

Achieve Sustainability through TQM Framework

Redha M. Elhuni

Libyan Petroleum Institute
Tripoli, Libya

Mohammad Munir Ahmad

Teesside University
School of Science & Engineering
Middlesbrough
UK

Abstract

This paper presents an analysis of the essential characteristics of the TQM philosophy by comparing the work of five notable authors in the field. A framework is produced which gather the identified TQM enablers under the well-known operations management dimensions of process, business and people. These enablers are linked with sustainable development via balance scorecard type economic and non-economic measures. In order to capture a picture of Libyan Company's efforts to implement the TQM, a questionnaire survey is designed and implemented. Results of the survey are presented showing the main differentiating factors between the sample companies, and a way of assessing the difference between the theoretical underpinning and the practitioners' undertakings. Survey results indicate that companies are experiencing much difficulty in translating TQM theory into practice. Only a few companies have successfully adopted a holistic approach to TQM philosophy, and most of these put relatively high emphasis on hard elements compared with soft issues of TQM. However, where companies can realise the economic outputs, non-economic benefits such as workflow management, skills development and team learning are not realised. In addition, overall, non-economic measures have secured low weightings compared with the economic measures. We believe that the framework presented in this paper can help a company to concentrate its TQM implementation efforts in terms of process, system and people management dimensions.

Key Words: TQM, balance scorecard, operation management, soft issues, EFQM excellence model, oil sector, Libya

1.0 Introduction

The development of quality activities has spanned over the entire twentieth century. Curiously, significant changes in the approach to quality activities have taken place almost every 20 years. Quality activities have traversed a long path from operator's inspection (1900s) to verification of quality by supervisors (1920s) to establishment of quality control departments and 100 percent inspection (1940s) to statistical quality (1960s) to Total quality control with statistical control (1980s) to total quality management and statistical problem solving (1990s) to self-managed teams and innovation (late 1990s) to (post 90s) laying of Quality System of International Standards to Backward and Forward Integration of TQM (2000 onwards). This historical development of quality concepts is shown in table 1.

People recognised that quality issues needed to be addressed on a wider scale, i.e. by directing organisational efforts towards preventing problems happening at the first place. Feigenbaum (1951) introduced the concept of total quality control, where he took a total system's approach to quality. His quality principles, outlined in 40 steps, put an emphasis on the prevention-based system by placing the focus on product, service and process design and by streamlining the source activities. The quality system, thus set in place, is documented and audited to ensure that it is adequate against pre-defined standards. Total Quality Management changing from detection to prevention required not only the use of a set of quality management tools and techniques, but also the development of a new operating philosophy that required a change in the way companies were managed.

Total Quality Management

(TQM) means achieving quality in terms of all functions of the enterprise. This includes interaction between all the components of the company as well as the components themselves. TQM aims to achieve an overall effectiveness higher than the individual outputs from the sub-systems, such as design, planning, production, distribution, customer focus strategy, quality tools and employee involvement. Customer satisfaction and continuous improvement are the essential beliefs of the TQM philosophy.

Table1: Development of quality concepts

Evolving Quality Activities		Period in Years
1.	Operator inspection	1875-1890
2.	Formeman verification	1890-1920
3.	QC department and 100 percent inspection	1920-1940
4.	QC department and statistical quality control (SQC)	1940-1960
5.	Quality assurance (QA) Department and statistical process control (SPC)	1960-1980
6.	TQM, QA department, statistical problem solving and statistical process control (SPC)	1990-1995
7.	Establishment of quality systems based on international standards, Award winning criteria laid for TQM implementation.	1995-2000
8.	Backward and forward integration of TQM	2000-onwards

Deming (1986), through his famous 14 principles, emphasized that quality improvement cannot happen without company changes directed by the top management. Juran (1974) described TQM as ‘fitness for use’, which may be seen as a key to business success in the 1990s compared with the other established performance indices, such as price and delivery. Juran introduced the concept of the quality trilogy: quality planning, quality control and quality improvement. Juran shared the views with Deming that, in order to implement continuous improvement, work-based training should be implemented on a frequent basis. For Crosby (1979), quality management concerns the prevention of problems occurring by creating the attitudes and controls that make such prevention possible.

Crosby coined the phrase ‘Do it right the first time’ and the notion of ‘zero defects’, indicating that a prevention-based system is crucial to achieve this. He also used the phrase ‘quality is free’, arguing that efforts to achieve quality would pay back more than the cost involved in terms of savings in wastes, rework, inspection and returns. As with Deming and Juran, Crosby also stressed the role of management in quality improvement efforts and the use of statistical process control in measuring and monitoring quality. Oakland (1989) defined TQM as ‘an approach for improving the competitiveness, effectiveness, and flexibility of a company’. Essentially it is a way of planning organising and understanding activities and individuals at each level.

Zairi (1998) provided a comprehensive tool for companies to undergo a two-stage external and internal benchmarking exercise, and stressed the role of leadership for implementing continuous improvement. In summary, the essence of quality is do it right first time, and to satisfy customer requirements every time, by involving everyone in the company. TQM is therefore a philosophy of management that strives to make the best use of all available resources and opportunities through continuous improvement. TQM has been a key business improvement strategy since the 1970s, as it has been deemed essential for improving efficiency and competitiveness.

2.0 The Elements of Total Quality Management

On the basis of a literature review, we conducted a comparative study of the work of the above five authors, who we believe have had a major influence in developing the total quality management discipline. Through a careful content analysis, a set of 18 elements are identified and categorized under the well-established operations management dimensions of process (and tools), business (and systems), and people. The complete framework may be viewed under enablers and results, as often advocated by EFQM Excellence model. Table 2 indicates the importance of each of these elements based on our subjective assessments. The measurement used is on a five-point scale. If one of the authors makes no mention of a key element, it is recorded as ‘no citation’ with a score of (0). Similarly ‘low citation (0.25)’, ‘moderate citation (0.5)’, ‘high citation (0.75)’ and ‘substantially high citation (1.00)’ scores are used. Where the use of these score is for illustrative purposes only, Table 2 identifies overall minimum and maximum ratings for these elements. It can be seen that the most cited element is ‘continuous improvement’, scoring 3.50, as TQM is often identified as a continuous improvement process.

The other notable elements recognised highly include ‘culture’ with a score 3.25 and ‘team learning’, scoring 3.25. A framework is of little use unless there are clear milestones and measuring procedures.

Table 2: A Comparative study of five authors showing emphasis on various TQM elements

TQM elements		Authors					Weighting(total= 5)
		Deming	Juran	Crosby	Oakland	Zairi	
Process (tools)	Single-loop learning	0.75	0.25	0.50	0.25	0.25	2.00
	Problem solving	0.75	0.50	0.25	0.25	0.50	2.25
	Benchmarking	0.50	0.25	0.25	0.25	0.25	1.50
	Action learning	0.75	0.50	0.50	0.25	0.25	2.25
	Continuous improvement	0.75	0.75	0.75	0.50	0.75	3.50
	Learning cycle	0.75	0.25	0.25	0.0	0.25	1.50
Business (system)	Data management	0.50	0.50	0.25	0.25	0.50	2.00
	Culture	0.75	0.75	0.50	0.50	0.75	3.25
	Company structure	0.50	0.75	0.50	0.25	0.50	2.50
	Communication	0.50	0.75	0.50	0.25	0.75	2.75
	Vision	0.50	0.50	0.25	0.25	0.50	2.00
	Performance management	0.75	0.75	0.50	0.25	0.75	3.00
People	Leadership	0.75	0.25	0.50	0.25	0.25	2.00
	Management responsibility	0.50	0.75	0.50	0.25	0.75	2.75
	Empowerment	0.75	0.50	0.25	0.25	0.75	2.50
	Rewards/recognition	0.50	0.25	0.25	0.0	0.50	1.50
	Training & education	0.50	0.50	0.75	0.50	0.50	2.75
	Team Learning	0.75	0.75	0.75	0.50	0.50	3.25

We believe that 21st century companies cannot solely rely on quantifiable measures such as cost and schedule performance, while ignoring qualitative measures such as workforce engagement and skills development. Therefore, two sets of performance measures are introduced to evaluate the company performance. The first set considers traditional economic measures such as net profits, revenue growth, and return on assets, Profit to revenue ratio, cost reduction, and productivity, as shown in Figure 1. The second set includes non-economic measures such as workforce engagement, skills development, injury frequency rate, diversity and inclusion, preventing corruption, social investment and local procurement & supplier development. To us, these economic and non-economic measures provide a balance scorecard, as introduced by Kaplan & Norton (1994). For us, these non-economic measures are essential to put right the infrastructure (business and systems) and reward and recognition system or hygiene factors (people elements) in place to establish and nourish the TQM characteristics. Where these economic and non-economic measures are linked to the TQM enablers in an implicit way, there is also an implicit link between the economic and non-economic measures identified in Figure 1.

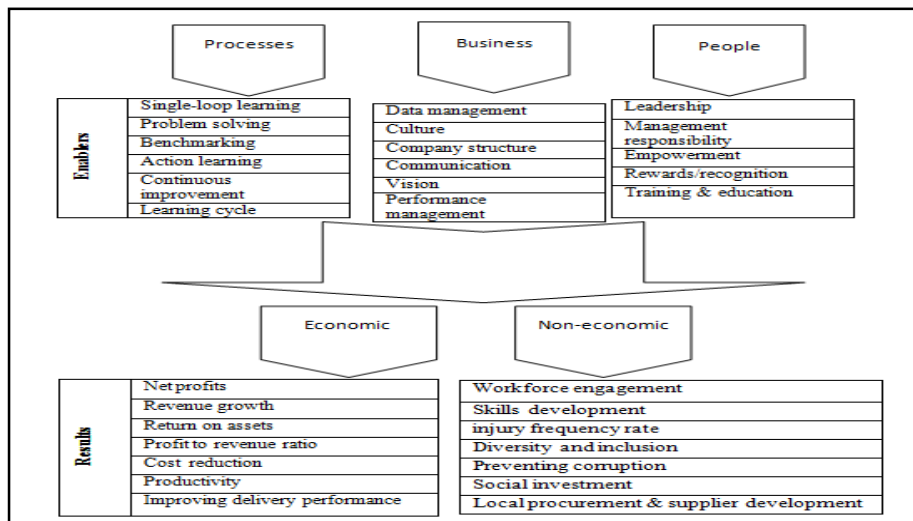


Figure 1: An enabler – results conceptual framework of TQM

However, we found it difficult to develop any one-to-one relationship between the two. In addition, in the light of recent developments in the field of core competence (Prahalad & Hamel, 1990), the main emphasis of the TQM enablers concerns collective learning (Hafeez et al., 2002, a, b, and c), and the outputs measures in terms of intellectual capital skill development, and knowledge management (Hafeez & Abdelmeguid, 2003). Survey Structure Using the framework given in Figure 1, a questionnaire survey was conducted to review the state of the quality movement in the Libyan companies. The sample consists of oil sector companies. A sample of 40 companies was contacted over the phone and/or email. The questionnaire was sent to 25 Libyan companies that had shown an interest in the qualifying round. A total of 12 questionnaires were completed and returned (around 48% response rate). Five of the return responses were rejected in the final analysis due to inconsistency or incompleteness. It should be noted that the companies selected had some business improvement strategies/programmes in place during the last three years. It was ensured that the responding companies were in the process of developing or implementing TQM projects.

3.0 Results and Discussions

Each element of the framework was translated in the form of Likert-scale/linear scale questions (Barnett, 1991). Respondents were asked to provide a subjective assessment for each enabler and the outcome. Sample responses were summed and averaged under process (P), business (B), and people (P) categories, as explained earlier. A total of seven questionnaires were used in the final analysis. However, for illustrative purposes, we explain the analysis for case company A in the next subsection and, subsequently, describe the overall results of the surveyed company.

3.1 Case Company A

Company A belongs to upstream operation and has implemented TQM as a business strategy during the last three years. It has less than 200 employees and a sale turnover below £50-500 million per year. A profile for this company in terms of employee, turnover, TQM implementation time, etc. is given in Table 3 (see company number 2). Analysis of the results reveal that team learning, management responsibility, and learning cycle have scored no ratings with regards to the framework enablers (see Figure 2). However, training and education, empowerment, communication, continuous improvement, and problem solving have scored relatively high ratings. Rewards/recognition, leadership, performance management, potential behaviours, shared vision, company structure, culture, benchmarking and action learning all scored relatively moderate ratings. For company A, where the leadership (with a score of 20%) takes some responsibility for developing individual training and education, they also emphasise empowerment and continuous improvement. The company A's tendency to organise is also matched by its capacity to facilitate problem solving (scoring 45%). The focus on analytical tools and systems-based methods tends to foster the learning processes for the company, perhaps through the instigation of training and education, and skill development initiatives. As explained in Figure 1, the framework elements were summed and averaged under the processes (P), business and systems (B), and people (P) category. Company A scored 0.25, 0.23, and 0.27, respectively for P, B, and P as shown in Figure 3.

Table 3: The overall profile of the surveyed company

Company number	Sector			Implementation period			Number of employees (size)				Estimated sale (\$m/year)		
	Upstream operation	Oil & gas production	Refinery & service	< 3	3-5 year	5-10 years	<100	100-200	201-500	>500	5-50	50-500	>500
1													
2													
3													
4													
5													
6													
7													

Figure 5 gives the individual output score illustrating that the company performance with respects to local procurement & supplier development, social investment preventing corruption, diversity and inclusion, and injury frequency rate each scored around 20%. Elements such as customer satisfaction, order cycle time, workflow engagement, skills development scored about 30%, where the score for the non-economic measures isn't quite encouraging for this company. This supports the view that non-economic measures are an essential part of the improvement strategy in relation to economic business measures, and to some extent it vindicates their inclusion in our framework. Like the TQM enablers, economic and non-economic measures are averaged to view the cumulative impact of the two output measures. Figure 5 illustrates that for company A, economic measures, on average, scored around 0.30. This is still relatively higher than the non-economic measures with an average score of 0.18. This highlights the fact that company A is very much traditionalist with its governance principles, and signifies an emphasis on the output driven approach to meet quantifiable targets.

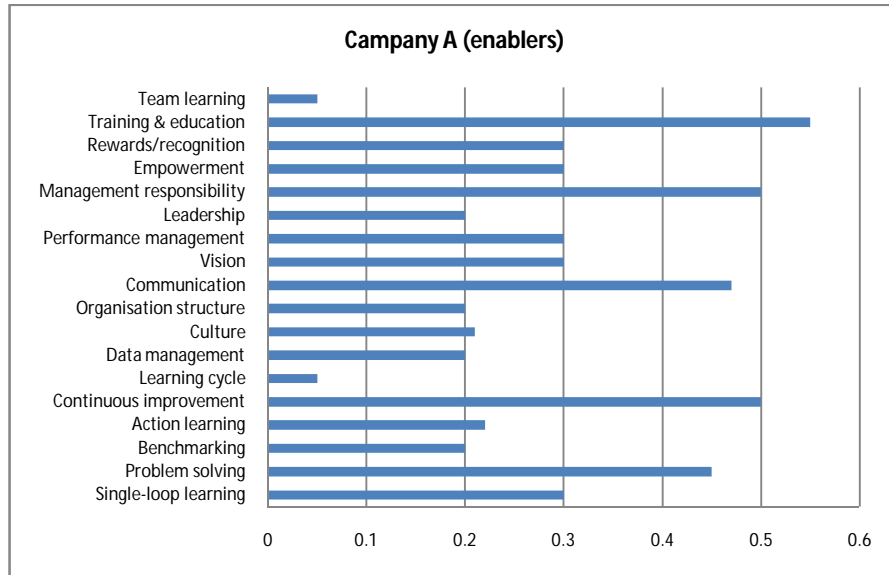


Figure 2: The scores of enable for the case Company A

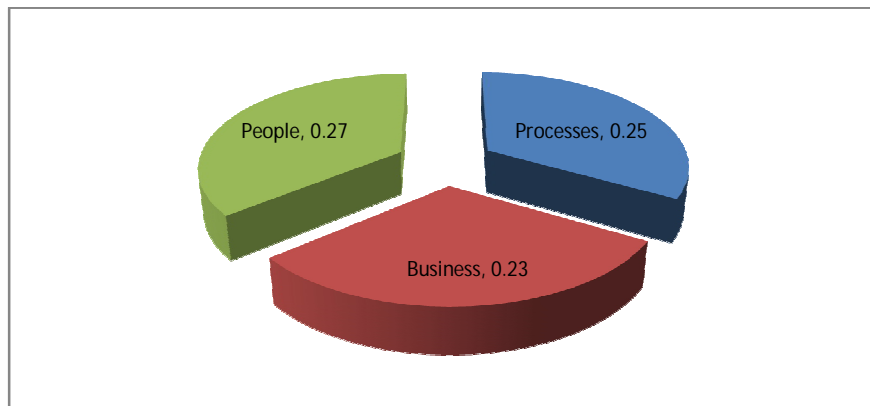


Figure 3: The values of P, B, and P elements for the case Company A

3.2 Overall TQM Enabler Results

A similar procedure to the above was adopted to evaluate the average scores for the remaining six companies (see Table 3). It is clearly demonstrated that none of these companies has a score above 0.33 for any of the P, B, and P dimensions. Where each of the radar plot provide a time history of the P, B and P initiatives a company has undertaken on its pursuit to become a truly TQM company, it was not possible to show a direct correlation between the enablers and results. However, for each company, the economic performance measures clearly outweigh the non-economic measures. As mentioned earlier there are implicit relationships between non-economic and economic performance measures, which are difficult to relate in tangible form.

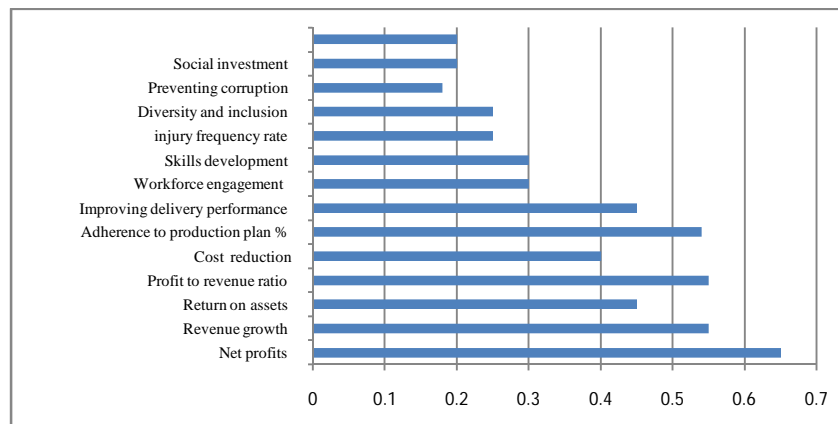


Figure 4:The values of company performance for case Organisation A

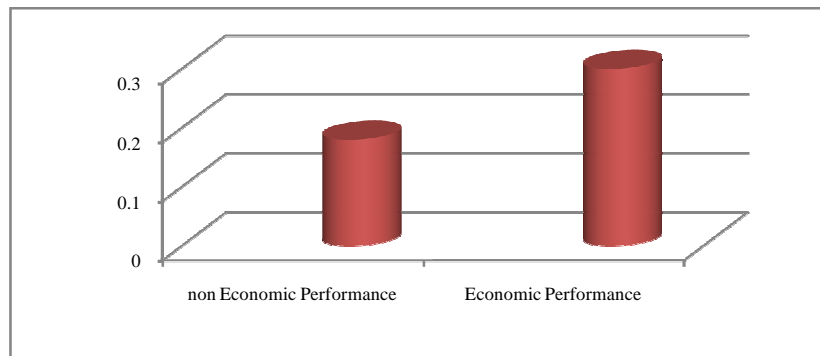


Figure 5: Average economic and non-economic performance score for the case Organisation A

Enquiring further into the T, O, and P model the average values of the seven companies were analysed. Figure 6 gives the average score for all nine sample companies. Overall, the respondents cited people (around 35%) as the most important factors in a TQM organisation, followed by processes (26%) and business and systems (24%). Overall five of the surveyed organisations indicated that there should be relatively more emphasis on the soft (people) issues when pursuing the TQM philosophy. This again justifies our rationale of including soft issues within our framework. In addition, five companies indicated there should be a greater emphasis on processes and tools, while only three of the survey group believed that business and systems are the main instruments for operationalizing TQM philosophy.

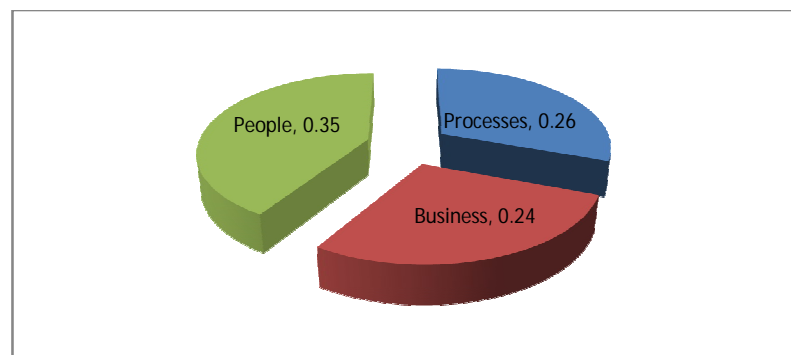


Figure 6: Average score of the seven sample companies according to P, B, and P classifications

Figure 7 gives a summary of the analysis by conducting a correlation study between the respective P, B, and P dimensions for the seven sample companies. Looking at the cluster of TQM companies, there seems to be some guidelines on the enabling mechanisms to help a company implement TQM on a continuum. In relative terms, there seems to be a stronger correlation between the people versus business (systems) dimensions of the framework (results of two companies are superimposed in Figure 7) compared with the people versus processes or the business versus processes dimensions. With caution, in a limited way, these results suggest that TQM can be delivered more successfully by placing the right business support structure to help people to achieve quality.

This implies that companies should take due considerations of the business structure in place and culture prevalent, and the associated integration issues while making investment in new processes.

3.3 Overall Organisation Performance Results

The conceptual framework illustrates a range of indicators, which are grouped according to economic and non-economic performance measures. More than half of the respondents have expected organisational benefits in terms of improving delivery performance (32%), reduced cost (47%), increased workforce engagement (25, and decreased injury frequency rate (51%). Only a few respondents did not anticipate any improvement in company performance, and believed that implementing TQM would not help in preventing corruption.

Again, individual company responses were summed and averaged under economic and non-economic categories. These were again summed and averaged to determine the overall performance for the seven sample companies. Figure 8, presents the overall average scores of the indicators as grouped under non-economic and economic performance.

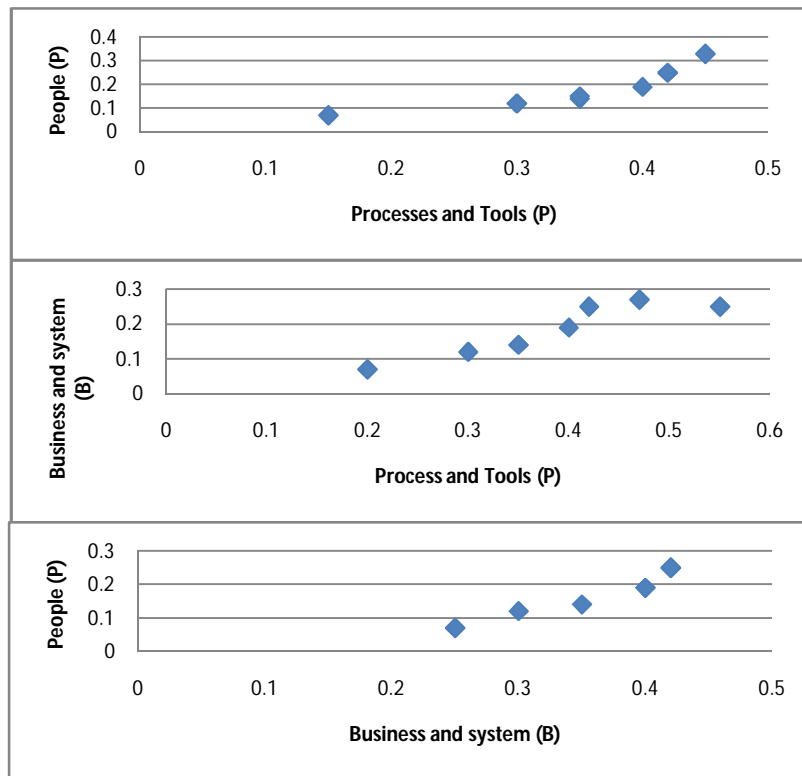


Figure 7: Correlation between the Processes, Business and People dimensions for the survey companies

Overall, on average, non-economic measures have scored relatively very low (15%) against their economic counterparts (35%). This indicates that, overall, either companies have not started thinking about the benefits of TQM in non-economic terms, or they have not employed any visible matrices to measures these impacts. Again, this to some extent highlights the fact that all of these companies have a strong output driven approach to meet quantifiable targets.

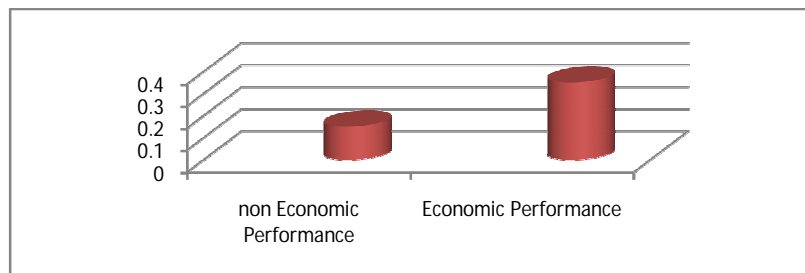


Figure 8: The overall economic and non-economic performance scores for the survey companies

Figure 9 represents the organisational performance under economic and non-economic categories. It is evident that the two performance measures have a relatively stronger correlation compared with the PBP enabler correlations. These results, in a way, illustrate the importance of non-economic measures, albeit that many of the surveyed companies felt that they have not made any significant improvement in the non-economic performance category. The main reason for this underachievement could be that any improvement with regards to social investment, diversity and inclusion and skill development was not realised. Perhaps these companies did not have any relevant performance measure in place to this effect? In the economic performance category, very little difference was noted between the overall scores of seven companies.

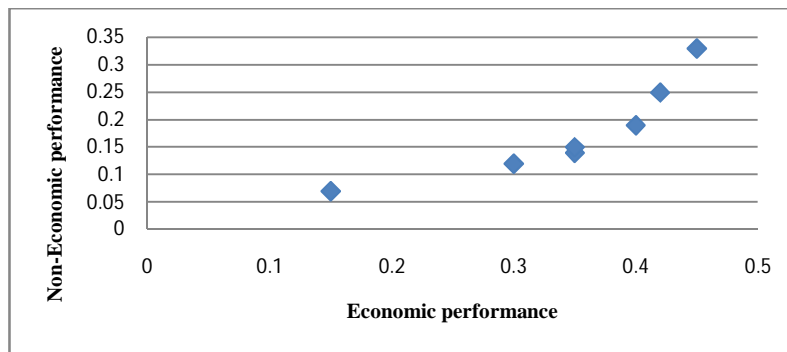


Figure 9: Correlation between the economic and non-economic performance measures for the survey companies

Table 4 gives a comparative study of the TQM elements drawn from the authors' weighting, against the survey results of the TQM companies, and Figure 10 charts the correlations between the two. The main gaps (if the relative difference between weights is 0.5 or more) between the authors' weightings and practitioners' weightings are shown in bold. It is evident that the largest gap is in the process (tools) dimensions for single loop learning, where practitioners are underperforming this activity by a difference of more than 1. This is surprising as single loop learning in the form of PDCA is to be the pre-requisite and essential part of any TQM activity. The only element in any category where practitioners outperform the authors' view is data management (scoring 2.25 against 2.00). This could be, perhaps due to the fact that, during the last two decades, the bulk of the major technology advancement has taken place in the computing field, and these advancements were not captured in the imagination of some of the classical TQM authors.

The biggest gap in the business (system) category is in the shared vision (by 0.75), illustrating that the management either had no vision, or were unable to convey the long-term aspiration of the companies' goals to its employees. One reason could be the lack of communication which is identified as the second biggest gap in this category. However, the analysis reveals three major gaps identified with the 'soft issues' in the people category, which is alarming. These include empowerment, reward/recognition and team learning, all underperforming by relatively large margins. It is clear that these companies still need to fully understand and implement soft issues with the people management dimensions.

Table 4: A comparative study of theory and practice of the TQM elements

Elements		Framework evaluation (out of 5)	Authors weighting (out of 5)
Process (Tools)	Single-loop learning	1.25	2.50
	Problem solving	2.0	2.25
	Benchmarking	1.25	1.50
	Action learning	2.00	2.25
	Continuous improvement	3.25	3.50
	Learning cycle	1.25	1.50
Business (system)	Data management	2.25	2.00
	Culture	2.75	3.25
	organisation structure	2.25	2.50
	Communication	2.25	2.75
	Vision	1.25	2.00
	Performance management	2.75	3.00
People	Leadership	1.75	2.00
	Management responsibility	2.50	2.75
	Empowerment	2.00	2.50
	Rewards/recognition	1.00	1.50
	Team learning	1.75	2.75
	Training & education	3.00	3.25

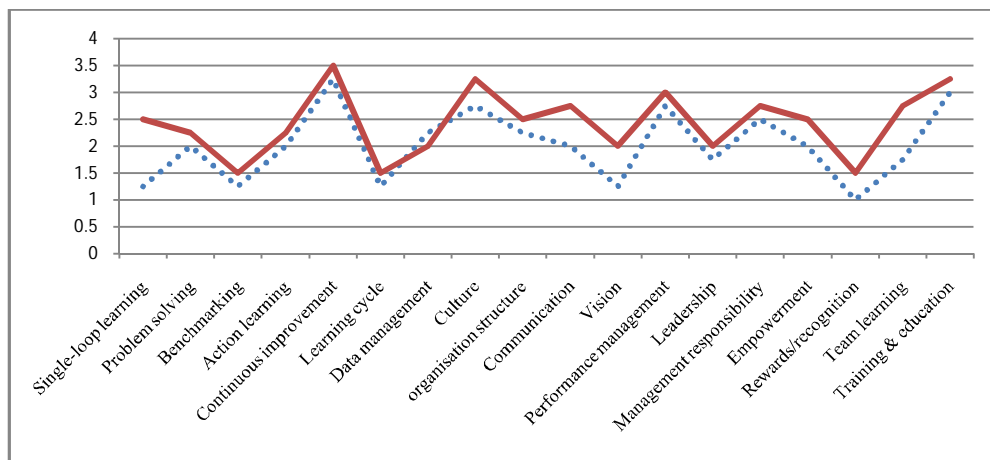


Figure 10: Comparisons between the theoretical (authors) weighting and framework evaluation (Practitioners weighting)

4.0 Conclusions

Our comparative study of 5 notable authors suggests that TQM initiatives can only be regarded as successful when a new working environment has been created in which people are able to learn, share knowledge and make contributions. To substantiate these theoretical concepts from the practitioners’ point of view, a questionnaire survey was conducted. The survey results indicate that companies are experiencing great difficulty in translating TQM theory into practice. Few companies have effectively adopted a holistic approach to TQM philosophy. In most cases, team learning and single loop learning elements were completely absent and companies were struggling to take appropriate measures to instigate empowerment and put suitable reward/recognition systems in place. Where theoretical concepts scored higher than the practitioners’ experience, we found that the only dimension where companies are outperforming the theoretical underpinning is in the area of data management.

However, a word of caution on these findings would be that companies must duly take into considerations 'people'-related issues while looking at TQM-related process investment. In addition, individually as well overall, economic measures outperform non-economic measures identified with the TQM conceptual framework.

In conclusion, from this sample group of companies it is seen that although most of the companies understand the commercial or institutional demands to introduce TQM as a business strategy, few benchmarks of best practice have emerged. Indeed, when considering the noted lack of skills and the cited organisational barriers to implement TQM philosophy, the substantial difficulties companies face in this critical transformation process become readily apparent in terms of soft issues. We suggest that the TQM framework presented in this paper allows companies to concentrate their efforts through process, system and people management instruments. Also, we believe that the

TQM framework based on the balanced scorecard type performance measuring system, as identified in the paper, provides a good metric for the companies to realise TQM efforts in terms of economic and non-economic business performance.

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