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**Outcome of quality management practices. Differences among public and private, manufacturing and service, SME and large organisations**

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# Outcome of quality management practices
## Differences among public and private, manufacturing and service, SME and large organisations

**Abstract**

**Purpose:** The main purpose of this paper is to describe differences among (1) public and private, (2) manufacturing and service, and (3) SMEs and large organisations regarding the outcome of quality management practices.

**Design/methodology/approach:** This study looks at the scores for different criteria (or practices) from quality award applicants in Sweden between 1992 and 2010.

**Findings:** The service industry outperforms the manufacturing industry. Furthermore, and perhaps unsurprisingly, large organisations are ahead of small and medium enterprises in the race for quality progress. In general, when comparing public with private organisations, private organisations do better, and the practice of process management seems to be easier for private firms.

**Research limitations/implications:** This study suggests that process management, as it is currently described and evaluated, needs to be revised and improved to better fit organisations.

**Practical implications:** Organisations, in general, score worse on business results than in all other criteria. This study proposes that quality managers must focus even more on how to achieve results and improve results in order to justify quality management.

**Originality/value:** This study suggests that researchers and managers need to change their mind-set regarding service organisations in relation to manufacturing organisations, and that manufacturing organisations in particular need to see how successful service organisations work with leadership aspects, information and analysis, and business planning; how they obtain committed and developed co-workers, and how they work with their customers.

**Introduction**

Four evolution stages are commonly identified in organisational work with regard to quality: inspection, quality control, quality assurance and Total Quality Management (TQM) (Dale, van der Wiele & van Iwaarden, 2007). At the start of the 1990s research into quality, and TQM in particular, boomed and many national quality awards and institutes were established. Quality was "the word" among companies, and researchers focused on what Quality Management (QM) was, how it should be implemented and the kind of results it brought back to the company. As many companies started to fail in their initiatives, a debate into its effectiveness was set in motion. TQM programmes were banned among companies and new names and methodologies were instead used, for example, Six Sigma and Lean, became popular among practitioners, even though much of the content was similar to TQM. To understand QM it is often described as consisting of different principles and practices.Sila and Ebrahimpour (2002), after analysing 347 survey articles published between 1989 and 2000, summarise the most frequently covered Quality Management factors in the literature: Customer Focus and Satisfaction, Quality Information and Performance Measurement, Process Management, Continuous Improvement and Innovation, Employee Training, Teamwork, Employee Involvement, Leadership and Top Management Commitment. Both Dean and Bowen (1994), and Boaden (1996) observe that QM has incorporated many insights from other management theories. Even though, Sousa and Voss (2002) argue that quality management (QM) can be distinguished from other strategies for organisational improvement and there is an agreement to which practices can be described as QM. Sousa and Voss (2002) use the criteria of the Malcolm Baldrige National Quality Award (NIST, 2011) to manifest the practices of QM.

Many different organisations work with QM, varying from public to private, large to small and manufacturing to service organisations. However, there is a discussion as to whether the general concept of QM and its practices should be the same for different types of organisations, for example between large and small organisations, see Ehresman (1995). Conti (2001) states that it is his belief that the quality management and its business excellence model are equally useful across all situations. Also, Sousa and Voss (2001) conclude that context needs to be considered when introducing QM. Shin, Kalinowski and El-Enein (1998) support the idea that QM can be implemented in many different types of organisations, but the specific circumstances of each organisation must be considered in order to gain fully from QM. Huq and Stolen (1996) analyse the difference between service and

manufacturing organisations, and conclude that the underlying concept of QM applies equally to both types of organisations, but differing in that service organisations have been slow to adopt QM. Yusof and Aspinwall (2000) discuss the possibility for Small and Medium Enterprises (SME) to adopt Quality Management and conclude that the current framework tends to be too complex and prescriptive for SMEs rather than being a general guide. (The European Commission regards an SME as a company that has fewer than 250 employees, is independent from larger companies and has a turnover of less than EUR 50 million). Ghobadian and Gallear (1997) argue that small organisations may adopt the principles of QM, but that implementation of QM demands specific requirements. Also, public organisations have been slow to adopt QM in comparison with private organisations, but the concept of QM is equally important in the two types of organisations (Dean & Helm, 1996). Finally, Eskildsen, Kristensen, and Juhl (2004) recorded that public organisations put much more emphasis on the people dimension than private organisations.

Even though much has been written about contextual issues and QM, Sousa and Voss (2002) argue that future research needs to distinguish more between different QM practices, and between different types of organisations; i.e. more contingency research is needed. Studies that actually compare different contexts and organisations to understand different aspects or practices of quality management are needed (see Sousa and Voss (2002)), and this is particularly true for the field of business excellence and the application of its models (Balbastre-Benavent & Canet-Giner, 2011). Hence, this study aims at filling this gap with knowledge by differentiating between both organisations and practices of quality management and seeing what can be learnt by doing so. More specifically, the purpose of this paper is  to describe differences among (1) public and private, (2) manufacturing and service, (3) SMEs and large organisations, when it comes to the outcome of quality management practices. Furthermore, this study also seeks to understand if there is any difference in outcome between organisations working with quality management during the 1990s and 2000s.

Looking back at quality management, we should have plenty to learn from the application of quality management since the beginning of the 1990s. One way to learn from the past is to look at the outcome in scores on different criteria from the various quality award applicants. In this study the criteria are seen and understood as different practices as each criterion includes different approaches to quality management; i.e. leadership, management of

processes, customer satisfaction etc., see also Samson and Terziovski (1999) for this method. This kind of data offers the researcher a relatively accurate and historical data-set that divides quality management into different practices but also allows the researcher to distinguish between different organisations. By doing so, it is possible to better understand quality management and in particular to move quality management research and initiatives forward by finding answers to the question of – "Who needs to learn what from whom?" from an organisational perspective.

This paper's outline starts with a brief overview of previous studies on business excellence. Next, the data collection and the analysis performed are presented. All scores from national quality award applicants in Sweden were collected between 1992 and 2010. The result section that follows presents the scores on the main criteria that were analysed on differences across organisations and context. A summary concerning learning opportunities for different organisations regarding practises of quality management is also presented. Finally, a discussion on the results, the research ahead and the main messages of this study are provided.

**Business Excellence**

Participating in a quality award process is for many organisations a way to support the quality management. The criteria of quality awards conform to the major constituents of QM (Ghobadian & Woo, 1994; Hendricks & Singhal, 1999; Tan, Wong, Mehta, & Khoo, 2003). In particular, Hendricks and Singhal (1999) claim, after a review of various criteria of quality awards, that the criteria and core values emphasised in the quality awards are those that are widely considered to be the building blocks of QM. Receiving a quality award is also a common proxy for a successful implementation of QM (Ghobadian & Gallear, 2001; Hendricks & Singhal, 1996). One of the arguments for this is that organisations granting quality awards typically decide on recipients after conducting an independent evaluation and assessment of an organisation's quality maturity and after measuring the organisation's quality performance against some pre-established criteria (Hendricks & Singhal, 1996).

Almost all the contemporary quality award processes include activities aimed at obtaining a description of the organisation's way of working based on a set of criteria and questions. Moreover, the quality award processes involve individual assessors to evaluate submissions, a consensus score determined by an impartial examiner group, a site visit to high-scoring finalists, and awards given to the organisations that best exemplify the criteria of award

models (Vokurka, Stading, & Brazeal, 2000). One main difference between the quality awards is the variation of the approaches and the definitions of the criteria (Vokurka et al., 2000). Two examples of well-known national and international quality awards are the Malcolm Baldrige National Quality Award (NIST, 2011), and the European Quality Award (EFQM, 2013). Grigg and Mann (2008) made a comparison of the Business Excellence award process by comparing the quality award processes of 16 countries, including Sweden.

Williams, Bertsch, Van der Wiele, Van Iwaarden and Dale (2006) carry out a theoretical study on self-assessment against business excellence models and put forward critique. They analyse why these models might no longer be relevant and useful unless the models and the way they are being used is revised. They argue that the practical validity is questioned because the models were developed during the 1980s and much has changed since that time. Now, the "one size fits all" model should be questioned and the actual award process is given too much attention. However, they also argue that organisations whose conformance quality is low could still benefit from the models. Jayamaha, Grigg, and Mann (2009) perform a study of the validity of three major business excellence models. They question both the conceptual validity and the theoretical validity. One reason why these kinds of studies are absent is due to the confidential reasons concerning historical data of past award applicants (Jayamaha et al., 2009; Pannirselvam, Siferd, & Ruch, 1998). They conclude however that all three studied Business Excellence Models (New Zealand, Australia and Singapore) passed the minimum requirement for measurement validity. There are also a number of studies on the relationship between different quality award criteria, often using survey data instead of actual application scores (Heras-Saizarbitoria, Marimon, & Casadesus, 2012; Moon, Lee, Yong-Seung, & Suh, 2011; Su, Li, & Su, 2003).

Evaluating organisations and putting scores on their way to work and its result can be troublesome. Firstly, the evaluation performed by the examiner may be inaccurate. However, Leonard and McAdam (2003) argue that the training and experience obtained by quality award examiners and assessors constitute one of the most unique, rigorous, practical and worthy forms of professional development that one can participate in. Coleman, Koelling, and Geller (2000) investigate the effect of training on improving the accuracy of third-party evaluators' scores for organisations. Their main conclusion is that the training of the examiners improves elevation accuracy but not dimensional accuracy. Elevation is useful when the scores are being used to investigate whether the organisation

meets some minimum threshold or level of performance. On the other hand, dimensional accuracy is useful when the scores are used to provide the organisation with feedback on relative strengths and weaknesses. Secondly, the model itself could be inaccurate; i.e. it is not measuring what is needed to be measured. Or perhaps the norm used for the Business Excellence Model might not be relevant. See also Curkovic, Melnyk, Calantone, and Handfield (2000) and van der Wiele, van Iwaarden, Williams, and Eldridge (2011) for a discussion on change in the business environment and its possible impact on excellence models. Jayamaha et al. (2009) investigate if the criteria measure what they purport to measure and they conclude that the criteria studied are reliable and valid.

**Methodology**

This study was performed in Sweden. The Swedish Quality Award is organised by the Swedish Institute for Quality (SIQ). The SIQ has developed a model called the SIQ Model for Performance Excellence, which is based on 13 core values and seven criteria, which are further divided into 27 sub-criteria. The seven criteria of the SIQ Model, and hence also the practices studied, are (1) leadership, (2) information and analysis, (3) business planning, (4) co-workers' commitment and development, (5) process management, (6) business results, and (7) customer satisfaction. The SIQ Model for Performance Excellence, which was originally inspired by the version of the Criteria for Performance Excellence that was used up to 1996 in the Malcom Baldrige National Quality Award (MBNQA), still has many similarities to the latter. The numbers that were collected for this study were the numbers that the examiner group, after setting individual numbers and reaching consensuses, set for each sub-criterion. The number is a percentage of what it is possible to get for each sub-criterion. The percentage of the main criteria was calculated from the sub-criteria. The total results that reflects the overall quality maturity of the organisation was calculated from the main criteria. Details of the number of employees at the organisations at the time of application and the companies were also categorised into SMEs or large organisations. Information about whether the organisation was privately or publicly owned and was a manufacturing or a service organisation was also collected.

The data was analysed with the use of a software program called JMP. JMP helps scientists explore data using statistical analysis combined with dynamic graphics. First, the whole data set was visualised in terms of differences between the years and differences between the criteria with the use of box-plots. Thereafter, differences in outcome in quality management practices (the criteria of the SIQ model) between different groups of organisations were

analysed (public were compared with Private, large organisations with SMEs, manufacturing with service, and organisations that applied during the 1990s with organisations that applied during the 2000s). Each data set was tested for normality with the Goodness-of fit Test (Shapiro-Wilk W Test). If one out of two groups was not normally distributed, it is recommended that non-parametric tests should be used. Wilcoxon each pair was selected as the most appropriate method comparing each pair instead of all pairs (using ChiSquare Appoximation) in case one of the compared data-sets was not normal distributed. In terms of normality, t-tests were used instead to discover differences between the two groups.

**Findings**

Figure 1 shows an overview of total score in the percentage for organisations applying between 1992 and 2010 (n=149) with the use of box-plots. As can be seen from Figure 1, the number of applicants has decreased, while their mean score has, increased overall. This may be due to the fact that when more organisations applied at the start, there was also a greater variance in the total score; i.e. both quality mature organisations and inexperienced organisations applied for the award, while only organisations familiar to the model and confident of a high score have applied in recent years. On average, the organisations score approximately 350 points out of a total of 1000 points.

**Insert Figure 1**

Figure 2 shows an overview with the use of box-plots of the score in percentage for the different criteria including all organisations (n=149) applying between 1992 and 2010. Organisations score worse on Business Results compared to all other criteria. The criteria for Business Results are different from the other criteria in the sense that all its sub-criteria include only result parts and not any descriptions in the text on approach, deployment and evaluation like other main criteria.

**Insert Figure 2**

Table 1 to 4 shows the differences for each criterion between Public and Private, Large organisations (above 250 employees) and SMEs (below 250 employees), Manufacturing and Service, and Organisations that applied during

the 1990s and Organisations that applied during the 2000s. The test of normality for the different data-sets is presented in Table 1 to 4 in the columns "p-value (normal test)". A bold and small p-value (below 0.05) in these tables indicates that the data is not from a normal distribution. The data was not always normally distributed with equal variance, as shown in Tables 1 to 4. A small p-value in the "p-value" columns also indicates that there is a significant difference between the two compared groups; see Table 1 to 4. In summary, private organisations are significantly better than public organisations at Process Management. Private organisations specifically, are also better than public organisations on Total Result and Business Results. Service organisations perform better than manufacturing organisations, with significant differences in Leadership, Information and Analysis, Business Planning, Co-workers Commitment and Development, Customer Satisfaction and Total Results. Large organisations score better than small and medium enterprises. This is especially true for Leadership, Business Planning, Process Management, Business Results and Total Results. Comparing the 1990s and 2000s, there are significant differences for all criteria, except for process management. The results indicate that organisations are not becoming better at process orientation to the same extent as for the other criteria. Using similar analyses as described above, it is revealed that when comparing organisations that have no prior applications with applicants that have applied on one previous occasion, there are no significant differences in scores. However, the average score is improved for all criteria. To better understand the insights of Table 1 to 4, information is presented as to which organisation should benchmark which, and in particular which organisation type has something to share and which organisation type has something to learn from each criterion, see Table 5. The learning and sharing opportunities reflect only the cases in which there was a significant difference between the practices of the two compared groups. Hence, the table also presents, from an organisational perspective, "who is better than whom at what, and who needs to learn what from whom."

**Insert Table 5**

**Conclusion**

This paper highlights differences in outcome of quality management practices among public and private, manufacturing and service, and SME and large organisations. The results indicate that it is time to question old truths. For example that service organisations are slow learners when it comes to quality management (Huq &

Stolen, 1996). The present study suggests instead that the service industry outperforms the manufacturing industry. Even though the ideas of quality and quality management originally evolved from the manufacturing setting, the manufacturing firms are now left behind. This study proposes that we need to change our minds and the rhetoric regarding service organisations in relation to manufacturing organisations. Manufacturing organisations in particular, need to turn to successful service organisations to see how they work with leadership aspects, information and analysis, business planning, how to get committed and developed co-workers and how they work with their customers. Furthermore, and maybe not surprisingly, large organisations are ahead of small and medium enterprises in the race for development. This is especially true when it comes to leadership skills, how they undertake business planning, how they work and develop its processes, and how they achieve results and improve their customer satisfaction. Comparing private with public organisations, private organisations do better in general, according to Dean and Helm (1996), and especially with regard to process management, it appears to be easier for private firms. Surprisingly, there are significant differences for all criteria with the exception of process management when comparing the scores of organisations that applied during the 1990s and 2000s. These results indicate that organisations in general are coming to grips with quality management and its practices but not when it comes to process management. Even though the basic idea of process management could be easily understood it seems like organisations have difficulty adopting this particular practice. Could it be that the models and the discourse surrounding processes do not fit complex organisations in which value creation and how it can be improved cannot easily be mapped, measured, organized and evaluated? This study suggests that process management as it is described and evaluated needs to be revised in order to better fit the organisations. Hence, new process management models and frameworks for understanding and improving the value creation need to be developed. More specific actions to be taken might also include changing the process sections in the award models. This is of paramount importance for the future of quality management as process management is one core practice of QM.

**Discussion**

On a more general level, the number of applicants has decreased, while their mean score has, on an overall level, increased. Organisations in general score worse on business results compared to all other criteria. This is interesting because in the result sections of the award criteria are the parts where the pay-off of the quality management initiative should be visible. This study recommends that quality managers need to focus even more on how to get

results and how to improve the results in order to justify quality management. Otherwise there is a risk that quality management could come to a dead end. On the other hand, organisations score better on business planning than on other criteria. An interesting perspective on the findings is, what do organisations do when it comes to business planning and what can they learn from that area with regard to other practices of quality management?

This study shows that there are differences in the outcomes of quality management practises across organisations. This calls for a development of different QM models and practices that fit different types of organisations and contexts. Perhaps excellence models in particular need to be contextualised in order to give a better value to more organisations? As the study shows, not many organisations apply for the Swedish quality award each year. Contextualised award models with contextualised processes might be an appropriate action for national administrators of quality and excellence awards. The present study has not studied the content and the quality award process, but it is relevant to question this in order for quality management and business excellence to continue to develop; for example, including sustainability (Asif, Searcy, Garvare, & Ahmad, 2011), social responsibility and innovation aspects into quality management (Bergquist et al., 2012) can help the movement progress.

In future research on this data material Bayesian network causal structure learning and structural equation modelling technique will be used to observe how the criteria are interrelated. If more regional, national and international quality award administrators provided access to their historical data from award applicants, the findings of this paper could be validated and knowledge regarding practices of QM and different contexts could be enhanced. The results of this study should be treated with some caution due to the limited number of organisations included. Including more organisations would help make more detailed research questions, such as whether service organisations also outperformed manufacturing organisations during the last century, and how the best manufacturing organisations have performed in comparison to the best service organisations during the last decade. Finally, Dahlgaard-Park (2011) reflects upon the quality movement and she concludes that quality management across the Japanese and the western approach, has reached stagnation and how the movement will recover is still to be addressed. One way forward and as this study has shown, can be learning across organisations and industries.

**References**

Asif, M., Searcy, C., Garvare, R., & Ahmad, N. (2011). Including sustainability in business excellence models. *Total Quality Management & Business Excellence, 22*(7), 773-786.

Balbastre-Benavent, F., & Canet-Giner, M. T. (2011). The strategy formation process in the EFQM Excellence Model: a critical review and new perspectives. *Total Quality Management & Business Excellence, 22*(7), 727-742.

Bergquist, B., Garvare, R., Eriksson, H., Hallencreutz, J., Langstad, J., Vanhatalo, E., & Zobel, T. (2012). *Alive and kicking–but will Quality Management be around tomorrow? A Swedish academia perspective.* Paper presented at the 13th Quality Management and Organizational development (QMOD) Conference, Poznan Poland, 5-7 September, 2012.

Boaden, R. J. (1996). Is Total Quality Management really unique? *Total Quality Management, 7*(5), 553-570.

Coleman, G. D., Koelling, C. P., & Geller, S. E. (2000). Training and scoring accuracy of organisational self-assessment. *International Journal of Quality and Reliability Management, 18*(5), 512-527.

Conti, T. (2001). *Why most companies do not get the most out of their self-assessments.* Paper presented at the Proceedings from the 55th annual ASQ Congress, Charlotte, North Carolina, 9-11 May 2001.

Curkovic, S., Melnyk, S., Calantone, R., & Handfield, R. (2000). Validating the Malcolm Baldrige National Quality Award framework through structural equation modelling. *International Journal of Production Research, 38*(4), 765-791.

Dale, B. G., van der Wiele, T. & van Iwaarden, J. (2007). *Managing quality.* Blackwell Publishers, Oxford.

Dahlgaard-Park, S. M. (2011). The quality movement: where are you going? *Total Quality Management & Business Excellence, 22*(5), 493-516.

Dean, J. W. & Bowen, D. E. (1994). Management Theory and Total Quality: Improving Research and Practice through Theory Development. *The Academy of Management Review, 19*(3), 392-418.

Dean, J. W. & Helm, M. M. (1996). The implementation of Total Quality Management into public sector agencies. A case study of the Tennessee Valley Authority. *Benchmarking for Quality Management & Technology, 3*(1), 50-64.

EFQM (2013). *EFQM Excellence Model.* Brussels: European Foundation for Quality Management (EFQM).

Ehresman, T. (1995). *Small business success through TQM.* Milwaukee, WI: ASQC Quality Press.

Eskildsen, J. K., Kristensen, K., & Juhl, H. J. (2004). Private versus public sector excellence. *The TQM Magazine, 16*(1), 50-56.

Ghobadian, A., & Gallear, D. (1997). TQM and organisational size. *International Journal of Operations & Production Management, 17*(2), 121-163.

Ghobadian, A., & Gallear, D. (2001). TQM implementation: an empirical examination and proposed generic model. *Omega, 29*(4), 343-359.

Ghobadian, A., & Woo, H. S. (1994). Characteristics, benefits and shortcoming of four major quality awards. *International Journal of Quality and Reliability Management, 13*(2), 10-44.

Grigg, N., & Mann, R. (2008). Promoting excellence: an international study into creating awareness of Business Excellence models. *The TQM Journal, 20*(3), 233-248.

Hendricks, K. B., & Singhal, V. R. (1996). Quality Awards and the market value of the firm: An empirical investigation. *Management Science, 42*(3), 415-436.

Hendricks, K. B., & Singhal, V. R. (1999). Don't count TQM out. *Quality Progress, 32*(4), 35-40.

Heras-Saizarbitoria, I., Marimon, F., & Casadesus, M. (2012). An empirical study of the relationships within the categories of the EFQM model. *Total Quality Management & Business Excellence, 23*(5-6), 523-540.

Huq, Z., & Stolen, J. D. (1996). Total Quality Management contrast in manufacturing and service industries. *International Journal of Quality and Reliability Management, 15*(2), 138-161.

Jayamaha, N., Grigg, N., & Mann, R. (2009). A study of the validity of three major business excellence models in the Asia Pacific region. *Total Quality Management, 20*(11), 1213-1227.

Leonard, D., & McAdam, R. (2003). Impacting organizational learning. The training and experience of quality award examiners and assessors. *Journal of European Industrial Training, 27*(1), 16-21.

Moon, J. Y., Lee, S. C., Yong-Seung, P., & Suh, Y. H. (2011). A study on the causal relationships in the Korean National Quality Award model. *Total Quality Management & Business Excellence, 22*(7), 705-726.

NIST. (2011). *Criteria for Performance Excellence.* Gaithersburg, MD: National Institute of Standard and Technology.

Pannirselvam, G. P., Siferd, S. P., & Ruch, W. A. (1998). Validation of the Arizona Governor's Quality Award criteria: a test of the Baldrige criteria. *Journal of Operations Management, 16*(5), 529-550.

Samson, D., & Terziovski, M. (1999). The relationship between Total Quality Management practices and operational performance. *Journal of Operations Management, 17*(4), 393-409.

Shin, D., Kalinowski, J. G., & El-Enein, G. A. (1998). Critical implementation issues in Total Quality Management. *SAM Advanced Management Journal, 63*(1), 10-14.

Sila, I., & Ebrahimpour, M. (2002). An investigation of the total quality management survey based research published between 1989 and 2002. *International Journal of Quality and Reliability Management, 19*(7), 902-970.

Sousa, R., & Voss, C. A. (2001). Quality Management: Universal or context dependent? *Production and Operations Management, 10*(4), 383-404.

Sousa, R., & Voss, C. A. (2002). Quality management re-visited: a reflective review and agenda for future research. *Journal of Operations Management, 20*(1), 91-109.

Su, C. T., Li, S. C., & Su, C. H. (2003). An empirical study of the Taiwan National Quality Award causal model. *Total Quality Management and Business Excellence, 14*(8), 875-893.

Tan, K. C., Wong, M. F., Mehta, T., & Khoo, H. H. (2003). Factors effecting the development of national quality awards. *Measuring Business Excellence, 7*(3), 37-45.

van der Wiele, T., van Iwaarden, J., Williams, R., & Eldridge, S. (2011). A new foundation for quality management in the business environment of the twenty-first century. *Total Quality Management & Business Excellence, 22*(5), 587-598.

Williams, R., Bertsch, B., Van der Wiele, A., Van Iwaarden, J., & Dale, B. (2006). Self-Assessment Against Business Excellence Models: A Critique and Perspective. *Total Quality Management and Business Excellence, 17*(10), 1287-1300.

Vokurka, R. J., Stading, G. L., & Brazeal, J. (2000). A comparative analysis of national and regional quality awards. *Quality Progress, 33*(8), 41-49.

Yusof, S. R. M., & Aspinwall, E. (2000). A conceptual framework for TQM implementation for SMEs. *The TQM Magazine, 12*(1), 31-37.
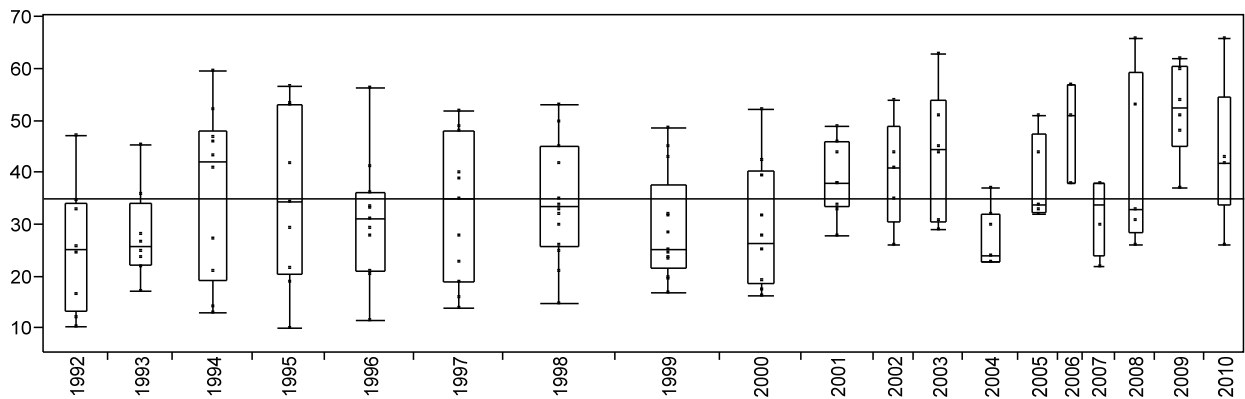
*Figure 1:*   *An overview of the total score in percentage for organisations applying between 1992 and 2010 (n=149) with the use of box-plots. The thicker the box plot, the higher the number of applicants for that particular year.*
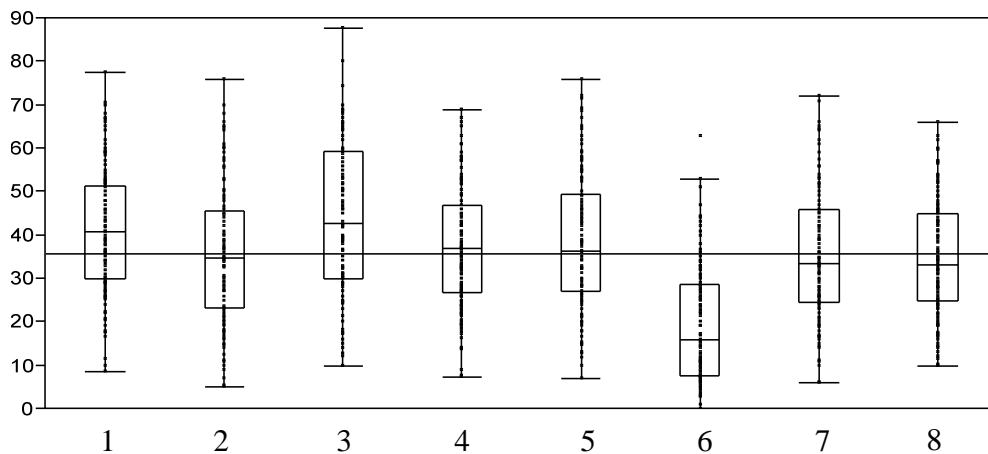


*Figure 2:*   *An overview with the use of box-plots of the score in percentage for the different criteria including all organisations (n=149) applying between 1992 and 2010. From left the criteria are 1. Leadership, 2. Information and Analysis, 3. Business Planning, 4. Co-workers Commitment and Development, 5. Process Management, 6. Business Results, 7. Customer Satisfaction, and 8. Total Results.*

*Table 1: The table shows the differences for each criterion between Public and Private (SD=standard deviation).*

| | Public (n=60) | | | | | Private (n=89) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Min | Max | p-value (normal test) | Mean | SD | Min | Max | p-value (normal test) | p-value |
| **Leadership** | 39,7 | 14,6 | 8,6 | 70,0 | 0,5084 | 41,8 | 13,8 | 10,0 | 77,5 | 0,5512 | 0,1874 |
| **Information & Analysis** | 34,1 | 16,0 | 5,0 | 68,0 | 0,3810 | 36,4 | 14,9 | 9,0 | 76,0 | **0,0337** | 0,3754 |
| **Business Planning** | 42,7 | 17,9 | 12,0 | 80,0 | **0,0463** | 44,7 | 17,1 | 10,0 | 87,9 | 0,3610 | 0,4679 |
| **Co-worker Com. & Dev.** | 35,7 | 12,9 | 7,5 | 65,0 | 0,8751 | 38,4 | 14,1 | 7,7 | 69,0 | 0,4288 | 0,1212 |
| **Process Management** | 33,2 | 14,7 | 7,1 | 63,0 | 0,0770 | 42,0 | 15,2 | 11,7 | 76,0 | 0,1273 | **0,0003** |
| **Business Results** | 17,4 | 12,8 | 0,0 | 53,0 | **0,0005** | 20,6 | 12,9 | 0,0 | 63,0 | **0,0057** | 0,1003 |
| **Customer Satisfaction** | 33,9 | 15,0 | 6,0 | 65,0 | 0,1020 | 36,4 | 14,4 | 11,2 | 72,0 | 0,0812 | 0,1508 |
| **TOTAL RESULTS** | 32,8 | 13,0 | 10,0 | 60,0 | 0,1360 | 36,3 | 12,9 | 10,3 | 66,0 | 0,1607 | 0,0509 |

*Table 2: The table shows the differences for each criterion between Manufacturing and Service.*

| | Manufacturing (n=40) | | | | | Service (n=109) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Min | Max | p-value (normal test) | Mean | SD | Min | Max | p-value (normal test) | p-value |
| **Leadership** | 37,2 | 14,6 | 10,0 | 77,5 | 0,4186 | 42,3 | 13,8 | 8,6 | 70,5 | 0,3211 | **0,0253** |
| **Information & Analysis** | 28,8 | 14,5 | 5,0 | 64,7 | **0,0162** | 37,9 | 15,0 | 5,3 | 76,0 | 0,3034 | **0,0005** |
| **Business Planning** | 36,3 | 16,9 | 10,0 | 87,9 | 0,1104 | 46,7 | 16,8 | 12,0 | 80,0 | **0,0066** | **0,0012** |
| **Co-worker Com. & Dev.** | 32,8 | 12,9 | 7,7 | 58,2 | 0,5792 | 39,0 | 13,6 | 7,5 | 69,0 | 0,4118 | **0,0065** |
| **Process Management** | 37,5 | 15,9 | 11,7 | 72,2 | **0,0524** | 38,8 | 15,5 | 7,1 | 76,0 | 0,0994 | 0,3291 |
| **Business Results** | 18,4 | 11,6 | 0,0 | 43,1 | 0,1333 | 19,7 | 13,4 | 1,0 | 63,0 | **<0,0001** | 0,7807 |
| **Customer Satisfaction** | 30,2 | 13,6 | 6,2 | 62,0 | 0,3482 | 37,3 | 14,7 | 6,0 | 72,0 | 0,2018 | **0,0045** |
| **TOTAL RESULTS** | 31,0 | 12,4 | 10,3 | 56,8 | 0,2257 | 36,3 | 13,0 | 10,0 | 66,0 | 0,2209 | **0,0127** |

*Table 3: The table shows the differences for each criterion between Large Organisations (above 250 employees) and SMEs (below 250 employees).*

| | SME (n=89) | | | | | Large org. (n=60) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Min | Max | p-value (normal test) | Mean | SD | Min | Max | p-value (normal test) | p-value |
| **Leadership** | 39,0 | 13,3 | 8,6 | 68,0 | 0,6840 | 43,8 | 15,0 | 16,7 | 77,5 | 0,2515 | **0,0203** |
| **Information & Analysis** | 33,8 | 15,9 | 5,0 | 76,0 | **0,0285** | 37,9 | 14,2 | 10,0 | 68,0 | **0,0383** | 0,0640 |
| **Business Planning** | 40,6 | 17,7 | 12,0 | 80,0 | **0,0266** | 48,8 | 15,9 | 10,0 | 87,9 | **0,0245** | **0,0052** |
| **Co-worker Com. & Dev.** | 36,1 | 14,9 | 7,5 | 69,0 | 0,0821 | 39,2 | 11,4 | 17,2 | 58,2 | 0,2378 | 0,0857 |
| **Process Management** | 36,0 | 15,3 | 7,1 | 76,0 | 0,2186 | 42,0 | 15,3 | 13,0 | 72,2 | **0,0356** | **0,0255** |
| **Business Results** | 17,8 | 13,0 | 0,0 | 63,0 | **<0,0001** | 21,7 | 12,6 | 1,0 | 53,0 | **<0,0001** | **0,0361** |
| **Customer Satisfaction** | 33,5 | 15,2 | 6,0 | 72,0 | **0,0241** | 38,2 | 13,5 | 9,8 | 64,6 | 0,0601 | **0,0243** |
| **TOTAL RESULTS** | 33,0 | 13,5 | 10,0 | 66,0 | **0,0369** | 37,8 | 11,8 | 16,0 | 59,8 | **0,0477** | **0,0161** |

*Table 4: The table shows the differences for each criterion between organisations that applied during the 1990s and organisations that applied during the 2000s.*

| | 1992-1999 (n=84) | | | | | 2000-2010 (n=65) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Min | Max | p-value (normal test) | Mean | SD | Min | Max | p-value (normal test) | p-value |
| **Leadership** | 37,8 | 14,6 | 8,6 | 77,5 | 0,2080 | 45,0 | 12,5 | 22,0 | 70,0 | 0,1526 | **0,0009** |
| **Information & Analysis** | 29,7 | 14,4 | 5,0 | 66,0 | **0,0075** | 42,9 | 13,2 | 16,0 | 76,0 | 0,0911 | **<0,0001** |
| **Business Planning** | 39,8 | 17,5 | 10,0 | 87,9 | 0,0916 | 49,3 | 15,8 | 20,0 | 80,0 | **0,0553** | **0,0004** |
| **Co-worker Com. & Dev.** | 33,5 | 13,3 | 7,5 | 60,8 | **0,0479** | 42,3 | 12,4 | 18,0 | 69,0 | 0,2940 | **0,0001** |
| **Process Management** | 36,7 | 15,4 | 7,1 | 72,2 | 0,1083 | 40,6 | 15,5 | 10,0 | 76,0 | 0,3692 | 0,0630 |
| **Business Results** | 17,0 | 11,6 | 0,0 | 44,3 | **0,0002** | 22,4 | 13,9 | 3,0 | 63,0 | **0,0184** | **0,0186** |
| **Customer Satisfaction** | 32,7 | 14,4 | 6,0 | 64,6 | 0,1607 | 38,9 | 14,4 | 15,0 | 72,0 | **0,0339** | **0,0224** |
| **TOTAL RESULTS** | 32,0 | 12,8 | 10,0 | 59,8 | **0,0377** | 38,6 | 12,4 | 16,4 | 66,0 | 0,2466 | **0,0032** |

*Table 5: The table shows an overview as to whether the organisation has insights that can be shared or if the organisation can learn from another type of organisation.*

| | Leadership | Information & Analysis | Business Planning | Co-Worker commitment and Development | Process Management | Business Results | Customer Satisfaction | TOTAL RESULT |
|---|---|---|---|---|---|---|---|---|
| **Public** | | | | | Learn from Private | | | |
| **Private** | | | | | Share with public | | | |
| **Manuf.** | Learn from Service | Learn from Service | Learn from Service | Learn from Service | | | Learn from Service | Learn from Service |
| **Service** | Share with Manuf. | Share with Manuf. | Share with Manuf. | Share with Manuf. | | | Share with Manuf. | Share with Manuf. |
| **SME** | Learn from Large | | Learn from Large | | Learn from Large | Learn from Large | Learn from Large | Learn from Large |
| **Large** | Share with SME | | Share with SME | | Share with SME | Share with SME | Share with SME | Share with SME |