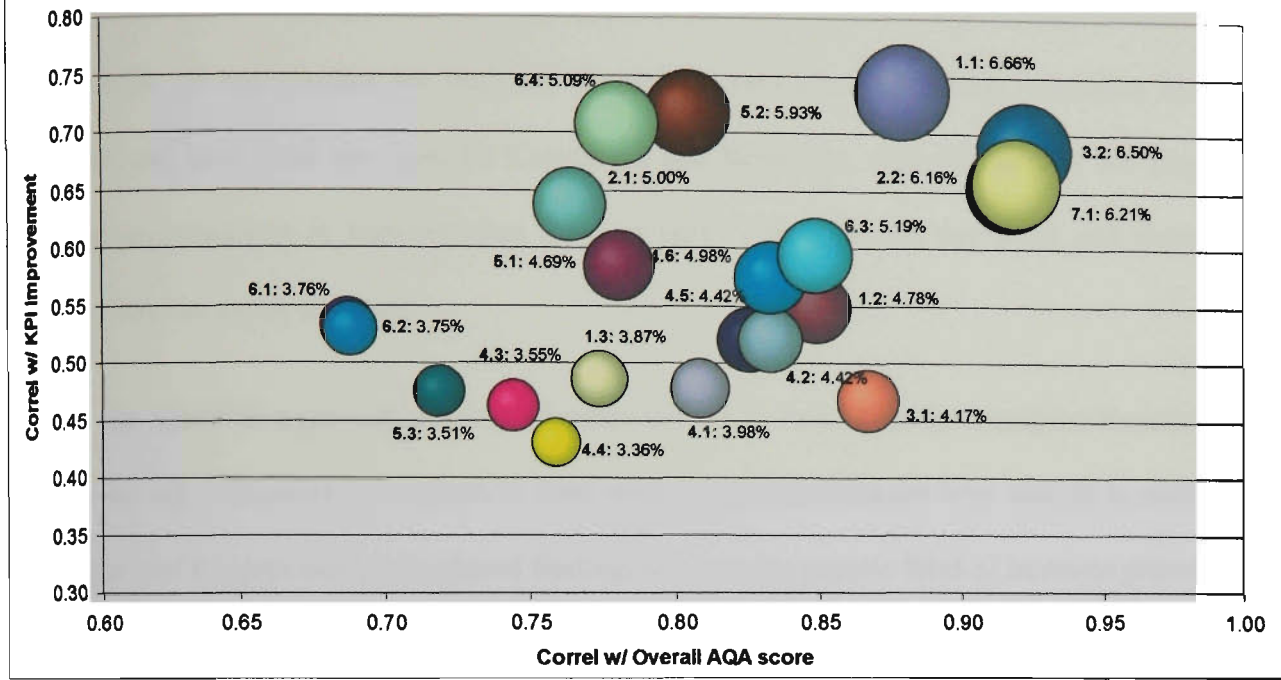


Figure 50 Inconsistency-free new weighting structure

One could argue that the current weighting of individual items was largely based on the perception of an expert team (i.e. AQC framework development panel) and has no scientific reasoning underpinning it. Concluding, and to the credit of the current framework, it appears that the significant experience and knowledge of members of the panel has built a rationale which should not be underestimated. It is in fact observed that some items with a particularly strong emphasis in the current weighting were also identified as key items when investigated in a more scientific manner (i.e. items of outstanding importance when correlated with KPIs and overall AQA results)

7.5 Implications at International Level

7.5.1 Other Business Excellence Models

Globally, there are now some 66 countries that have adopted such frameworks and associated Awards processes indicating an increasing global interest and commitment to adopting ‘National Excellence Frameworks’. The Australian model (i.e. ABEF) with its own individual design, and used for the

basis of this research, is only one of them. This inevitably has some limiting consequences in terms of the relevance of the findings of this study to other National Awards around the globe. There is however one factor which provides a link between all frameworks. The management principles around which all frameworks are built are essentially very similar. These principles have been interpreted and translated into specific Categories and Items (i.e. criteria), so that the progress of individual organisations in implementing them as part of their day to day work and management practices could be easily assessed.

Linking the ABEF to a globally relevant framework of 10 Principles for Business Excellence

The fact that all frameworks in respect to their underlying principles are very similar is used here to convert some of the previously introduced findings to the more generic level of business principles.

Table 35 identifies those elements of the AQA framework which are clearly linked to the specific Business Management Principles 1-10. For example, Principle 1 (Senior Leaders as role models) is essentially represented through the content of AQA Item 1.1. (Senior Executive Leadership) and Item 2.1 Integration of Values.

Table 35 Business Management Principles vs. AQA Items

10 PRINCIPLES FOR BUSINESS EXCELLENCE	AQA EQUIVALENT
1. Senior Leaders as Role Models The senior leadership's constant role modelling of these principles and creation of a supportive environment are necessary to achieve the organisation's potential.	Senior executive leadership 1.1, Integration of values 2.1
2. Focus on Achievement of Goals Clear direction allows organisational alignment and a focus on achievement of goals. Mutually agreed plans translate organisational direction into action.	The planning process 2.2, Human resource management planning 4.1, Performance management 4.3
3. Customer Perception of Values Customer perception of value drives all aspects of the organisation.	Knowledge of customers' needs & expectations 5.1, Customer relationship management 5.2, Customer satisfaction 5.3, Measures of success 7.1
4. To improve the Outcome, Improve the System In order to improve the outcome; improve the system and its associated processes. All people work in a system: outcomes are improved when people work on improving the system.	Performance management 4.3, Well-being and satisfaction 4.5, Supplier relationships 6.2, Management & improvement of processes 6.3
5. Improved Decisions Effective use of facts, data and knowledge leads to improved decisions.	Scope and collection of data 3.1, Analysis and use of data and information 3.2

continued...

<p>6. Variability</p> <p>All systems and processes exhibit variability, which impacts on predicability and performance.</p>	<p>Analysis and use of data and information 3.2,</p> <p>Quality of products and services 6.4</p>
<p>7. Enthusiastic People</p> <p>Potential of an organisation is realised through its people's enthusiasm, resourcefulness and participation.</p>	<p>Leadership throughout the organisation 1.2,</p> <p>Employee involvement 4.2,</p> <p>Well-being and satisfaction 4.6</p>
<p>8. Learning, Innovation & Knowledge</p> <p>Continual improvement and innovation depends on continual learning.</p>	<p>Education and training 4.4,</p> <p>Design and innovation 6.1</p>
<p>9. Corporate Citizenship</p> <p>The organisation's action to ensure a clean, safe, fair and prosperous society enhances the perception of its value to the community.</p>	<p>Leadership in the community 1.3</p>
<p>10. Value for All Stakeholders</p> <p>Sustainability is determined by an organisation's ability to create and deliver value for all stakeholders.</p>	<p>Senior executive leadership 1.1,</p> <p>Measures of success 7.1</p>

Figure 51 provides a more schematic overview of the relations between principles and AQA elements.

<div>Principles</div> <div>AQA Items</div>	1 Senior Leaders as Role Models		3 Customer Perception of Values		5 Improved Decisions		7 Enthusiastic People		9 Corporate Citizenship	
	2 Focus on Achievement of Goals		4 To improve the Outcome, Improve the System		6 Variability		8 Learning, Innovation & Knowledge		10 Value for All Stakeholders	
Senior executive leadership 1.1	1.1									1.1
Leadership throughout the organisation 1.2							1.2			
Leadership in the community 1.3									1.3	
Integration of values 2.1	2.1									
The planning process 2.2		2.2								
Scope and collection of 3.1					3.1					
Analysis and use of data and information 3.2					3.2	3.2				
Human resource management planning 4.1		4.1								
Employee involvement 4.2							4.2			
Performance management 4.3		4.3		4.3						
Education and training 4.4							4.4			
Communication 4.5				4.5						
Well-being and satisfaction 4.6							4.6			
Knowledge of customer needs and expectation 5.1			5.1							
Customer relationship management 5.2			5.2							
Customer satisfaction 5.3			5.3							
Design and innovation 6.1							6.1			
Supplier relationships 6.2				6.2						
Management and improvement of processes 6.3				6.3						
Quality of products and services 6.4				6.4		6.4				
Measures of success 7.1			7.1							7.1

Figure 51 A Conversion Matrix of Management Principles

This matrix is used not only to define the content of the Principles for Business Excellence with the aid of AQA Items, but also to convert evaluation scores from an AQA Item level to a Business Principle level. In the example of Principle 1, the corresponding score would be the sum of scores in Items 1.1. and 2.1. This procedure provides a bridge to other National Business Excellence models which makes the research findings internationally relevant and applicable.

Figure 52 shows the effectiveness of this conversion as it compares the overall results of the new 10-Principle based framework with the aggregate score of the same organisations' AQA evaluation results. As can be seen by the coefficient of determination $R^2=0.99$, both results are practically identical as 99% of the variation in the AQA scores can be explained with the variation in scores against the principles. It essentially means that the overall effectiveness of an organisation is equally well-described with either framework. The points shown are the scores of individual companies when assessed against the 10-Principle Framework (X-Axis coordinate) in comparison to the result against the AQA framework. The regression line fits exactly through the middle of the coordination system at 45 degree (i.e. bisector of the angle). The relationship found suggests that any value for the independent variable X leads to the same value for Y. For example a 50% achievement if evaluated against the 21 AQA items is still likely to be a 50% score when scored against the 10-Principles. This observation serves as a satisfactory validation of the conversion process, which takes specifically selected AQA Item scores and transforms them into the more generic 10 Business Excellence Principle scores.

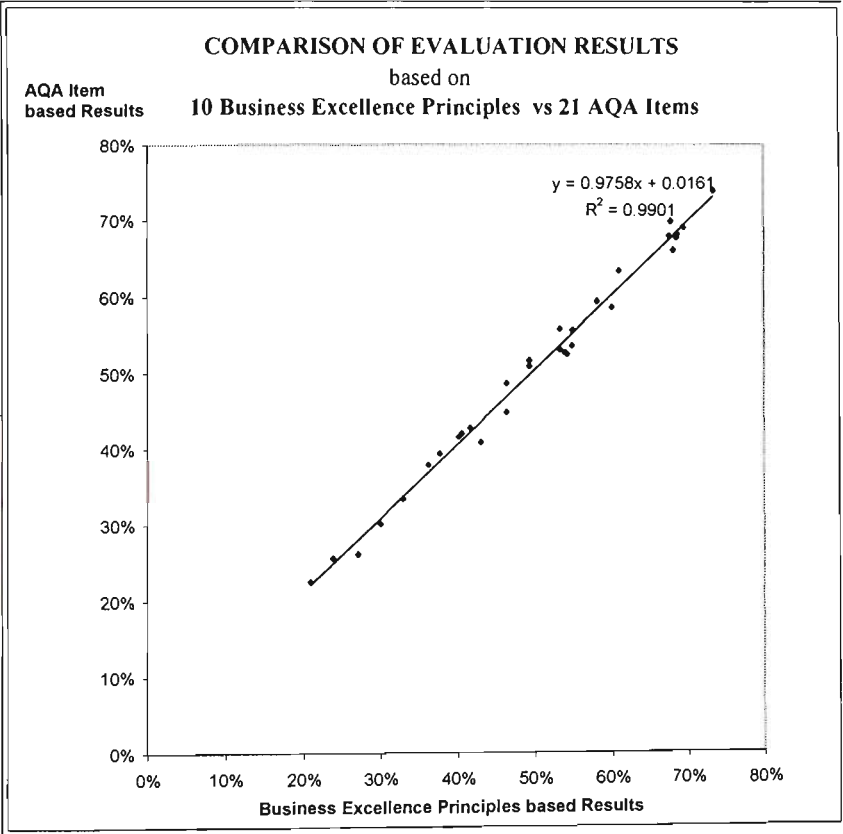


Figure 52 Converted scores plot

In order to assess the importance of specific Business Principles three types of information are consolidated:

- association with the aggregate score against all Business Excellence Principles: X-Axis
- association with average improvements of an organisation's business results: Y-Axis, and

• typical improvement potential of individual Business Excellence Principles based on average scores (see Figure 53).

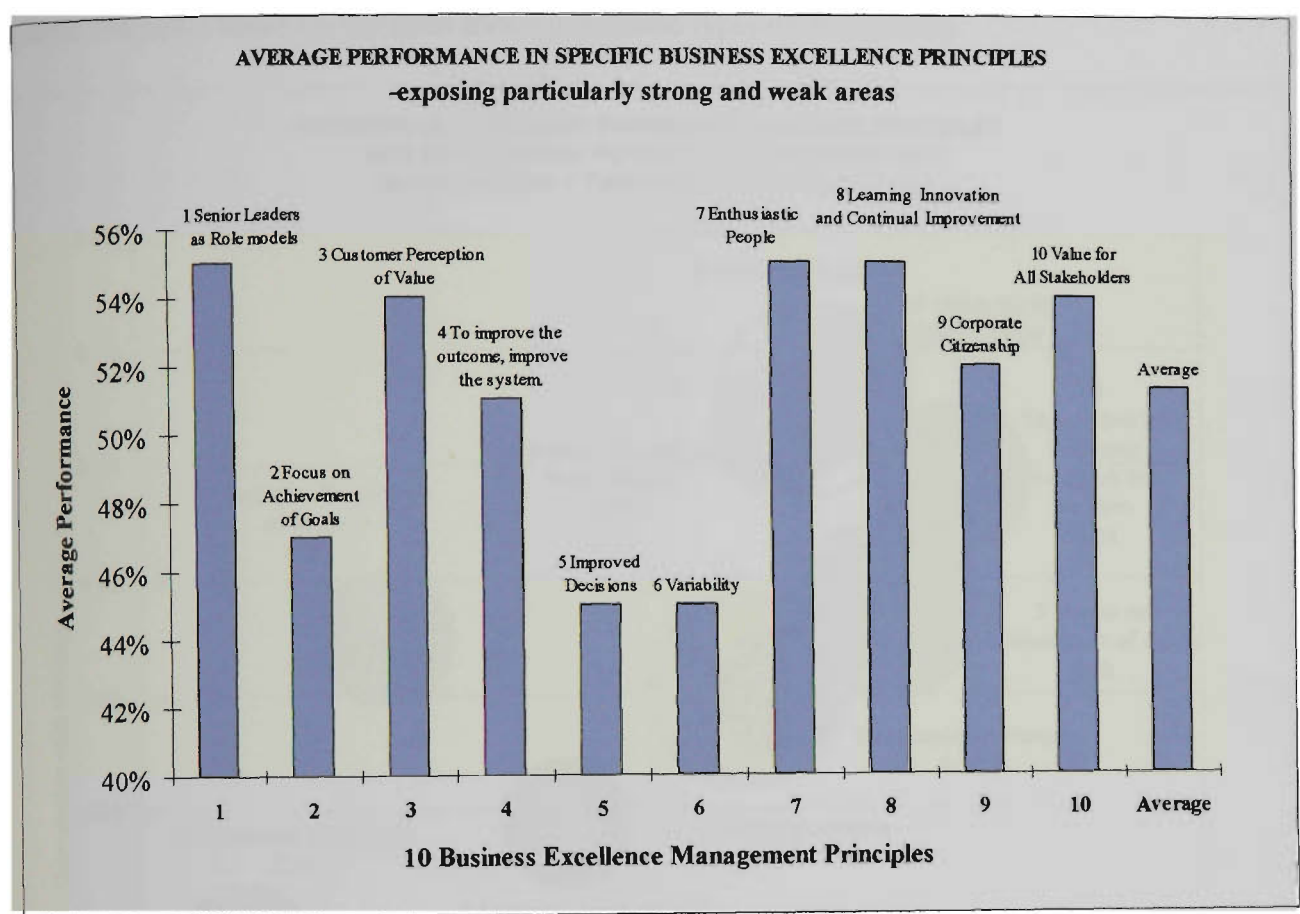


Figure 53 Average Strength of Management Principles

In analogy to Figure 38 Entire Population’s average scores’, the above graph identifies the improvement potential of specific Principles based on the average scores of the underlying AQA Items. A relatively low average score (e.g. Principle 6 Variability) is seen as an area for particularly high improvement potential. In analogy to Eq 5, the average score is mathematically transformed through:

Eq 6 Improvement Opportunity of Principles Transformation

$$Y''' = (1 - \bar{Y})^2 \text{ with } Y''' = \text{Typical Improvement Potential of a specific Principle}$$

and \bar{Y} = Average Scores of the Items underlying to the Principle.

In analogy to the main findings of the previous chapter (shown in Figure 46) the investigations on Business Excellence Principles are concluded in Figure 54 which summarises the importance of specific Principles based on the three above-mentioned types of information.

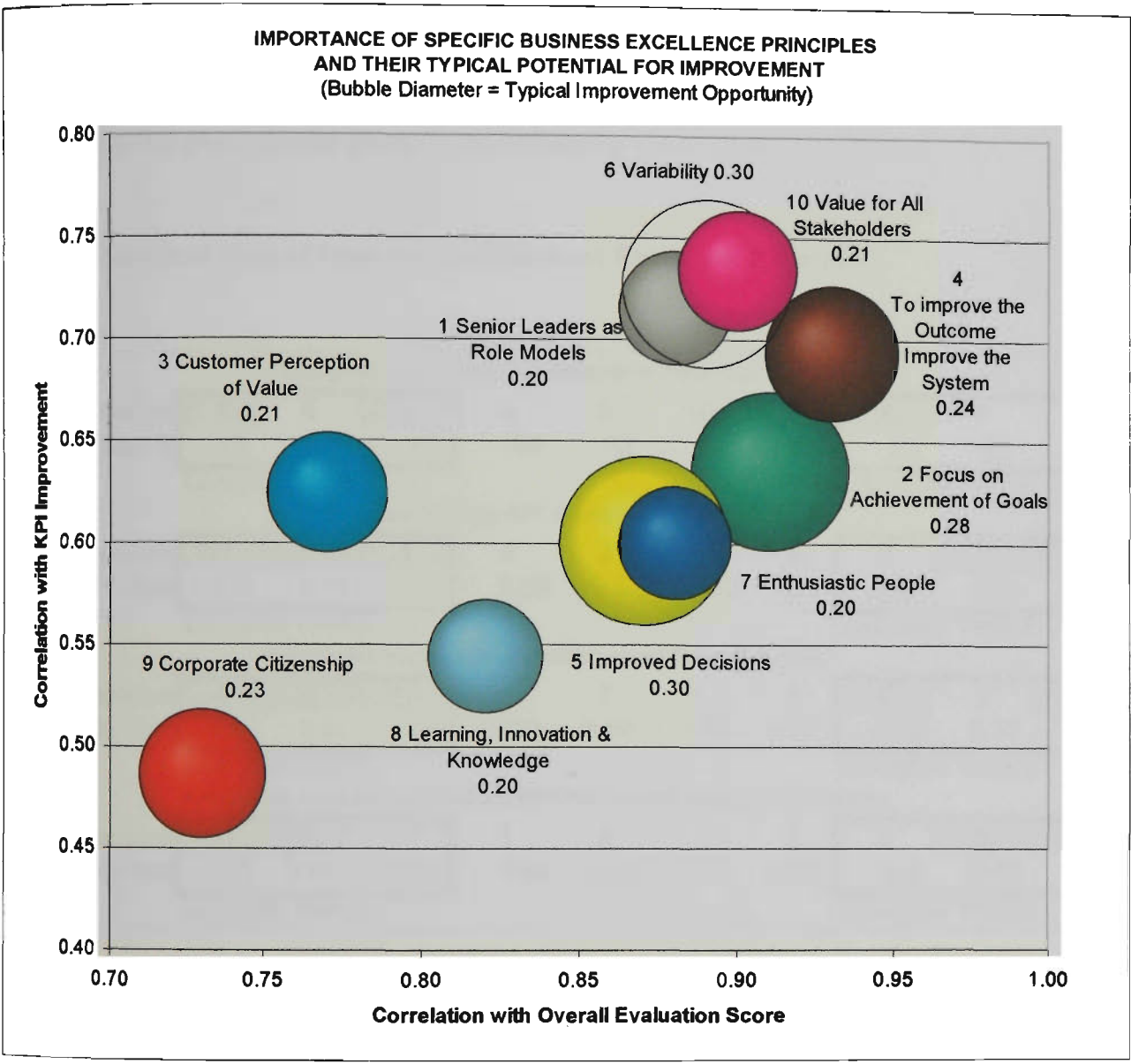


Figure 54 Chart of Importance of Business Excellence Principles

Interpretation of results

Interpretation of this chart is straightforward as the graph clearly identifies those Principles which are clustered in the top right corner to be of outstanding importance when compared with the remaining ones in the middle field. In particular Principle 10 (Value for all stakeholders), Principle 6 (Variability) and Principle 4 (To improve the outcome improve the system) seem to deserve special

attention, with Principle 6 having the largest typical improvement potential, closely followed by Principle 5 (Improved Decisions) and 2 (Focus on Achievement of Goals).

Table 36 presents the sorted and quantitative data used to produce the above-shown summary graph (Figure 54). The first of the four sections refers to the average evaluation results and highlights the potential for improvement based on these average scores. Generally speaking the weaker the average scores of specific principles the greater is the underlying improvement potential.

Table 36 Tabulated Data of Importance of Business Excellence Principles'

Principles ranked by Improvement Potential										
Principles	6	5	2	4	9	10	3	8	7	1
Average %	45	45	47	51	52	54	54	55	55	55
LEADING THREE			LAGGING THREE							
Principles ranked by KPI Correlation										
Principles	10	6	1	4	2	3	5	7	8	9
KPI Correl	0.73	0.73	0.72	0.69	0.64	0.62	0.60	0.60	0.54	0.49
LEADING THREE			LAGGING THREE							
Principles ranked by Correlation w/ Overall Result										
Principles	4	2	10	6	7	1	5	8	3	9
AQA Corr	0.93	0.91	0.90	0.89	0.88	0.88	0.87	0.82	0.77	0.73
LEADING THREE			LAGGING THREE							
Principles ranked by product of KPIxOverall Result Correlation										
Principles	10	6	4	1	2	7	5	3	8	9
KPIxOverall	0.66	0.65	0.64	0.63	0.58	0.53	0.52	0.48	0.45	0.36
LEADING THREE			LAGGING THREE							

It is important to realise that all these findings have been produced based on the current understanding and design of management aspects which on the one hand permit conclusions which are rightfully discriminating between certain principles, but on the other hand may also give rise to the possibility that a specific concept has not yet been effectively grasped and incorporated (e.g. into the AQA framework's design) to make it a powerful stand-alone item. In other words, rather than merely to drop or ignore the less important principles, one might be better advised to work on this particular concept's development and conceptual strengthening.

This information is relevant to both designers and users of other National Business Excellence Frameworks as it offers the possibility of a convenient re-conversion process which will make this

study's AQA framework specific findings directly applicable to their own individual model. This could then lead to interesting findings for emphasising and developing specific Business Principles or Framework Items as well as for prioritising improvement opportunities based on their associated improvement potential.

7.6 Theoretical Consequences

7.6.1 Proposal of Additions to Contemporary Theory of Quality Management

This research has produced findings representing significant contributions to modern Management theory. Specifically the empirically validated part of this research leads to the following three distinct propositions:

- A. Advancements in the implementation of Quality Management are clearly linked to important Business Results, including financial performance.
- B. The theory of Quality Management consists of specific areas (i.e. management aspects) with variable criticality when assessed for its effect or capitalising on managerial advancements against a Quality-Management-based Framework for Business Excellence.
- C. The decision as to which framework (i.e. national model) to choose when aiming for systematic business improvement may be of secondary importance, provided that it adequately reflects all ten Principles of Business Excellence.

Brief assessment of the proposed additions to Quality Management theory

The following requirements on building a theory by Hemphill and Oppenheim (1948) and by Kaplan (1964) have been brought to the author's attention by the Wider Quality Movement, where the attempt was made to establish a theory of Quality Management (Foley 1997).

Kaplan defines theory as a set of statements about how certain concepts or constructs are interrelated, based on which propositions or hypotheses are made which predict the occurrence of events or

explain why certain events have already occurred (Kaplan 1964). He also suggests assessing a theory and its propositions against the following four criteria.

Correspondence: *To which extent does the theory fit to the facts or how accurate are predictions when compared with actual events.*

Coherence: *Refers to the degree of logic inherent to the theory and how well it guides the drawing of conclusions.*

Parsimony: *Requires a theory to be built on the lowest possible level of complexity and number of assumptions.*

Pragmatism: *A theory should be capable of being tested through new research.*

Furthermore Hemphill and Oppenheim argue that four additional criteria should be met before a theory can be accepted as ‘adequate’ (Hemphill and Oppenheim 1948):

- The theory is logically deducible from the tested assumptions.
- The assumptions must contain relationships which are empirically tested and accepted.
- At least one of their propositions must be empirically testable.
- The evidence found by such testing must clearly support the proposition.

Table 37 provides an overview of the assessment of propositions A-C against these criteria. Concluding it can be said that the assumptions underlying these propositions are viable, with reasonable prospects for consideration in future reviews of the theoretical body of knowledge of Quality Management and the subsequent identification of top research issues.

Table 37 Assessment of New Quality Management Theory

CRITERION	PROPOSITION A <i>Quality Management can be linked to Business Results</i>	PROPOSITION B <i>Specific management aspects have variable effectiveness in terms of enhancing an organisation's fitness.</i>	PROPOSITION C <i>The decision which framework to use is of secondary importance provided all main principles are reflected.</i>
• Correspondence:	The main correlations established have a coefficient of determination $R^2=0.50-0.65$ at a significance level of 0.01. The corresponding accuracy of predictions is therefore between 60-65%. This relatively high level significantly depends on the ability to filter out noise in the observations made.	About half of the investigated Items or principles were found to correlate extremely strongly with the overall organisation's managerial effectiveness while the other half is still strongly positive and significantly correlated but plays a noticeably less critical role. The range of correlation found depending on the management aspect and the type of variable concerned (KPI results or aggregate framework score) ranges between ($R=0.43$ and 0.93) at a confidence interval of 99%.	The matrix-transformation of AQA scores into a 10-Principle based framework and the comparison of the results obtained revealed a 'near to perfect' relationship with a $R^2=0.99$. All principal findings regarding relationships found can be maintained or transformed for other frameworks, which are based on the same 10 Principles.
• Coherence:	All of the above-established propositions are coherent reasoning and are deducted from basic assumptions of Quality Management and its benefit.		
• Parsimony:	Unnecessary complexity is avoided through the exclusion of any additional dimensions other than the generally beneficial effect of Quality Management and its underlying principles.		
• Pragmatism:	Propositions A, B and C can be further tested through empirical research beyond the scope of this study. This specifically refers to inclusion of service industry, larger samples and use of other frameworks.		
Theory is deducible from the tested assumptions.	The acceptance of Hypothesis 1 about the implication of higher aggregate Award scores, is where preposition A has been deduced.	The acceptance of Hypothesis 3 and 4 regarding the importance of specific AQA Items and their relationships is where preposition B has been deduced.	The recognition about the insignificance of the difference as to whether the AQA framework or a 10-Principle based framework is used to describe an overall organisation's effectiveness is where preposition C has been deduced.
Assumptions contain relationships which are empirically tested.	The relationship between AQA scores as an indicator for Quality Management implementation and annual average KPI improvements for Business Results has been tested.	Relationships have been established between specific AQA Items or Management Principles and overall results in terms of both their association with the overall organisation's level of managerial effectiveness (aggregate AQA score), and with their overall improvements of business results (KPIs).	The relationship between aggregate AQA framework scores and scores calculated for a framework of 10 Management Principles of Excellence has been proven to make no overall difference for either approach.
Propositions must be empirically testable.	The evidence found during the conduct of this study led to the formulation of these three prepositions which can only be considered as finally proven by the conduct of a study with significantly larger scope and incorporation of other industries.		
Evidence found must clearly support the proposition of theory.			

7.6.1.1 Recommendations for Future Research

Concerning the methodologies used, this study shows that the challenging task of identifying bottom line impacts can only be mastered effectively with a study methodology which goes beyond the normal 'purely quantitative' approach, in which numerical data is anonymously collected and then processed. An in-depth understanding of every participant's individual business environment turned out to be critical to the success of this research. The quality of the methodology is largely determined by the ability to filter noise and to recognise trends. Increasing the sample size, a common strategy used in an attempt to generate more reliable results may not deliver key benefits at all. In fact it would be highly questionable if qualitative studies were conducted to the same depth if the sample size were much greater. A larger quantity of data would also inhibit greater noise and variation caused by more extraneous variables and therefore not necessarily result in terms of better findings.

The combined approach used in this study of hybrid research (quantitative and qualitative) proved to be the right choice. Studying the effects of various alternative and optional analysis techniques led to interesting learning experiences, all of which highlighted the importance of every little, even seemingly insignificant, factor. A number of analysis techniques have been identified to be marginally conducive to the overall strength and clarity of findings. It is there individually small effect that when combined makes a significant difference. It is this uncompromising pursuit of rigour in this approach, plus other conceptual design factors implemented to specifically address shortcomings of previous similar studies (Hausner & Arndt 1999), which make this study unique and which implies valuable learning for future conduct of research.

Suggested areas for future research

In recognition of this study's limitation and areas which remains largely unexplored, the author makes the following suggestions for fellow researchers to identify and research these problems:

There is significant potential for original research through replica studies in other settings, specifically:

- Non-manufacturing private service industries (e.g. Hospitality, Tourism, Legal Consulting)
- Public sector industry specific studies (e.g. Health, Education or Defence)
- Other National Awards Frameworks (e.g. EFQM, MBNQA)

Research in these areas could lead to significant learning about the ability to generalise this study's findings to other industries and to apply the new theories there.

The author also suggests studies which target relationships with more specific performance aspects or dimensions (e.g. sustainability of success). To underpin this study's general findings, it would be highly desirable to develop methodologies which are capable of studying the causal nature of the here-established links. This area is probably not only the most challenging but also the one with the greatest potential for practice relevant insights into the mechanism which connect management strategies and business performance.

7.7 Practical Consequences for Management Practice

This research has produced findings with significant relevance for management practitioners of Australia's manufacturing industry and beyond. This section highlights the significance of some of the findings which are important to business management practitioners.

7.7.1 The Proof that 'Quality Management Works'

We all know instinctively that improving quality and other service and product dimensions through implementing Quality Management has to be good for a business. But why should shareholders be interested in, or believe in, our instincts? Why should the board continue to invest time and effort in something that up until now could not be clearly linked to the all-important cash flow and profitability? This research provides the answer to these questions as it has identified a strong and positive association between advancements in Quality Management and business success measures including profitability. Whilst several other studies have come up with tentative results along the same lines, the solid backbone of this study in terms of a comprehensive collection of hard factual

business performance data is likely to be much more convincing in the lean business environments of today.

7.7.2 Prioritisation of Improvement Opportunities based on their Importance

Most managers at any time would have no difficulty in listing maybe 100 or even more improvement ideas. Instead of merely listing some key strengths and opportunities, the Awards process takes a systems view and provides specific feedback on the potential achievement of an applicant. Such a view does not favour improvements of an entity through the arbitrary addressing of individual problems, but promotes a more holistic and sophisticated approach. It normally always requires such a systematic pursuit of improvement opportunities to realise the full benefit of organisational enhancements. If done properly, such enhancements may indeed lead to synergy effects in which the total benefit of individual improvement effects is greater than the sum of them.

This study revealed relationships between specific management concepts (i.e. AQA Items or principles) and results which if understood properly and put into context with an organisation's own performance structure can provide an ideal basis or rationale for deciding which problems to tackle first. This is valuable information which if synthesised can add a solid strategy to the prioritisation of improvement opportunities as opposed to a more simple and traditional quality tool such as for example a Pareto chart.

7.7.3 The ABEF Success Diagnostic Instrument

Many companies are already measuring some isolated elements of Quality in a non-methodical way (appraisal and performance related pay schemes, satisfaction of shareholders, vendors and customers). However, there are usually no integrated and holistic measurement systems in place to measure the success of a Quality Management program. The performance diagnosis instrument (Table 30) can be a useful tool for setting target achievements, monitoring progress and for benchmarking the final outcome of an ABEF based improvement program.

7.7.4 The Value of the New Business Success Explanation Model

The author's business success explanation model provides an understanding of the basic mechanisms and factors by which bottom-line results are affected. It emerged that the organisational fitness in terms of its managerial capabilities (i.e. AQA score) is the best predictor of business success, far superior to those external factors (e.g. rivalry) for which management can or does not want to be held responsible. Continuous enhancement of this capability may therefore be a well chosen target of which one is best advised to never lose sight, not even during the busiest and most stressful periods which is usually when this capability is needed most.

“Although a model will greatly improve visibility of things that add to, and take from, the bottom line, it will not mean instant success for companies using it, just as Quality Management does not guarantee success. The model is just another element of the TQM learning process that managers need to get to grips with. But if it can help convince the board that Quality Management is not just a nice idea, if it can help convince stakeholders that Quality Management is good for the business, and hence for them, and if it can boost staff motivation to continue the improvement effort by adding a clear sense of purpose and direction, then who would argue against it ? (Williams, M, 1993)

7.8 A Note on the Identification of Best Management Practices

Background and use of the Best Practice study

In Appendix 11.1 the management practices of a number of particularly successful organisations are presented. “Successful” means that they achieved recognition for outstanding performance through the Australian Quality Awards evaluation process. The themes and management practices that are common to these organisations were identified and catalogued. This data was then validated, strengthened and enriched with details obtained through sample on-site visits and interviews conducted with senior management. Some of the issues covered during the interviews are how they, as an individual organisation, are implementing the practices while ensuring their effectiveness. Other aspects discussed were how management applies its beliefs to the organisation and what constitutes its particular value.

Furthermore, it gives advice on how to achieve the ideals and elaborates on the suitability of these practices for organisations who focus on individual strategies in order to suit their particular environments. The findings should provide practical guidance to organisations seeking assistance in the implementation of Best Practice business management. Furthermore, they should also support the AQC’s continuous efforts to ensure that its criteria always reflect current Best Practice.

Discussion of the Best Practice research findings

The findings presented in Appendix 11.1 are fairly straightforward and do not require much interpretation as they are simply common sense applied to management. This becomes particularly obvious when compared to this summary of Deming's principles which were first published several decades ago (Deming 1986):

- The management's understanding of, and commitment to, the new approach are essential for its success.
- It is important to create constancy of purpose, and consistency in pursuing that purpose.
- It takes commitment to knowledge and learning throughout the organisation plus sufficient resources to back it up.
- Barriers in communication between departments need to be broken down.
- Fear needs to be replaced by trust.
- People must be given opportunity to develop pride in what they do.
- Leaders must demonstrate by example.

The fact that they are still as valid today as they were a long time ago suggests that the key challenge remains to make their application more common.

Organisations which are committed to these principles have proven to be successful not only in their achievements in using the AQC framework but also and more importantly in bottom-line business results (Hausner 1998). That is why it is strongly recommended to consider an approach similar to that which is introduced as Best Management Practices in Appendix 11.1. Ideally though an organisation embarking on a Best Practice program should recognize the fact that nothing stands still, and that it takes genuine commitment and integrity by senior management as well as more creativity than merely copying others to advance on the journey towards business excellence.

8 CONCLUSIONS⁴

8.1 Empirical Evidence Links Business Success with the ABEF

This study has found a very strong and positive correlation between results of ABEF evaluation and bottomline performance indicators. The strength of the results found are very encouraging to those organisations already using the Framework for self-assessment, or for the purpose of seeking external recognition through an Award, and to those contemplating the use of it. The established relationships, as reflected in the Business Success Prediction Model, are suitable for surprisingly accurate predictions of business outcomes. Organisations are invited to attempt reproducing those numbers or benchmark themselves against them, but should be aware of the techniques with which these results were produced and the limitations inherent in them.

While this research outcome was specifically gained from Australian manufacturers using the Australian Business Excellence Framework (ABEF) the author believes that similar results could be obtained for the service industry or for other similar national frameworks. Given that today some 66 countries have adopted such frameworks and that thousands of organisations are committing significant resources, these independently researched findings can have major international implications.

8.2 Role of Other External Factors in Explaining Business Success

A number of factors of the overall business environment in which an organisation operates have been investigated for their role in explaining business success. The model distinguishes between ‘Special Event Factors’ (e.g. company mergers, catastrophes or major shifts in processes, products and markets) and ‘Industry Characteristics’ (i.e. the degree of rivalry, the existence of entry barriers and agility). This research shows that indeed the evidence of rivalry or entry barriers to the market when studied in isolation of other factors are significantly correlated with the level of accomplishment in

⁴ Please note that a one-page ‘Executive Summary’ is presented on page i at the front of this report. This summary identifies very briefly the methodology used and the main results obtained.

business results. These factors over which most individual firms usually have little or no control may put some organisations in lucky or unfortunate positions. However organisations will be better positioned for sustainable success if they are striving for return based on their managerial capability rather than merely exploiting their market position. It is therefore not surprising to learn that when those ‘industry characteristics’ are being studied in context with their organisational effectiveness assessment results against the Framework are the by far the most powerful predictor of business success when compared to the often-overestimated industry characteristics. In fact multiple regression analysis in this study has shown that an AQA evaluation score literally overrides the power of industry characteristics to determine bottomline results.

The author’s Business Success Explanation model highlights the necessity for an organisation to focus on what is within their circle of impact: to effectively transform opportunities into business. It is this ability, which is largely determined by their organisational effectiveness or fitness, which in turn is very well captured through the ABEF, that can provide an organisation with the edge it desires.

Assessment against the Business Excellence Framework provides a reliable and unbiased vehicle for evaluation of an organisation’s true fitness or effectiveness which does not require much adjustment or modification compared to traditional accounting systems⁵. This recognition may give rise to the idea of what should be tomorrow’s evaluation tool. It seems it has some substantial advantages when compared to those currently used (or more often misused). Why not use Awards evaluation results as

⁵ In this context a word of cautioning may be appropriate with the interpretation of the increasingly ‘quick-fix’ or short cut survey approaches which are due to their nature nowhere near as reliable as an evaluation through an independent, accredited team of evaluators. In fact it is the whole evaluation process which makes the findings (i.e. evaluation score) as meaningful as this research study found them to be.

an instrument for business owners learning about viability, investors determining prosperity or banks deciding on creditworthiness.⁶

8.3 Completion of the ‘Big Picture’ Business Model and Algorithm

Figure 55 shows the author’s previously introduced model (Figure 15) with the additional information that an ABEF evaluation score is suitable to predict an organisation’s overall performance (‘big picture’) with an accuracy of about 65%. The evaluation incorporates knowledge about Industry Characteristics and the continuity and consistency of organisational improvement efforts which is why they are part of the 65% puzzle piece. Overall this research has shown that the evaluation result is a reliable as well as significantly accurate predictor of Business Outcomes.

The Validated BIG PICTURE Business Model

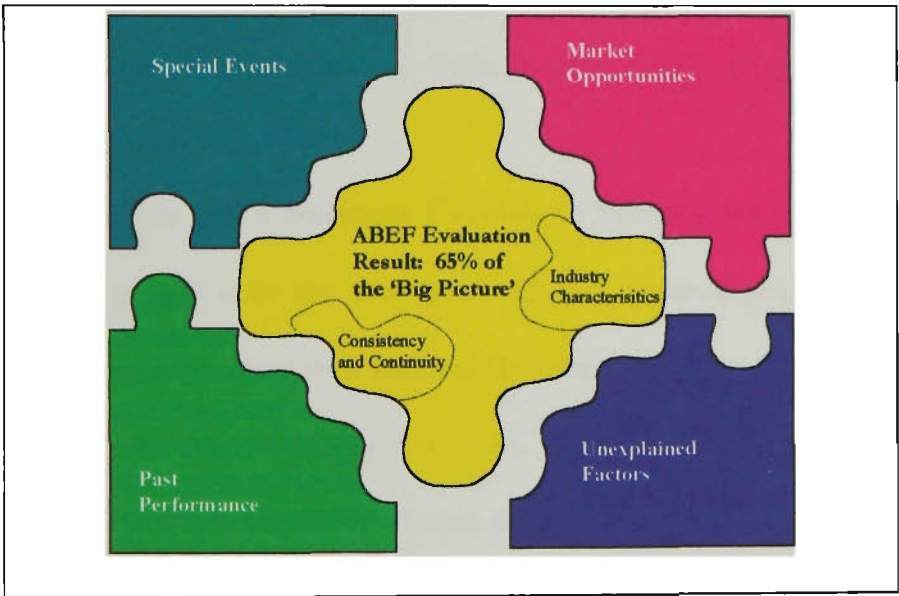


Figure 55 Validated Business Success Prediction Model

⁶ The author made observations about organisations increasingly entering the Awards process for the reason that their future existence is currently threatened by budget-slashing exercises (especially in the public service) or reviews of a multi-national parent company’s strategic review of global activities. Based on their evaluation results, the organisations often felt better equipped to demonstrate organisational effectiveness which can be a powerful argument in such decision making.

The linear business predictor equation (Eq 1 page 82) can now be quantified, based on the empirically validated findings. The previously introduced generic equation is reduced to:

$$Y = \alpha \times ABEF + \beta \times Unexplained\ Factors + C$$

(Eq 1a)

with $\alpha = 0.005$ and $C = -0.172$ (from Figure 27 Principal Correlation Plot, R= 0.79) hence:

$$Y = 0.005 \times ABEF + \beta \times Unexplained\ Factors - 0.172$$

(Eq 1b)

This equation can be expected to produce predictions of about 65% accuracy (the rest accounts for the unexplained factors) and was previously used in Table 30 (Performance Diagnostic Tool).

8.4 Recommendation to Use a Business Excellence Framework

Based on the insights gained over the four years of this research project the author strongly recommends any organisation to adopt their national Business Excellence Framework as a vehicle for driving systematic and holistic business improvements. By the same token, the author urges those concerned, or even dubious about the return of such an investment, that it is in their hands (or more specifically in their attitude and dedication, particularly if they are members of the senior executives) whether and to which extent their organisation will be able to capitalise on the obtainable benefits. In other words as with so many management-related issues it is not the product (i.e. which Framework to choose) but the process (i.e. the commitment, its adoption and its deployment) one should be primarily concerned about.

It is a universally valid statement to say that any organisation at any time and in any place would be better off by using a Business Excellence Framework than without it.

8.5 Limitations

This section addresses some of the problems of this study which have not already been dealt with in Chapter 4.2 ‘Pre-Analysis Verification Methods (Validity)’.

- The study only dealt with manufacturing companies and although useful it does not allow us to generalise its findings for other industries.
- The study’s limited sample size of only 22 companies is from the point of view of Statistics not sufficient for accepting the evidence and relationships found as ‘definite proof’. At this stage they may only be accepted as ‘tentative’ which is despite the great strength and significance with which those relationships appear to exist. A sample of maybe ten times this size with similar results would be more easily accepted as definite proof.
- The study does not permit conclusions about any cause-effect relationships between the two observations AQA scores and business results.

8.6 Contribution of Original Knowledge

This study makes several new contributions to the existing knowledge of Quality Management theory and practice.

1. It adds to the literature a rigorous, hybrid type, study of Quality Management benefits carried out with manufacturers. ‘Good’ results were achieved in terms of the strength and significance of the positive associations found. The results are indeed significant enough to conclude the debate as to whether Quality Management can be linked to bottom-line improvements.
2. It also makes significant contribution to the understanding of business performance mechanism issues through the development and validation of a Business Success Explanation model which identifies the main factors by which business results are affected.

- 3. The findings helped to develop a practical Business Improvement Diagnosis Instrument that provides management with an understanding of what level of business performance improvements can be expected, based on specific evaluation scores against the ABEF.
- 4. The study of Best Management Practices advances today’s knowledge and understanding of the characteristics, attributes and practices common to highly successful organisations.

“Both researchers and practitioners look forward to the day when companies using the Awards model for self-assessment purposes will be able to convert points into profits” (Williams M., 1993).

The author is of the opinion that this research is an important step forward in this direction.

9 REFERENCES

Asia Pacific QC Organisations, The impact of Quality Management on Productivity Conference, New Zealand, March 1991.

Australian Manufacturing Council, Leading the Way: A study of Best Manufacturing Practices in Australia and New Zealand, AMC, 1994.

Australian Quality Awards, Application Guidelines, Enterprise Australia, 1988.

Australian Quality Council, Australian Business Excellence Framework, AQC 1998.

Australian Quality Council, The 1997 Australian Quality Awards Framework, AQC 1997.

Bowls J and Hammond J, Being Baldrige eligible is not enough, NY Times 22 Sept. 1991.

Bracht, G. H., & Glass, G. V. The external validity of experiments. American Educational Research Journal, 5, 437-474, 1968.

Business Week, Who's excellent now ? No 5 Nov 1984.

Campbell D & Stanley J, Experimental and quasi-experimental designs for research, Chicago: Rand McNally, 1972.

Chorn N, The myths of TQM exposed, Marketing, Feb. 1993.

Craig C, and Douglas S, Strategic Factors Associated with Market and Financial Performance Quarterly Review of Economics and Business, Summer 1982.

Deming W, Out of the Crisis, Cambridge University Press, 1986.

EFQM/Coopers & Lybrand 'A European Quality benefit study' 1993

Entrekin L and Pearson C, A comparison of values espoused by quality and other managers, Murdoch University, Australia 1992.

Ernst & Young, International Quality Study, Ernst & Young Management Consultancy, 1993.

Ernst & Young, International Quality Study, Ernst & Young Management Consultancy, 1993.

- Fisher T, Quality Management and Productivity-A preliminary study, 1990 UTS Australia, Australian Journal of Management, 1993.
- Foley K., Barton R., Busteed K., Hulbert J. and Sprouster J.(1997), Quality, Productivity and Competitiveness: The role of quality in Australia's social and economic development, The Wider Quality Movement c/- Standards Australia, ISBN 07337 1072 7, 1997.
- Gale B, and Klavans R, Formulating a Quality Improvement Strategy Journal of Business Strategy, Vol. 5 No. 3, 1985.
- Garvin D, A quality benefit study, The Free Press, NY Managing Quality: The strategic and competitive edge, 1988.
- Garvin D, How the Baldrige award really works ?, Harvard Business Review 1991.
- Garvin D, Quality on the Line, Harvard Business Review pp65-75, Oct. 1983.
- Gay L. & Diel R, Research Methods for Business and Management, Macmillan Publishing Company, ISBN: 0-02-340810-3, 1992.
- Ghosh A, Praeger, Redefining Excellence: The financial performance of America's 'Best Run Companies, NY 1989.
- Gilmour P, Driva H, Macquarie Uni, The impact of winning the Australian Quality Award, 1993.
- Hausner A, Mills C, Massera T, Arndt G. Best Leadership Management Practices Found in Successful Australian Organisations: Preliminary Findings, Sydney, 4th National Research Conference on Quality Management, 1997.
- Hausner A, Quality Awards linked to Business Improvement Results, Sydney, Australian Quality Awards Evaluators Conference, 1998.
- Hayes, Clark & Modarress B, An empirical examination of SQC and its relationships with Quality, Quality Cost and Productivity, University of Nebraska, NB 1987 PHD dissertation, 1994.

- Kano N, Evaluating the Organisation - A Deming Prize Perspective JUSE 1983, AQC Seminar proceedings, 1993.
- Kaplan A, The conduct of Inquiry, Chandler, San Francisco, 1964.
- Keiningham T, Zahorik A, Rust R, Getting return on Quality, Journal of Retail Banking 1992.
- Kotter J and Heskett , Corporate Culture and Performance, NY The Free Press, 1992.
- Maani K, Putterill M & Sluti D, Empirical Analysis of Quality Improvement in Manufacturing, University of Auckland NZ, International Journal of Quality and Reliability Management, Vol 11 No 7, MCB University Press, 1994.
- Mahajan V, Sharma S, Netemeyer R, Should we expect the BA to predict a Company's financial success ?, College of Business Administration University of Texas at Austin, 1992.
- Newton B, Statistics for Business, Science Research Associates Inc., ISBN: 0-574-18465-1, 1973.
- Peters and Waterman, In search of excellence, 1982.
- Phillips L, Chang D and Buzzell R, Product Quality Cost Position and Business Performance: A test of some key hypotheses, Journal of Marketing, Spring 1983.
- Powell T, Total Quality Management as a competitive advantage: A review and empirical study, Strategic Management Journal, Vol. 16, pp15-37, 1995.
- Ranganath N, Executive Caravan TQM Survey Summary Corporation, Arthur D Little 1992.
- Raynor, Comparison of the National Quality Awards, 1997.
- Ritter D, The GAO report, GAO (US General Accounts Study), 1991.
- Roth A, Linking Manufacturing Strategy and Performance: An empirical investigation, Manufacturing Round Table Research Report Series, Boston Uni, MA, 1989.
- Schmenner R & Cook R, Explaining productivity differences in North Carolina Factories, Journal of Operations Mgmt, Vol5 No3 May 85 pp273-89, 1985.

- Schoeffler S, Buzzell R and Heany D, Impact of Strategic Planing on Profit Performance, Harvard Business Review, March/April 1984.
- Smith G, Linking the results, The TQM Magazine, Melanie Williams UK, Aug 1993.
- Strategic Planning Institute, Profit Impact of Marketing Strategies, PIMS Study 1992.
- Terciovski M, Samson D, The business value of Quality Management Systems Certification: Evidence from Australia and New Zealand, Melbourne Business School, University of Melbourne, 1996.
- Terciovski M, The Relationship between Quality Management Strategies and Organisational Performance in Manufacturing Firms, PhD Thesis, Business School, University of Melbourne. 1997.
- Voss C, Made in Europe London Business School, 1994.
- Wisner J, Eakins S, A performance assessment of the US Baldrige Quality Award Winners, University of Nevada, Las Vegas 1993.
- Zairi M, Letza S and Oakland J, Does TQM impact on bottom line results ? University of Bradford Mgmt Centre, American Quality Foundation and Ernst & Young 1991 International Quality Study, 1993.
- Zikmund W, Business Research Methods, Fourth Edition, The Dryden Press USA ISBN: 0-03-097585-9, 1994.

10 Bibliography

10.1 Bibliography-Books

Australian Manufacturing Council, Emerging Exporters-Australia's High Value-Added Manufacturing Exporters, Report by the AMC and McKinsey & Co, 1993.

Australian Manufacturing Council, The Wealth of Ideas-How linkages help sustain innovation and growth, Report by the AMC and McKinsey & Co, 1994.

Australian Quality Awards, Application Guidelines, Enterprise Australia, 1988.

Australian Quality Awards, Application Guidelines, Enterprise Australia, 1989.

Australian Quality Council, Australian Business Excellence Framework, 1998.

Australian Quality Council, The 1992 Australian Quality Awards Framework, 1992.

Australian Quality Council, The 1993 Australian Quality Awards Framework, 1993.

Australian Quality Council, The 1994 Australian Quality Awards Framework, 1994.

Australian Quality Council, The 1995 Australian Quality Awards Framework, 1995.

Australian Quality Council, The 1996 Australian Quality Awards Framework, 1996.

Australian Quality Council, The 1997 Australian Quality Awards Framework, 1997.

Bamberg G & Baur F, Statistik, R. Oldenbourg Verlag Muenchen, 6. Auflage 1989.

Clark C, Geer T and Underhill B, The Changing of Australian Manufacturing, Staff Information Paper, Australian Government Publishing Service, December 1996.

Deming W, Out of the Crisis, Cambridge University Press, 1986.

Ernst & Young, The International Quality Study, American Quality Foundation, Best Practices Report 1993.

Foley K, Barton R, Busteed K, Hulbert J and Sprouster J, Quality, Productivity and Competitiveness: The role of quality in Australia's social and economic development,

The Wider Quality Movement c/- Standards Australia, 1997 ISBN 07337 1072 7, 1997.

Foley K, Report by the Committee of Review of Standards, Accreditation, Quality Control and Assurance, 1987.

Gay L, Diehl P, Research Methods for Business and Management, Macmillan Publishing Company, NY, 1992.

Kamiske G, Rentabel durch TQM, Springer Verlag Berlin, 1996.

Newton B, Statistics for Business, Science Research Associates Inc, USA, 1973.

Prokopenko J and North K., Productivity and Quality Management: A modular program, Asian Productivity Organisation & International Labour Organisation, 1996.

Tincher M, Top Management's Guide to World Class Manufacturing, Buker Inc, 1993.

Walton, The Deming Management Method, Pedigree New York, 1986.

Zeller H, The best on Quality-Targets, Improvements, Systems, Yearbook of International Academy for Quality Vol.1, Carl Hanser Verlag Muenchen, 1998.

Zikmund W., Business Research Methods, Fourth Edition, The Dryden Press, 1994.

10.2 Bibliography-Journal Publications

Business Review Weekly, TQM Madness, BRW Australia 1998.

Capon, Measuring the success of a TQM program, IJQRM Vol.12 No.8, 1995.

Chapman R, Mellor R, & Murray PC, Strategic Quality Management and financial performance indicators, International Journal of Quality and Reliability Management, 14 (4) p 432-448, 1997

Chorn N, The myths of TQM exposed, Marketing, Feb. 1993.

- Cupello J, A new paradigm for measuring TQM progress, *Quality Progress*, May 1994.
- Ernst & Young, *Quality Practices in Australian Manufacturing Firms*, Monash University, Thought Leadership Series, 1994.
- Flynn Barbara B, and E.J. Flynn, Achieving Simultaneous Competitive Advantages Through Continuous Improvement: World Class Manufacturing as Competitive Strategy, *Journal of Managerial Issues*, 8 (3) p360-379, 1996
- Flynn Barbara B, and S. Sakakibara, and R.G. Schroeder, The Impact of Quality Management Practices on Performance and Competitive Advantage, *Decision Sciences* 26 (5) p659-692, 1995
- Fry T, Manufacturing Performance and Cost Accounting, Productivity. & Inventory Management Journal No.3, 1992.
- Fuchsberg G, Quality Programs show shoddy results, *Wall Street Journal*, May 14, 1992.
- Fuchsberg G, Total Quality is termed only partial success, *Wall Street Journal*, October 1, 1992.
- Gilmour P, Driva H, The impact of winning the Australian Quality Award, Research Paper, Graduate School of Management, Macquarie University, 1993.
- Grandzol, JR & Gershon M, Which TQM practices really matter: an empirical investigation *Quality Management Journal*, 4 (4) p43-59, 1997
- Haim A, Does Quality work ? A review of relevant Studies, The conference board Inc, Report Number 1043, New York, NY, 1993.
- Hardie, N., The effects of Quality on Business Performance, *Quality Management Journal*, 5 (3) p 34-49, 1998
- Hausner A, Arndt G., On the need for better quality in Quality Management research - A critical but constructive review of recent publications on the benefits of Quality

- Management, Melbourne, Third International Research Conference on Quality Management, RMIT University, 1999.
- Hemphill C & Oppenheim P, Studies in the logic of explanation, Philosophy of Science, Vol. 15 pp 135-75, 1948.
- Henricks K, Singhal V, Does implementing an effective TQM program actually improve Operating Performance ?, Empirical Evidence from firms that have won quality awards, Management Science Journal, Vol. 43, No 9 September 1997.
- Henricks K, Singhal V, Firm Characteristics, Total Quality Management, and Financial Performance: An empirical investigation, School of Business, The College of William and Mary, Williamsburg, VA. 23187 USA, 1995.
- Juran J, Made in USA: A renaissance in Quality, Harvard Business Review, pp42-50, July-August 1993.
- Kannan, V.R., Tan, KC, Handfield, RB & Ghosh, S, Tools and techniques of Quality Management: an empirical investigation of their impact on performance, Quality Management Journal 6 (3), p34-49, 1999
- Keiningham T, Zahorik A, Rust R., Getting Return on Quality, Journal of Retail Banking, Vol XVI. No. 4, Winter 1994-95.
- Maani K, Empirical Analysis of Quality Improvement in Manufacturing, IJQRM, Vol 11, No.7, 1994.
- Matthews J and Katel P, The Cost of Quality: Faced with hard times, Business Sours on Total Quality Management, Newsweek, pp48-49, September 7, 1992.
- Mills C, Comparing the AQA, Baldrige Award and European Q Award, AQA Research paper 1995.

- Montgomery JC, Reed R & Lemak DJ, Beyond Process: TQM content and firm performance, Academy of Management Review, 21 (1), p173-202, 1996
- Morrow PC, The measurement of TQM principles and work-related outcomes, Journal of Organisational Behaviour, 18, p363-376, 1997
- Nakai B, The Deming, Baldrige and European Quality Awards, Quality Progress, April 1994.
- Neves J, The evolution of the Baldrige award, Quality Progress, June 1994.
- Oakland J, Total Quality Management, BH Business Series, 1995.
- Rose K, A performance measurement model, Quality Progress, Feb. 1995.
- Rumelt, R, How much does Industry matter ?, Strategic Management Journal, 12 (3), pp. 167-185, 1991.
- Schmalensee R, Do markets differ much ?, American Economic Review, 75(3), pp. 341-351, 1985.
- Senge P, Quality Management current state of the practice, Key note speech at the American Society of Quality Control, Annual Conference, 1993.
- Sparks J., QA and Best Practice: Associates or Adversaries ?, AQC, 1995.
- Swerzgold J, Why most Quality Efforts fail, Management Review, August 1992.
- Voss C, Made in Europe, London Business School and IBM Consulting 1993.

10.3 Bibliography-Unpublished Works

Australian Quality Awards for Business Excellence, Statistical Information of 1998 presented in Platinum Sponsorship Brochure, 1999.

Coleman B, Announcements of the AQC's strategic plan for 2000, Sydney 1998.

Deming W, Roadmap for Change: The Deming Approach, video recording, Encyclopedia Britannica Educational Corp, Chicago, IL, 1984.

Hausner A, Stewart V & Arndt G, Training and Education Needs of Manufacturers Pursuing Best Practice, CAMIA Report No. R-96.1 (Classified), Wollongong University, November 1995.

Hausner A, Quality Awards linked to Business Improvement Results, Australian Quality Awards Evaluators Conference, Sydney, 1998.

Henricks, K, Singhal V, Award Winning Companies Improve Bottom Line, Georgia Oglethorpe Award Process Inc., 1998

Little A, Executive caravan TQM survey summary, private correspondence dated October 1992, Arthur D Little Corporation 1992.

11 APPENDICES

11.1 Identification of Best Management Practices

11.1.1 Introduction of the Best Practice Study

The following pages are an extract of findings from the underlying study with a focus on those practices which were found to be particularly common. This is the first comprehensive release of these research results after some preliminary findings were previously published at the 4th National Research Conference on Quality Management in February 1997 (Hausner 1997) and at the 3rd International Research Conference on Quality Management (Hausner 1999). The original research project underlying these findings originally commenced in February 1995 and was initiated by an AQC research team.

Word of caution

In recent literature consensus exists about the assertion that TQM is not easily imitable as it requires the pre-existence of complementary factors (which at first sight seem unrelated to TQM itself) to make it successful. The findings from the 1993 International Quality Study (Ernst & Young 1993) suggest that quite different actions and quality practices are required for organisations which are performing at different levels. They concluded that the IQS data does not support the hypothesis of universally beneficial practices.

Although there is significant common ground, in most of the leading nations these practices have evolved through deployment in their particular environments. Experience has shown that mainly due to cultural differences, individual nations have found some practices to be more or less effective if applied to their industries. This set of attributes is today reflected in national awards for organisational excellence around the world.

It must be stressed that the practices, attributes and recommendations are by their nature somewhat prescriptive and require caution and recognition of the fact that, even though they were found to be

common in leading organisations, their suitability for enhancing a particular organisation may vary with different cultural backgrounds, different maturity, different sizes of organisations and last but not least different performance levels (Ernst & Young 1993). This should be taken into account when benchmarking or adoption of these practices is being considered.

It should also be noted that the quality as well as the quantity of the researched and recommended management practices in this report varies from category to category. This is mainly due to the characteristics of the underlying data. The rigour and the extent with which the researchers could pursue certain management topics depended mostly on the level of interest received by their interview partners (i.e. senior executives) who, no doubt, had their own preferred area of conversation and expertise. This phenomenon is consistent with an observation often made by evaluators of the Awards who find that certain categories or items are frequently those where organisations show the least strengths. More research is needed to fill the gaps and produce more valuable guidance for modern management practice.

11.1.2 Methodology of the Best Practice Study

Initially, AQA application material from 1993 to 1996 (submissions and evaluators' feedback reports) was examined:

- A) Leading organisations were identified through quantitative analysis of scores which were achieved as part of the quality award evaluation process.
- B) The submissions and feedback reports of these top-performing organisations were then used for identification and examination of common management practices.
- C) A matrix was produced detailing the common threads in the approaches (attributes) of these leading organisations. This document formed the basis for subsequent research.
- D) Pilot site visits and interviews were carried out to test the validity of this methodology and its preliminary products.
- E) After piloting was completed, a selected number of organisations were visited to ascertain

the degree to which they followed the approach suggested by the first document (see C) and the manner in which the approach was implemented in practice.

The companies selected for interviews made on an actual on-site visit exclusively belonged to finalists and winners in the Australian Quality Awards process. They were selected with the intention of covering a wide spectrum across industries and both public and private organisations. These formal interviews from on-site visits were conducted in order to validate and “operationalise” the common practices, i.e. to define and identify the behaviour and processes that support the identified common factors in these successful organisations and thereby provide useful guidance to others. As an example, questions asked on Senior Executive Leadership Management Practices, during these structured interviews are given below. The identified common attribute here was “Steadfast personal commitment and involvement of the CEO in the promotion and reinforcement of Quality principles”:

- What personal behaviour supports this statement ?
- How is it demonstrated ?
- What convinces you that such an involvement is a necessary commitment ?
- What proportion of your time is spent in personal involvement with Quality-related activities ?
- How do you measure the effectiveness of your involvement ?

This research methodology was chosen to test the underlying hypothesis that the identified approaches are common to leading organisations and represent the best practice approach. In addition to testing the hypothesis, case studies were compiled to illustrate the major issues. Some of these case studies are now available from the AQC.

Presentation format

The identified practices are grouped according to the structure of the 1997 ABEF categories. Initially, the category concerned (e.g. Leadership) is introduced and briefly defined, followed by common attributes (in shadowed boxes). Recommendations in the form of Best Practices are presented in bullet point, bold print format for each attribute. These recommendations are based on the interviewed organisation’s individual experience. In the indented paragraphs below each bullet point contains

examples and other elaborations as given by the interviewed parties.

11.1.3 Best Management Practice Findings

In the following sections, the mechanisms by which managers have succeeded in achieving Best Practice are listed in a condensed form. They effectively represent recommendations for practical action based on the collective experience of top management in some of Australia’s top Best Practice companies and will be helpful to other companies striving to achieve business excellence.

11.1.3.1 ‘Leadership’ Category

Leadership provides the vehicle, i.e. management system, for encouragement of continuous improvement and total involvement of all employees. It determines the values of an organisation including its purpose (Mission), direction (Vision) and milestones (key goals). It affects an organisation’s basic beliefs and hence their behaviour in such aspects as trust, honesty and integrity.

Steadfast personal commitment and involvement of the CEO in promotion and reinforcement of Quality principles (1.1.)

- **Produce a simple uncluttered plan on a page including vision, mission and values.**

It is important that this plan is produced jointly and displayed prominently for all to see.

- **Develop a clear and unequivocal business direction.**

It provides an imperative for maintaining focus towards a unity of effort in one direction whilst pursuing business unit objectives. Do not be diverted. Establish and maintain priorities to ensure that the team is at all times moving forward in the chosen direction.

- **Develop a passion for continuous improvement.**

Everyone is continuously striving to improve. Make sure to “close the loop (PDCA)” of a review

process by reflecting and learning from the experiences which can then be used as an input for the next cycle.

- **Practice participation and involvement.**

Be involved with teams as a member. Demonstrate commitment by participation. Be a member and build the team's capability. Increase team authority.

- **Assess people and their performance on the criterion of adding value to the product or service as perceived by the customer.**

Leaders design any reward and appraisal system so that peoples' performance is actually related to their contribution to customer satisfaction.

Willingness on the part of the CEO and members of the management team continually to learn new principles and practices (1.2)

- **Participate in leadership development programs.**

Leaders, at whatever level within an organisation, need to enhance their skills through continuous learning and can benefit from formal training and development.

- **Regularly visit recognised corporate leaders to learn and apply new ideas about leadership and management.**

Exposure to a broad range of ideas is essential to fundamental improvement. Innovation is likely to result from the application of new ideas and stems from creative thinking.

- **Encourage trust and honesty through true feedback to management.**

The feedback system in use (formal and informal) must reward behavioural values such as trust and honesty. Make sensitive issues discussible. Consider the development of a peer group review and

feedback exercise from immediate levels (same, above and below) for management development. This may foster personal and organisational development and better working relationships.

Willingness to experiment with new ideas (1.1)

- **Encourage an entrepreneurial approach.**

The sustainability of an organisation's success is related to its ability to identify new opportunities and prospects. Look for the extraordinary. Look for outstanding attributes. Don't always seek compliance with norms. A climate of support, continuous learning and no fear of failure fosters initiative and the early adoption of new ideas.

Regularly review their own leadership effectiveness (1.1)

- **Introduce an upward appraisal system. Formulate human resource strategies using peer group review and feedback exercises to review effectiveness.**

This is to ensure management is responsive to subordinate levels and to ensure the maintenance of empowerment of operational teams.

- **Audit (MD) core processes periodically to review progress, ensure effectiveness and seek new and better ways.**

This is in the interest of assessing improvements and providing support and recognition to quality teams. Data is captured, monitored, visualised and applied with the view to continual improvement.

Quality initiatives are effectively integrated into the corporate business plan(1.1)

- **Establish a quality steering committee (especially for large organisations) to implement the strategic direction set by the support and leadership team.**

Leaders establish a formal task force to oversee the quality journey of the organisation. Typically, this group is made up of general managers, staff representatives and a full-time quality champion. The committee meets monthly to oversee the quality process. Its purpose is to guide quality action plans and provide information relating to quality deployment. The Quality Steering Committee has considerable power and influence within the organisation to achieve improvements on all matters relating to quality initiatives.

Regularly review progress against plans (1.1)

- **Let the Quality Steering Committee put rules in place and review progress.**

The Quality Steering Committee defines the framework in which action is to be undertaken and subsequently matches their plans with achievements. The review process itself should not be based on checklists but allow for debate and flexibility to change directions if required. In all aspects of the committee's operations, communication should have a strong emphasis. The committee needs to be able to communicate effectively with all levels of management.

The Workforce is treated with the utmost trust and respect (1.2)

- **Measure workforce attitudes and emotions.**

The work force attitudes are measured by opinion surveys. A staff attitude survey, by asking people for their opinions and emotions, plus using this information in planning and actions, demonstrates the principle of respect for people.

- **Assume that, broadly speaking, people come to work to “do a good job”.**

There are no time clocks and other similar control mechanisms.

- **De-emphasise management authority during meetings to enable a free flow of information.**

The management's role is to support and to lead. For example, there is a high degree of information

sharing through consultative meetings.

- **Have plenty of celebrations for targets achieved.**

These actions acknowledge efforts beyond the normal call of duty and reinforce the identity of the group as well as strengthen morale.

Responsibility and accountability devolved to teams and individuals throughout the organisation (1.2)

- **Genuinely empower the workforce.**

This needs to be demonstrated at all levels. Leaders are committed to devolving responsibility to operational work teams. They are genuinely prepared to transfer power. Examples include the responsibility of the team for recruitment, performance appraisals and for project management.

- **Continuously advance the concept of self management and empowerment of work teams.**

Employees are enabled to apply their labour and their minds to the tasks of their business units.

High level of commitment to development of the skills and aptitudes of individuals and teams (1.2)

- **Actively work on the development of teams both individually and collectively to assume greater responsibility for productivity, quality and performance.**

Career path plans (progression planning) are developed for all staff including shop floor people. They are based on skills (including multi-skilling), attitudes, behaviour and aptitudes.

- **Provide staff with encouragement and opportunity to advance.**

Staff are given time, career and monetary incentives where appropriate. People are encouraged to further their education through formal course work, both externally and internally.

Assisting other organisations to adopt Quality principles and practices (1.3)

- **Provide modelling for other organisations.**

There is active sharing of knowledge and technology with suppliers, customers and trade allies. Leaders interface with other organisations to expand and develop the principles of quality both for themselves, their suppliers and the common good. They encourage participation in conferences and tours of facilities. Leaders establish workshops with dedicated facilitators to promote relationships and communication. This fosters and develops the cross fertilisation of ideas and is therefore of mutual benefit. Such actions support and develop suppliers and distributors to the organisation and establish support networks for better mutual understanding.

Accepting responsibility for (and involvement in) community related projects and activities (1.3)

- **Allow for activities such as community involvement and support even beyond the normal business interests.**

Some leading organisations provide assistance to charitable organisations and provide funding for welfare groups. Some are involved in sponsorships of sporting activities and some are members of Chambers of Commerce. Overall, this facilitates an awareness of quality principles and the adoption of them into the community. The environment in which the organisation is operating matters because it influences how effective an organisation's operations are. "Green policies" may serve as an acknowledgement of the wider community as an important stakeholder.

11.1.3.2 'Strategy & Planning' Category

This Category covers how the organisation develops its strategies, policies and plans and communicates and deploys them. It determines the way that employees at all levels contribute to the development of its values and how these values and basic beliefs are translated into policies and incorporated into plans

at all levels. It explores how strategic plans are developed and deployed plus the extent to which it involves or considers all stakeholders.

Feedback & Input on mission, vision and values are actively sought from staff on an ongoing basis (2.1)

- **Provide every staff member with opportunities for input to the process.**

Workshops are a suitable vehicle for getting staff involved, for generating new ideas and to encourage ownership by the operational teams.

- **Ensure that the planning process is participative.**

Open meetings are best facilitated by an external consultant.

Evidence exists that the values have influenced business decisions (2.1)

Environmental practices changed as a result of commitment to certain values.

Objectives of individuals or business units must be clearly linked to higher level corporate goals (2.2)

- **Make use of a planning matrix to facilitate the process of giving priority to action plans**

Company goals are stated across the horizontal axis with the goals of sub-divisions on the vertical axis. The matrix has provision and space for how success will be achieved. All intersecting points between company goals and the goals of the sub-divisions are then prioritised with the development of detailed action plans.

Performance against plans is regularly reviewed (2.2)

Review strategies relate to the core function of the business.

11.1.3.3 'Information and Analysis' Category

This Category determines the ability of the organisation to collect data around key stakeholders and core activities, to convert this data into meaningful information, and to deploy this increased knowledge to continually improved processes, outputs and results. It covers how the information supports a responsive prevention and improvement-based approach.

Data collection is linked to the strategic planning process (3.1)

- **Collect data as part of your strategic planning process**

Surveys and Focus groups are commonly used for data gathering. Collected data must be used not filed and forgotten. Data collection and analysis is carried out by project teams which report at weekly team leader meetings.

- **Focus on data relating to understanding customer needs and evaluating the extent of their satisfaction.**
- **The data collection process is subject to regular review.**

The process of data retrieval has to be in alignment with the intended use of this data. Some collection methods may not be suitable for carrying out the analysis as intended. The periodic quality reviews include the facility to examine also the correlation between internal and external indicators.

Syndicated studies are also considered and used by corporate decision makers (3.1)

Syndication allows for the gathering of extensive data at a reasonable cost through apportioning the costs to several organisations who are interested in the outcome of the study. This is commonly administered by consulting firms.

All levels of management and increasingly staff as well, are trained in the analysis and use of statistical data and the concept of variation (3.2)

- **The use of statistical analysis should be widespread in the organisation including studies of process capabilities and financial issues.**
- **Data should be used to anticipate customer requirements and to maximise customer satisfaction.**

Performance against KPIs is clearly and regularly communicated to staff (3.2)

- **Performance measurement can be expanded beyond the primary production functions in particular with emphasis on customer feedback.**

The KPIs are considered vital elements of the annual process for the production of business and work plans.

11.1.3.4 'People' Category

This Category covers the way in which people are encouraged and enabled to make a personally satisfying contribution to achievement of the organisation's goals. It is concerned with maintaining an environment that enables the full potential of its people to be realised as well as with aligning its people's objectives with company objectives.

Critical success factors of a HR plan are identified and their achievement is pursued (4.1)

- **These can be included in one of the business performance indicators.**
- **Strategies for their achievement could be identified on a one-page HR plan.**

Employee opinion surveys are used as an input to the planning process (4.1)

- **Conduct a climate benchmark survey as a measurement of attitudinal change.**

The measurement of culture can be done with the use of a multivariate survey that relates the perceived importance against perceived performance from a list of 50 issues. Leading organisations have found that improvements and HR plans are strongly influenced by the staff survey.

The ability to work in teams is nurtured through extensive training for team members (4.2)

- **Build team confidence and competence through support for increased responsibility and recognition.**
- **Make development of skills the major focus**

Upgrading existing skills on an 'as need' basis and recognising aptitudes can be made a priority. The building of teams and team competence to face the issue of change is the responsibility of management. Consider the establishment of a learning centre. Study can be part of an incentive scheme through which fees can be reimbursed on successful completion.

There is an extensive range of opportunities for staff at all levels to become involved in a variety of improvement projects (4.2)

- **Ensure staff feel they are part of the team able to influence processes for improvement and they become involved. Reward initiative and entrepreneurial flare.**

The need to encourage participation is part of the process of assisting staff to add value, e.g. provide an opportunity for establishing improvement committees in every work area.

There is effective, widespread communication on team activities and results (4.2)

- **Lift the profile of work teams, make communication of team activities and achievements something to celebrate and meaningful to others and broadly reported.**

Team activities are circulated via informal communication, e.g. golf afternoons, regular meetings addressed by high level executives or in an information corner (e.g. notice board).

Management takes the role of facilitator and coach (4.2)

- **Management must change the approach from command and control and become the facilitator and coach of independent and competent work teams. It must move away from an autocratic approach towards a participative one.**

Management needs to give up the exclusive decision making power. The keys to success are to let go and encourage trying new things, to accept mistakes and to be completely honest with no agenda hidden from lower levels. Staff need to accept more responsibility

There is a clear link between group performance and individual performance to corporate goals and remuneration (4.3)

- **Ensure that the individual efforts are compatible with the group and both are in alignment with corporate goals.**

There is a system in place to reward teamwork, compliance with corporate values, achievement of corporate goals, safety, innovation and excellence (4.3)

- **Ensure that rewards are recognised, have perceived value and are supportive of corporate values and the corporate plan.**

Competitive market salaries are reviewed with the opportunity to earn up to 20% above market rates as incentives for meeting objectives. Rewards include non-monetary incentives.

Management has their performance rated by staff (4.3)

- **Ensure that the subordinate level can assess and provide feedback on the performance of management.**

A 360 degree feedback system can be applied.

Establish a process for identifying and satisfying training and development needs (4.4)

- **Analysis tools can be developed and applied to compare skills possessed with skills actually required. Plans including a tailored development package can be developed for each individual employee.**

Training needs are determined in negotiation between manager and employees through the performance review process and via overarching corporate programs designed to achieve corporate business, quality and culture objectives.

There is a flexible approach to delivering training (4.4)

- **Adopt a flexible approach - the goal is competency in the workforce.**

Courses can be focused on in-house learning, be external or be on the job training.

The effectiveness of training and education is assessed through competency-based reviews (4.4)

The approach with any new training course is to pilot and critically evaluate it before putting the organisation through it. The performance of individuals at training courses is rigorously assessed. This can include presentations or written reports from attendees.

Knowledge sharing is promoted (4.4)

- **Make specific knowledge including the results of benchmarking studies available to people within the organisation. Discourage the practice of knowledge hoarding between divisions or groups.**

All staff who attend conferences or seminars are required to make presentations to other staff. Knowledge hoarding can be eliminated through peer pressure and mutual dependence of team members.

Various methods for effective two-way communication between all levels within the organisation are put in place (4.5)

- **Provide open communication channels between levels within the organisations.**

The internal magazine includes a section for anonymous questions to be answered by management.

- **Measure the effectiveness of communication throughout the organisation.**

An environment of trust is established in which people feel comfortable about volunteering information (4.5)

- **Create a merit-based structure where there is acceptance of the contribution of all in the best interests of the group, and where the benefits can be expected to be shared equally.**

Team problem solving and participation is emphasised. A team is defined by the knowledge that they share. When the group shares knowledge it is truly a team.

Strong management commitment to maintain a high level of staff morale (4.6)

- **Measure well-being and morale of staff to assess the organisational climate.**

This is achieved through surveys and via sick leave and staff turnover statistics.

- **Put special programs in place to support well-being and morale.**

Program examples include counselling, social activities, canteen services, health surveys and tests, medical benefit funds, subsidised health insurance premiums, chaplain, job sharing, employee assistance programs, EEO, safety, harassment policies and affirmative action.

11.1.3.5 ‘Customer Focus’ Category

This Category is concerned with the way that the organisation identifies its customers and markets and reflects the needs of its current and future external customers in all its activities.

CEO constantly reinforces the relationship between business success and satisfying customer needs and expectations (5.1)

- **Make the customer the central focus of the business.**

Customer information is communicated to the organisation by the CEO personally.

Customer needs and expectations are determined by a variety of methods and approaches to meet different market segments (5.1)

- **Maintain regular communication with customers.**

Visits to the major customers are considered essential. Face to face meetings are supplemented by many telephone conversations.

- **Segment your markets to identify market opportunities.**

Distinguish for example between domestic, small, medium or large businesses.

- **Use a broad array of data gathered from many sources and channels to assist with your annual planning process.**

Use qualitative as well as quantitative measures to assess the situation. Have standard guidelines established for consistency of maintaining relationships (formal and informal), conducting market research and surveying customers (e.g. Exit interviews).

Recognition by senior management of the vital importance of customer relation skills (ahead of technical skills) in meeting customer needs and expectations (5.2)

- **Make time available for the senior executives to visit key customers.**

It takes considerable time and effort to build customer relationships. It can take even longer to get the first order.

- **Select staff in accordance with specific criteria and who have received specialised training in customer relations management.**

However sales staff do also require satisfactory technical skills.

Recognition of the importance of personnel with direct customer exposure (5.2)

- **Involve customer relation staff in design, development, planning, management and process improvement meetings.**
- **Make it normal practice to involve personnel with direct customer contact in cross-functional improvement teams.**
- **Empower employees to take out-of-the-ordinary action to resolve customer related issues**

This can be applied to many areas. Authority levels may be documented in ISO9002 procedures.

Consistency of practice may be an issue particularly with high budget items.

Put integrated customer relation processes in place to determine root causes of customer dissatisfaction and to modify procedures to correct them (5.2)

- **Establish communication lines to contact management if necessary even outside normal business hours.**

This is an essential element of the customer complaint procedure.

Customer queries receive prompt responses (5.3)

- **Keep customers informed of progress against commitments by regular, personal follow-up.**

Formal customer service standards are established and communicated throughout the organisation (5.3)

- **Set minimum standards of performance.**

Meeting these standards should always be achieved especially at the level of the customer interface.

This applies to all operational areas of the organisation.

Customer feedback is shared across the organisation using a variety of media (5.3)

- **Ensure that this information is accepted, understood and acted upon at all appropriate levels of the organisation.**

Widespread comparisons of competitors' products, services and processes are gathered from both competitors and customers (5.3)

- **Benchmark your products and services in comparison with competitor products.**

Carry out market research and external surveys to determine what competitors are doing and to assess

the gaps and to decide on strategies. Anecdotal evidence whilst subjective may also be of value.

Competitive data used to direct marketing strategies as input to the business planning processes as well as for starting goals (5.3)

- **Use techniques such as Quality Function Deployment to systematically make quality products which consistently exceed customer expectations.**

11.13.6 ‘Processes, Products & Services’ Category

This Category is concerned with the processes whereby the organisation supplies quality products and services to its customers and improves those products and services.

Customers are involved in the design, validation and testing of new products (6.1)

- **Recognise that customers can have valuable input into product development and design at an early stage.**

Customers or their representatives play an essential role in cross-functional teams.

High level of investment in new technology to improve customer service and for better co-ordination of resources (6.1)

- **Take advantage of advances in new technology for productivity increases and resource utilisation.**

Appropriate investments in new computer systems and new process technology on an ongoing basis will help to maintain competitiveness.

Regular review and redesign of the way in which the customers are serviced (6.1)

- **Be innovative in designing customer service operations and facilities in order to make access to products and services user-friendly.**

For example this may involve streamlining of all distribution channels for customer ease of use, opening of new branches in other states and the introduction of new phone systems or work flow systems.

- **Create an atmosphere which accepts and welcomes innovative change that benefits the customer.**

Willingness to experiment cautiously with different technological and human resource systems (6.1)

- **Be prepared to try new ideas, experiment, innovate and take reasonable risks. Encourage people to take initiatives and be proactive.**

Programs are in place to reduce the overall number of suppliers providing products and services and to develop partnerships with selected suppliers (6.2)

Leading organisations are concerned in establishing fewer but higher quality relationships where trust, reliability, mutual integration on business competencies for the supply of high standard products are fostered. There is a commitment to continuous improvement on both sides of the relationship.

- **Establish a process to evaluate, improve and maintain the performance of suppliers at a high level.**

Leading organisations carefully evaluate suppliers before appointment and ensure the ongoing standards of supply are maintained at a high level. New suppliers can be assessed according to their business experience or their references from their current customers or their certification to relevant standards and their commitment to quality principles.

- **Establish performance measures for suppliers. Regularly review and monitor standards with suppliers. The benchmark is relative to industry standards and competitors.**

Leading organisations ensure suppliers are evaluated and reviewed by the purchasing department.

Consider a business partnering program to transfer responsibility down the supply line.

Vendor certification processes are put in place, which include programs for encouraging, guiding and educating suppliers in Quality Assurance systems and procedures (6.2)

- **Streamline your supply processes and adopt 'Just in Time' delivery supported by a computerised planning system.**

For some preferred suppliers a vendor scheduling system exists which integrates into a manufacturing resource planning process (MRPII) to reduce lead times to a minimum.

Key suppliers are invited to participate in process improvement and product development activities (6.2)

- **Establish a formal committee including some supplier's representatives for governing improvement initiatives.**

You may have to limit the extent of this exercise to key suppliers and significant improvement initiatives only.

Key process are identified, given priority and regularly reviewed using the PDCA cycle (6.3)

- **Set a maximum of how many high level process improvement projects are carried out at one time.**
- **Carry out benchmarking against internal business units as well as against other external organisations.**
- **Consider formal certification of your quality assurance system.**

ISO9000 certification for example, may have benefits beyond Quality Assurance (e.g. marketing)

A well-communicated and clearly-defined process exists to capture new continuous-improvement ideas (6.3)

- **Establish a dynamic mechanism to capture and consider new ideas from all sources without apportioning value based on the rank or source of the idea.**

A central data base can be established to record Best Practice activity ideas and to make these available to the organisation.

A comprehensive set of key measures is built into the production process to ensure minimum variation and the consistently high quality of products and services (6.4)

11.13.7 'Organisational Performance' Category

The intent here is to demonstrate the success of the organisation up to the present and, by the use of appropriate measures, to envision its success in the future. It includes how key performance indicators and other measures are used by the organisation for this purpose.

KPI's are cascaded throughout the organisation and measured at the workplace (7.1)

- **Consider use of the balanced score card approach.**
- **Aim for their continuous improvement and have both people and dollar based indicators.**

There is recognition of a clear relationship between improved organisational performance, as measured by the KPIs and the application of Quality principles to all areas of the business (7.1)

- **Conduct regular self assessment against a recognised best practice management model.**

This is to indicate business priorities or to gauge the pace of change required to maintain competitiveness.

11.2 Survey Cover Letters & Fax Response Forms

11.2.1 1992-96 Manufacturing Applicants Approach Letter



**AUSTRALIAN
QUALITY COUNCIL**

To
"Organisation"
Att: Mr "Boss"
"Address"

"Date"

**RE: 'THE IMPACT OF IMPLEMENTING QUALITY
MANAGEMENT ON THE BUSINESS PERFORMANCE OF
AUSTRALIAN MANUFACTURING INDUSTRIES'
-An Australian Quality Council Research Project With
The Support Of BHP Steel.**

Dear Mr "Salutation",

I am writing to enlist your support and assistance in an important research program which has the potential for direct positive benefit to your organisation.

Data from overseas demonstrates a positive correlation between 'Total Quality' practices and improved business performance. Although Quality has been part of the Australian management scene for more than fifteen years, there is plenty of anecdotal information, but credible or quantifiable documentation of its effectiveness in transforming business performance is still sparse.

The Australian Quality Council is conducting research into the impact of implementing quality management on the business performance of Australian manufacturing industries. As an organisation with an interest in Quality, as demonstrated by your involvement in the Australian Quality Awards, you could make a very important contribution to this research.

Over the past ten years of operation the Australian Quality Awards have accumulated a valuable database of information about the management practices and achievements of applicants. The research project will utilise this data and add to it with additional surveys and through face-to-face interviews.

This study is expected to deliver breakthrough results because of the soundness of the methodology employed. It is expected that findings from the study will generate significant international interest.

Australian Quality Council
ACN 050 541 047
Quality Awards Division

Level 3, 69 Christie Street
St Leonards, Sydney, Australia
PO Box 298, St Leonards NSW 2065
Tel: (02) 9901 9999 Fax: (02) 9436 3251

AQC R&D Study: Business Outcomes of Quality Management

The Study

Participation in this study will involve the collection of past business performance data. Quantitative data on the economic dimension as well as on production efficiency which relates to the time of your Australian Quality Awards application is being sought. It should be suitable to draw a comprehensive picture of the organisational business performance at that time.

While mostly mail and telephone surveying will be sufficient, additional assistance in terms of on-site visits for data collection and verification is offered. Overall, your organisation would be expected to check the availability of past performance data and share some of this information with us. Depending on this availability, your preference and our need for verification, it may then be decided to conduct an on-site interview. It is anticipated that the total time spent with one organisation would not exceed two days.

Total confidentiality of any information already on file or which you supply in the course of the research is assured. No reference will be made to your company's identity in any publication or other research outcome without your express consent.

It is expected to have all surveying concluded in November with interim results being available in December.

Independence of the study

The Australian Quality Council is working with an independent researcher, Alexander Hausner from the University of Wollongong. This research project will be used as the foundation for his Doctoral thesis (PhD) to be completed early next year.

This bears the advantage that your organisation would only be contacted by one person which should further facilitate the processes involved and keep the inconvenience to a minimum.

Alexander Hausner has thoroughly prepared the theoretical foundation for this study over the last two years while further developing and refining his competency through research at the University and at the Australian Quality Council. Alexander has extensive work experience with manufacturing industries in Australia and overseas in Germany, the United Kingdom and Canada. He has presented a number of research papers at national conferences.

The Benefits

We believe that the project has the potential to add very important insights into Quality which you may find particularly useful with the following direct benefits to your organisation :

- learning opportunity to better understand the impact of quality management practices.
- all participants will receive early findings and if desired additional feedback based on relative comparison of their company.

AQC R&D Study: Business Outcomes of Quality Management

- opportunity to enhance and promote organisational wide acceptance and endorsement of your management approach or alternatively,
- opportunity to critically review and reflect on the effectiveness (i.e. business impact) of efforts towards Quality Management as a valuable learning exercise. Looking at key factors of performance may give you a further valuable edge for determining and refining future performance & productivity strategies.
- opportunity to work closely with a leading researcher in business improvement through Quality Management.

The Australian Quality Council is facilitating this study, with the support of BHP Steel. We are not seeking financial assistance from participating organisations.

If you are interested to participate in this research project, please consider which person within the organisation, if not yourself, would manage access to the required information.

Attached is a pre-prepared Fax Form on which you can indicate your willingness to be involved or otherwise.

We look forward to your involvement in this important project. If you would like further information about the project or the research team please contact Alexander Hausner at the above address.

Yours sincerely

Norbert Vogel
General Manager Development

Encl. Pre-prepared Fax Response Form

11.2.2 1997 Manufacturing Applicants Approach Letter



**AUSTRALIAN
QUALITY COUNCIL**

“Organisation”
Att: “Boss”
“Address”

“Date”

**RE: ‘THE IMPACT OF IMPLEMENTING QUALITY
MANAGEMENT ON THE BUSINESS PERFORMANCE OF
AUSTRALIAN MANUFACTURING INDUSTRIES’**

Dear “Salutation”

The Australian Quality Council, with the support of BHP Steel, is undertaking a research project to assess the impact of implementing quality management on the business performance of Australian manufacturing industries. I would like to invite you, as an applicant in the 1997 Australian Quality Awards, to participate in this important study.

Although data from overseas demonstrates a positive correlation between ‘Total Quality’ practices and improvement business performance, we have little in the way of Australian data to test the hypothesis here. We have anecdotal evidence collected from past applicants in the Awards process, but as yet no statistically valid study has been undertaken. You could make a very important contribution to this research.

This study is expected to deliver breakthrough results. A very sound methodology, using data collected over the past ten years of the Australian Quality Awards and additional surveys and face to face interviews will be used, and we expect that the findings will attract significant international interest.

The Study

Participation in the study will involve the collection of past business performance data. Quantitative data on economic as well as production efficiency will be collated to reflect a comprehensive picture of business performance. This data will be collected mostly by mail and telephone survey, augmented with on site visits for additional data collection and verification. Overall, your organisation would be expected to check the availability of past performance data and share some of this information with us. Depending on this availability, your preference and our need for verification, it may then be jointly decided to add an on-site interview to the process. We anticipate the time required for your participation to be no more than two days.

Total confidentiality of any information you supply in the course of the research is assured. No reference will be made to your company’s identity in any publication or other research outcome without your express consent. We expect to undertake all surveying in November with interim results available in December.

Independence of the Research

An independent researcher, Alexander Hausner of the University of Wollongong, is undertaking the study. This research will underpin his Doctoral (PhD) thesis. Alexander has thoroughly prepared the theoretical foundation for this study over the past two years while further developing and refining his competency through research both at the University and at the Quality Council. He also has extensive experience with manufacturing industries in Australia and in Germany, the UK and Canada and has presented a number of research papers at national conferences. The advantage of using one researcher is that you will be contacted only by him to keep the process as simple and convenient for you as possible. You will not be asked for financial assistance.

The Benefits of Participating

We believe that this project has the potential to validate and provide important insights into the application of Quality principles and practices in Australia. Some direct benefits to your organisation may include:

- a learning opportunity to better understand the impact of implementing those principles and practices;
- receipt of early findings and, if desired, additional feedback based on a relative comparison of your company;
- the opportunity to enhance and promote organisation-wide acceptance and endorsement of your management approach and/or to critically review and reflect on the effectiveness (ie., business impact) of efforts towards Quality Management as a valuable learning exercise;
- the opportunity to work closely with a leading researcher in business improvement through the use of Quality management.

If you can participate in this research project, please nominate a contact person for your organisation who can access the required information. We have attached a fax back form for your response to this offer. Please fill it out and return it to us at your earliest convenience. Please note that the invitation to participate in this study in no way reflects what sort of recognition you may achieve in the 1997 Awards process, if any.

We look forward to your participation in this important study for Australia's future. If you would like further information on the project, please contact Alexander Hausner direct at the Australian Quality Council, PO Box 298, St. Leonards NSW 2065, phone (02) 9901 9965, fax (02) 9436 3251.

Sincerely yours,

Melissa Dunn Lampe
Manager, Australian Quality Awards

Encl. Pre-prepared Fax Response Form

2

11.2.3 Pre-prepared Expression of Interest Reply Fax Form

URGENT Facsimile Response



AUSTRALIAN
QUALITY COUNCIL

To
Alexander Hausner, Quality Awards

Fax No.
02 9436 3251

From _____ Company _____

Phone Contact No. _____ Date _____

Subject
Our involvement in the Australian Quality Awards's Research Study:
*'The impact of implementing quality management on the business performance of
Australian manufacturing industries'*

Dear Alexander,

☐ Yes, we would like to participate. For future correspondance please contact:

Name _____ Phone _____ Fax. _____

☐ We may be interested but need some more details and information. Please contact:

Name _____ Phone _____ Fax. _____

☐ No, unfortunately we do not wish to participate.

Additional comments:

(Signature)

Australian Quality Council
ACN 050 541 047
Quality Awards Division

Level 3, 69 Christie Street
St Leonards, Sydney, Australia
PO Box 298, St Leonards NSW 2065
Tel: (02) 9901 9999 Fax: (02) 9436 3251

11.2.4 Sample Performance Measures Document

Facsimile Message



AUSTRALIAN
QUALITY COUNCIL

To	No. of Pages (Inclusive)
	3
Company	Fax No.
From	Date
Alexander Hausner	
Subject	
Your requested sample performance measures	

Message

Dear "Salutation",

The following list provides samples of business performance indicators as they may be required for participation in the AQC research study.

A final selection of performance measures will be carried out during the next stage of surveying. This next step will aim at determining the availability of data as well as their commonality under participating organisations and their suitability for testing the relationship between Quality Management practices and business performance.

Preference is given to tangible measures, which possess a generally accepted and direct relationship with competitiveness and business success.

Business success in this context is being broken down to two dimensions, the overall financial performance plus the manufacturing specific performance of production operations.

Process measures (e.g. employee satisfaction etc.) are therefore considered 'inferior' performance indicators when compared with profitability figures although their link with management practices may be more direct and obvious than what may be the case for financial performance figures. This perception is based on the business owners' view which is that the intent of a 'for profit' enterprise which is to primarily generate economic value and not satisfied employees or customers. In those cases where the issue of confidentiality arises a solution may be found in using trend data (relative development over time) rather than absolute figures.

Initially, some demographic information will be sought about the participant's operations. This may include:

- Net investment in plant and equipment
- Year plant originally built
- Equipment age (3-5, 6-10, 11-20 years)
- Production process (one of a kind, small batch, large batch, repetitive/semi continuous, continuous)

SAMPLE FINANCIAL PERFORMANCE DATA

Financial Management:

- Profit: Revenue, Margin, Expenses
- Profit (Growth Figures)
- Working Capital: Creditors, Debtors, Inventory
- Value added cost rates
- Costs per sales dollar
- Employees per sales dollar
- Operating margin
- Earnings per share
- Return on Earnings, Return on Investments
- Return on Assets,
- Sales per employee
- Profit per employee
- Business growth
- Capital turnover
- Break even point over sales
- Direct/Indirect labour costs
- Accounts receivable costs
- Direct Labour/Materials/Overhead ratio

- Marketshare
- Sales growth
- New Product development (e.g. sales ratio of new products)
- Fixed Asset Trend
- Trend in number employed
- Export growth
- Percent of repeat customers

Managerial Elements

- Degree of achieving target cost, budgets
- Absenteeism

SAMPLE MANUFACTURING PERFORMANCE DATA

Manufacturing Operations (production capability):

- Lead times
- Total product cycle time
- Waste costs
- Defect rates (external/internal)
- Fault rates
- Time lost to injury reductions
- Number of injuries/ severity
- Operating Costs
- Productivity
- Equipment utilisation
- Equipment effectiveness
- Equipment reliability/availability
- Labor productivity
- System reliability
- Throughput per day
- Production Quantity, Production per employee/machine
- Inventory turnover
- No of days of inventory in stock
- Inventory reduction
- Delivery on time

I hope that you will find the above information useful. I would very much welcome your cooperation and willingness to participate.

With kind regards.

Alexander Hausner

P.S. Please contact me under 02-9901 9965

11.2.5 Letter of Request for KPIs

URGENT Facsimile

"Company"
Att: "Boss"



AUSTRALIAN
QUALITY COUNCIL

"Address"

"Date"

RE: 'IMPACT OF USING THE AUSTRALIAN QUALITY AWARDS MODEL
ON THE BUSINESS OUTCOMES OF AUSTRALIAN MANUFACTURERS'
-An Australian Quality Council Research Project With The Support Of
BHP Steel.

Dear "Salutation",

We thank you once more for your demonstrated commitment to our research project. We would like to invite you to take part in our next stage of this research which aims at putting together the set of measures which will be used to gauge the progress made by past AQA applicants.

When deciding which measures to choose and to prioritise you may find it useful to consider the following:

They should concentrate on those measures which will distinguish leading organisations, and it will be the desirability of accomplishment in those measures (plus of course the outcome of our study) which may provide other organisations with an incentive to use the AQA model* as their structured approach towards business improvement. In other words, these measures should be commonly regarded as some of the most important business outcomes. 'Business outcomes' are defined primarily as outcomes for the owners or stockholders of the business, and could include such things as improved profit, increased return on investment, and enhanced market position. It is important to not only list a number of top business outcome indicators but also to prioritise them according to their preference given in relation to one another. Typically these measures will cover financial results as well as manufacturing output or productivity related issues such as presented in the example below:

Example:

MEASURES	PRIORITY		
Net Profit	A	Lead times	B
Return on Assets	B	Image in Public	C
Market Share	B	Production numbers	C
Customer Satisfaction	B	Utilisation/waste	C
Sales	B	Safety	C

You may want to identify measures which your organisation is continuously reporting on to the management board and/or the business owners. Or you may want to list those measures by which you believe most world class organisations today are driven. We are nevertheless strongly encouraging you to consider measures which may not be explicitly dealt with in the AQA model.

We have prepared a response fax form which will facilitate your contribution. Ideally it should be filled in by the highest ranking person available. You will find that it will only take a few minutes of one person's time to fill in the attached form and fax it back. If you have any difficulties though please do not hesitate to ring Alexander under 02 99019965.

We thank you for your collaboration and look forward to hearing from you soon.

Melissa Dunn Lampe
Manager, Australian Quality Awards

Alexander Hausner
Researcher

Encl. Pre-prepared Fax Response Form

* in '98 referred to as the "Australian Business Excellence Model"

11.2.6 Pre-prepared KPI Identification Fax Response Form



URGENT Facsimile Response

To Alexander Hausner, Quality Awards	Fax No. 02 9436 3251
From	Company
Phone Contact No.	Date
Subject <p>Our prioritised list of key business performance measures: <i>'The impact of using the Australian Quality Awards model on the business performance of Australian manufacturers'</i></p>	

Dear Alexander,
our prioritised list of ten key performance indicators is as follows:

Priority
A, B or C

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Additional comments:

11.2.7 Letter of Requesting for Business Performance data

IMPORTANT Facsimile

"Organisation"

Att: "Boss"

"Address"



AUSTRALIAN
QUALITY COUNCIL

11 March, 1999

RE: 'IMPACT OF USING THE AUSTRALIAN QUALITY AWARDS MODEL ON THE BUSINESS OUTCOMES OF AUSTRALIAN MANUFACTURERS' -An Australian Quality Council Research Project with the support Of BHP Steel.

*****Your contribution of past key business performance data*****

Dear "Salutation",

Thank you for your recent contribution to our first round of surveying which included the identification of your key performance measures. We would now like to invite you to take part in our most important and last step of this research project which involves the **collection of past business performance data on exactly those measures which were recently identified by your organisation**. As you have chosen the measures, we hope that you have some data readily available, and this step will not unduly have an impact on your valuable time.

Which Data is Needed ?

We are seeking quantitative data which relates in particular to the time of your Australian Quality Awards (AQA) application. It is important here to refer only to that part of the organisation or business unit, which was originally involved in applying for the AQA. Our records show that your organisation applied for the Australian Quality Awards in "Year of Application". However in order to carry out trend analysis we would greatly appreciate more comprehensive data relating to several years before and after the year of your application. This is why we have prepared a response form for **data entries for the period between 1991 and 1998**. Whilst we appreciate that in some cases it may be impossible to trace all data completely, you will realise that any additional year's performance data will add more value to our data analysis taking into consideration the importance of the continuity of the data series. Please use the same units over the entire data series for one performance measure.

If preferred, growth indices instead of absolute figures can be used to describe performance changes over the years. These growth indices could be calculated by basing them on a certain, for example the performance figures in the earliest year of the data series, or alternatively, the year of the first AQA application.

What about Assistance ?

We understand that this part of the surveying is probably the most resource consuming stage of your participation which is why we would like not only to thank you again for your support but also offer our assistance in collecting past performances. While mostly telephone assistance should be sufficient, additional on-site visits depending on your preference, need and our availability, may be considered. Please ring Alexander for any requests.

Consideration of special circumstances ?

A special and distinguishing feature of this study is that it is designed to take into account any abnormal deviations of performance trends or external factors which are likely to have had a significant impact on bottom line results but which are not directly related to the effectiveness of a management system. We would therefore like you to answer the questions listed on the attached response form as well as make additional qualitative comments which may help us to better understand your particular business environment.

Will there be On-site Visiting ?

In some cases it may appear beneficial to conduct an on-site interview for the purpose of elaboration, verification and clarification of data in particular of a qualitative nature (i.e. on special circumstances and external factors). Such interviews may either be suggested by you or by our researcher and an appointment will be made at the interviewee's convenience.

What about Confidentiality ?

Total confidentiality of any information, which you supply, is assured. No reference will be made to your company's identity in any publication or other research outcome without your express consent. If preferred, growth indices instead of absolute figures can be used to describe performance changes over the years which to some degree eliminates the issue about confidentiality.

How to Respond ?

As usual, we have prepared a fax response form, which will facilitate your contribution. Ideally it should be filled in by the highest ranking person available. The attached pre-prepared fax response form consists of two pages of which the first page asks for quantitative data on your business outcome with your top performance measures already filled in. The second page aims at collecting information on the characteristics of your business environment.

Concluding, we are pleased to say that as soon as we have received your response there will only be a few weeks of data analysis before we finally conclude this study and more importantly share the findings with you. If you have any queries at all please do not hesitate to ring Alexander at 02 9901 9965. We thank you so much for your collaboration and look forward to hearing from you soon. This study will be of tremendous benefit to Australian organisations and your contribution is highly valued.

Melissa Dunn Lampe (Manager, Australian Quality Awards)

Alexander Hausner (Researcher)

11.2.8 Sample Pre-prepared KPI data Fax Response Form

STRICTLY CONFIDENTIAL !!!
Facsimile Response



To: Alexander Hausner, Quality Awards
From

Fax No.: 02 42941717
Company

Phone Contact No.

Date

Subject Our key business performance data:
'The impact of using the Australian Quality Awards model on the business performance of Australian manufacturers

KPI No.	Prioritised KPIs (Year of AQA application)	1991	1992	1993	1994	1995	1996	1997	1998 to date
1	A. Return on Net assets								
2	A. Sales result (Gross Profit to Budget)								
3	A. Dead Stock								
4	A. Order fulfilment (in full on time)								
5	A. Manufacturing (IFOT of work orders/seconds)								
6	A. Sales forecasting accuracy								
7	B. OHS (No of injuries/hazards)								
8	B. Customer satisfaction								
9	B. Employee satisfaction								
10	B. Supplier satisfaction								
11	B. Product development (in full on time)								
12	B. Product returns								
13	B. Days stock holding								

Comments:

11.2.9 Industry Characteristics and Background Survey Response Form

CONSIDERATION OF SPECIAL CIRCUMSTANCES	
<p>Your response on the following issues are going to be taken into account for the analysis of your performance trends. Please make any additional comments, which may help us to better understand your particular business environment, and please do also request for a follow-up-interview if you regard it necessary.</p> <p>Participants are asked to circle the best response to each statement on a 1-5 scale (5=agree strongly, 1=disagree strongly)</p>	
<i>Issue</i>	<i>Ranking (1-5)</i>
1. rivalry	
<i>In our industry , customers are loyal - they rarely switch to new firms or competitors</i>	
<i>Competition in our industry is mainly on price, not product or service differentiation</i>	
<i>Compared to other industries, rivalry in our industry is extremely intense</i>	
<i>Firms in our industry advertise heavily compared to other industries</i>	
<i>Demand in our industry has been growing rapidly in the past few years</i>	
<i>Innovation and R&D are more prevalent in our industry than in most industries</i>	
<i>Over the past few years, our industry has been more profitable than most</i>	
<i>We have a serious excess capacity problem in our industry</i>	
<i>Our industry is still in early growth and infancy</i>	
<i>Our industry would be characterised as a high technology industry</i>	
2. entry barriers to market	
<i>Our industry is very difficult for new firms to enter successfully</i>	
<i>In our business, existing firms have insurmountable advantages over new entrants</i>	
<i>Large firms have definite cost advantages in our industry</i>	
<i>Our industry is dominated by a few large competitors</i>	
3. agility	
<i>Our industry is very fast moving and those who do not improve fall rapidly behind</i>	

In the following please circle the appropriate response

1. Our organisation has foreign ownership overseas ?

Have you carried out organisational self-assessment prior or after your AQA application ?

Yes

No

Was your decision to adopt the AQA framework in any way related to a crisis situation which you were already undergoing or anticipating ?

Some of our profitability margins are in Export and therefore foreign exchange rate dependent

Yes

No

Can you see reasons on-site why it may be beneficial to conduct a follow-up conversation

by phone or even an on-site interview ?

Are there any other external factors which should be taken into account such as large acquisitions, business termination, economical factors, industry trends etc. ?

(If desired please provide additional comments, explanations or documentation below if necessary on a separate sheet of paper)

11.3 Data Preparation Processes

11.3.1 Time Compliance Conversion Process

From 1992 to 1997:

Category 3: Change the maximum score from 130 to 60. Delete item 3.2 scores and replace them with those of item 3.3. Delete item 3.3 and its scores. Take item 3.4 scores away and insert them into 7.1.

Category 4: Swap the maximum score as well as the data of item 4.5 with item 4.6.

Category 5: Change the maximum score from 220 to 165. Delete item 5.4 and its data. Delete item 5.5 and make its data become 6.1.

Category 6: Change the maximum score from 200 to 225. Insert the data and its maximum score (25) from the previous item 5.5 into item 6.1 if not already done. Move the data of item 6.3 to 6.4. Move the data of the previous item 6.1 to 6.3. Insert the data and maximum score 930) from the previous item 3.4 into 7.1.

Category 7: Insert the previous item 3.4 into 7.1

From 1993 to 1997:

Category3: Change the maximum score from 100 to 60. Delete item 3.3 and its data. . Take item 3.4 scores away and insert them into 7.1.

Category 4: Swap the maximum score as well as the data of item 4.5 with item 4.6.

Category 5: Change the maximum score from 220 to 180. Delete item 5.4 and make its data become 6.1.

Category 6: Change the maximum score from 200 to 210. Insert the data and its maximum score (40) from the previous item 5.4 into item 6.1 if not already done. Delete item 6.3 and its data. Move item 6.2 to 6.3. Move the previous item 6.1 to 6.2.

Category 7: Insert the previous item 3.4 into 7.1

From 1994 to 1997:

Category 4: Swap the maximum score as well as the data of item 4.5 with item 4.6.

Category 5: Change the maximum score from 220 to 160. Delete item 5.5 and make its data become 6.1. Delete item 5.4.

Category 6: Change the maximum score to 220. Move items 6.2 and 6.3 one further so they become 6.3 and 6.4 respectively. Move the previous item 6.1 to 6.2.

From 1995 to 1997: (identical to 1994)

Category 4: Swap the maximum score as well as the data of item 4.5 with item 4.6.

Category 5: Change the maximum score from 220 to 160. Delete item 5.5 and make its data become 6.1. Delete item 5.4.

Category 6: Change the maximum score to 220. Move items 6.2 and 6.3 one further so they become 6.3 and 6.4 respectively. Move the previous item 6.1 to 6.2.

From 1996 to 1997:

Nil changes

11.3.2 BP Study: Overview of Perceived Value of Data Available

AQA Item	Company A	Company B	Company C	Company D	Company E	Company F	Company G	Company H	Company I	Perceived Value of data
1										
1.1	yes ***	yes ****	no	yes ****	yes ***	yes**	yes ****	yes****	yes****	5
1.2	yes ***	yes ****	no	yes ****	yes ****	yes ****	yes ****	yes****	yes****	6
1.3	yes **	yes ***	no	yes ****	yes ****	yes ***	yes ****	yes****	yes****	5
2										
2.1	no	yes ***	no	Missing	yes ***	yes*	yes ****	yes***	yes****	2
2.2	no	yes ***	no	Missing	yes****	yes ****	yes ****	yes***	yes****	4
3										
3.1	no	yes **	yes ***	yes ***	no	yes ***	yes ****	no	no	1
3.2	no	yes **	yes ***	yes ***	no	yes ***	yes ****	no	no	1
4										
4.1	yes **	yes **	yes ***	yes ***	yes****	yes****	yes ***	yes **	yes****	3
4.2	yes **	yes *	yes ****	yes ****	yes****	yes****	yes ***	yes ***	no	4
4.3	yes **	early	yes **	yes ***	yes ***	yes****	yes ***	yes ****	yes **	2
4.4	yes ***	yes **	yes ***	yes ***	yes ***	yes****	yes ***	yes **	yes ***	1
4.5	yes **	yes *	yes ***	yes ****	yes ***	yes****	yes ***	yes ***	yes**	1
4.6	yes *	yes **	no	yes ***	yes ***	yes****	yes ***		yes **	0
5										
5.1	yes **	yes *	no	yes ****	no	yes ****	yes ***	no	no	2
5.2	yes ***	yes ***	no	yes ****	no	yes ***	yes ***	no	no	1
5.3	no	yes ***	no	yes ***	no	yes ***	yes ***	no	no	0
5.4	no	yes ***	no	yes ***	no	yes ****	yes ***	no	no	1
5.5	no	yes **	no	yes ***	no	yes ****	yes ***	no	no	1
6										
6.1	no	yes ***	no	Missing	yes ***	yes ***	yes ***	one comment	yes *	0
6.2	no	yes **	no	Missing	yes ****	yes ***	yes ***	yes**	no	1
6.3	no	yes ***	no	Missing	yes ***	yes ***	yes ***	no	yes*	0
7										
7	no	yes ***	no	yes ****	yes ****	yes ***	no	yes ***	yes****	2
	MidTransition	High Transition	High Transition	Crest	Crest	Crest				
	Data presented									
	Data not presented									
	Data									

11.4 SPSS Output

11.4.1.1 Factor Analysis Sample

----- FACTOR ANALYSIS -----
--

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
LOYAL	1.00000	*	1	3.73594	37.4	37.4
PRICE	1.00000	*	2	1.54761	15.5	52.8
RIVAL	1.00000	*	3	1.34660	13.5	66.3
ADVERT	1.00000	*	4	1.31059	13.1	79.4
GROWTH	1.00000	*	5	.92030	9.2	88.6
RD	1.00000	*	6	.54055	5.4	94.0
PROFIT	1.00000	*	7	.39805	4.0	98.0
SURPLUS	1.00000	*	8	.15206	1.5	99.5
INFANCY	1.00000	*	9	.04212	.4	99.9
HITECH	1.00000	*	10	.00618	.1	100.0

PC extracted 4 factors.

Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4
LOYAL	.85287	.25331	-.10872	.18040
PRICE	-.28024	.34373	.63818	.17604
RIVAL	.61391	.50097	-.47021	.05148
ADVERT	.10778	.07646	-.33174	.85485
GROWTH	.67840	.42824	.44690	.26059
RD	.79319	-.39686	-.05165	-.18315
PROFIT	.66592	-.41157	.24808	.12147
SURPLUS	-.19360	.63788	-.36162	-.44017
INFANCY	.53996	.35810	.42103	-.34559
HITECH	.82442	-.25113	-.15621	-.29025

11.4.1.2 Test of Normal Distribution of Residuals of the ‘Difficulty to Enter’ Variable

NPar Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Unstandardized Residual	16	-5.2E-10	5.653E-02	-.10962	.08215

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		16
Normal Parameters ^{a,b}	Mean	-5.2386895E-10
	Std. Deviation	5.653360E-02
Most Extreme Differences	Absolute	.091
	Positive	.083
	Negative	-.091
Kolmogorov-Smirnov Z		.363
Asymp. Sig. (2-tailed)		.999

a. Test distribution is Normal.

b. Calculated from data.

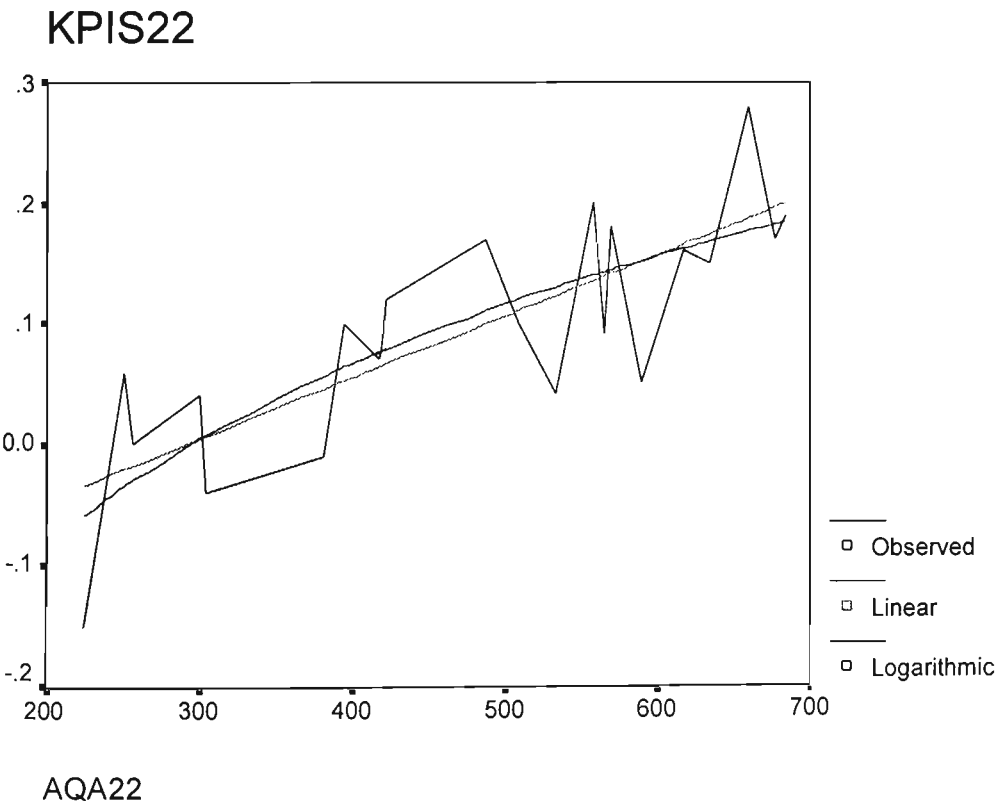
11.4.1.3 Curve Fit: Observed, Linear & Logarithmic

Curve Fit

MODEL: MOD_1.

Independent: AQA22

Dependent	Mth	Rsqr	d.f.	F	Sigf	b0	b1
KPIS22	LIN	.617	20	32.27	.000	-.1485	.0005
KPIS22	LOG	.629	20	33.89	.000	-1.2399	.2182



11.5 Awards Process Description Material

11.5.1 Evaluation Protocol Sample

1.1 Senior executive leadership (60 points)

This Item examines senior executive leadership, their collective and personal commitment, involvement and visibility in creating the values of the organisation and developing and maintaining an environment for Quality.

In this context, 'senior executive' means the highest ranking official of the organisation and those reporting directly to that official.

'Values' in this context includes all the things that are considered fundamentally important to the organisation. This will include what is strategically important as expressed in its purpose (Mission), direction (Vision) and key goals. It also includes the basic beliefs of the organisation and how they are translated into the behaviours considered essential to achieve the strategic goals.

Areas to address could include:

Approach

- The values of the organisation, how they are expressed in documents such as Mission, Vision and goal statements, declarations of basic beliefs, and Policies. The role of senior executives in creating the values. (Note that the role of other employees in this process is considered in Items 2.1 and 2.2.) How the interests of all stakeholders are considered in this process.
- The organisational culture the senior executive is creating and its relationship to Quality principles. How this is reflected in the management system, with particular emphasis on the role of senior executives in creating a sense of purpose, in setting direction, providing resources and enabling all people to contribute. How the management system ensures the creation of value for the organisation and its customers.
- How senior executives interact with the Board of Management (where they or an equivalent exist) to ensure ongoing support for the organisational culture the executive is creating.

Deployment/Integration

- How the approaches described are deployed. Specifically how unity of purpose is being achieved and departmental barriers are being eliminated within the organisation. How this encourages and enables integration of the values into routine and improvement activities and creation of a common aim in achieving organisational goals.

Results/OUTCOMES

- How the organisation evaluates [a] the depth and breadth of deployment of the approaches described and [b] the extent to which its aims were achieved. The outcomes of that evaluation.

Improvement

- How the organisation reviews [a] the effectiveness and appropriateness of the approaches described, [b] their deployment and [c] learns from this and seeks further improvement.

A

D/I

R/O

I

OVERALL

OTHER TEAM MEMBER SCORES

--	--	--	--

--

--	--	--	--

--

--

STRENGTHS

SITE VISIT
IMPORTANCE
(H, M, L)

OPPORTUNITIES/SVIs

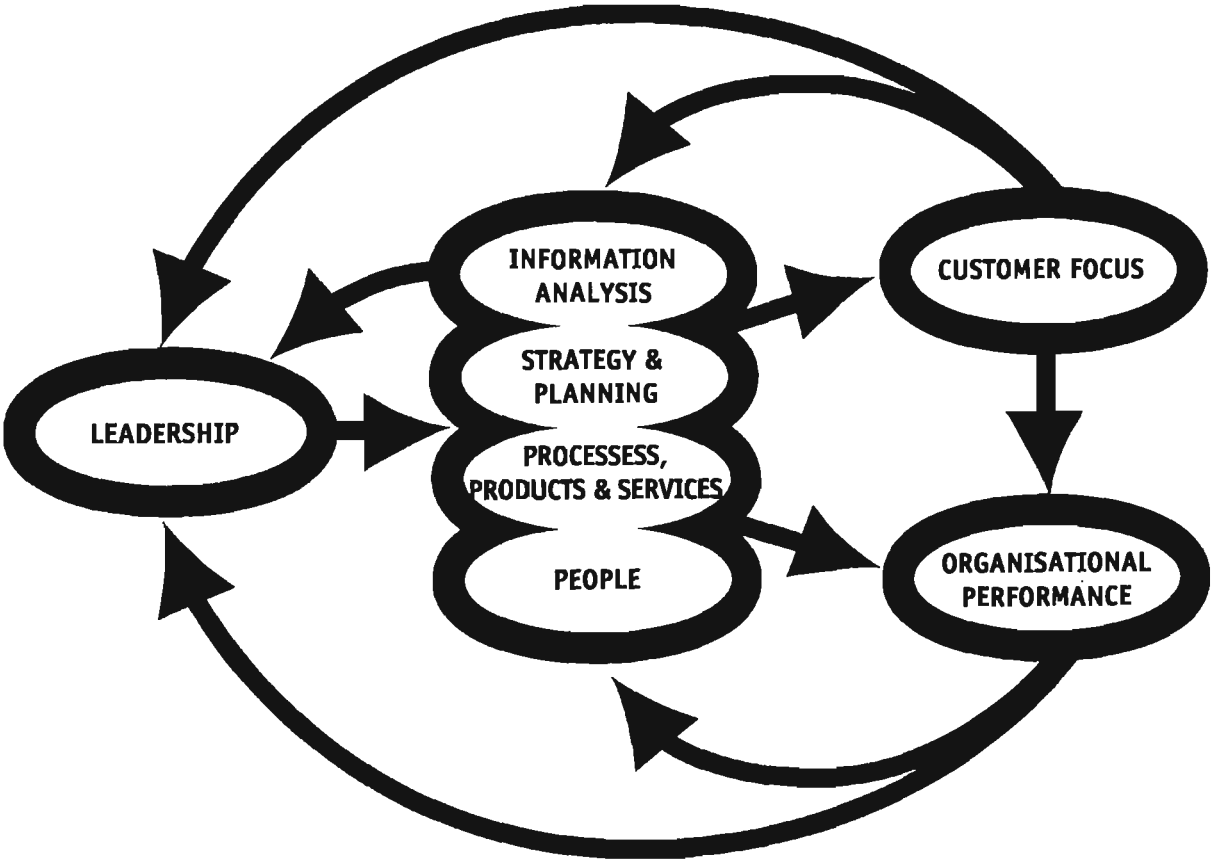
SITE VISIT
IMPORTANCE
(H, M, L)

11.5.2 Scoring Form

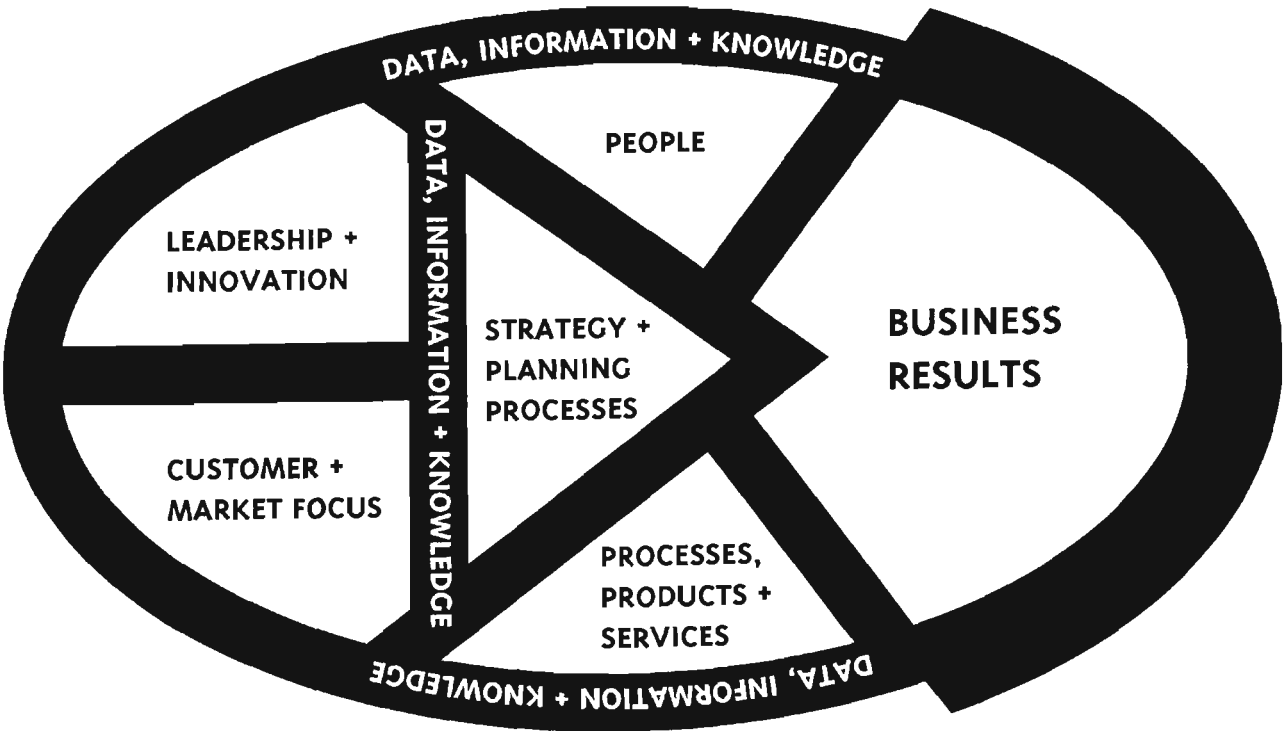
Item	[A] Points available	[B] My points score /10	[C] My weighted score	[D] Consensus points score /10	[E] Consensus weighted score	[F] Final team score /10	[G] Final weighted score
1.1	60						
1.2	40						
1.3	40						
TOTAL	140						
2.1	30						
2.2	50						
TOTAL	80						
3.1	40						
3.2	40						
TOTAL	80						
4.1	30						
4.2	40						
4.3	30						
4.4	30						
4.5	30						
4.6	40						
TOTAL	200						
5.1	60						
5.2	60						
5.3	60						
TOTAL	180						
6.1	40						
6.2	30						
6.3	70						
6.4	60						
TOTAL	200						
7.1	120						
TOTAL SCORE	1000						

11.6 The 1998 and 1999 AQA models

The 1998 Model:



The 1999 Model:



11.7 Fold Out Section
11.7.1 1997 AQA Framework Foldout

1	LEADERSHIP	140
1.1	Senior executive leadership	60
1.2	Leadership throughout the organisation	40
1.3	Leadership in the community	40
2	STRATEGY, POLICY AND PLANNING	80
2.1	Integration of values	30
2.2	The planning process	50
3	INFORMATION AND ANALYSIS	80
3.1	Scope and collection of data	40
3.2	Analysis and use of data and information	40
4	PEOPLE	200
4.1	Human resource management planning	30
4.2	Employee involvement	40
4.3	Performance management	30
4.4	Education and training	30
4.5	Communication	30
4.6	Well-being and satisfaction	40
5	CUSTOMER FOCUS	180
5.1	Knowledge of customers' needs & expectations	60
5.2	Customer relationship management	60
5.3	Customer satisfaction	60
6	PROCESS, PRODUCT AND SERVICES	200
6.1	Design and innovation	40
6.2	Supplier relationships	30
6.3	Management and improvement of processes	70
6.4	Quality of products and services	60
7	ORGANISATIONAL PERFORMANCE	120
7.1	Measures of success	120

