

An Empirical Analysis of ISO 9004:2000 Maturity in ISO 9001 Certified SMEs

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Abstract

This paper empirically determines the extent to which ISO 9001 certified small and medium-sized enterprises (SMEs) were able to attain the eight quality management principles on which the ISO 9004:2000 Standard is based. It employs the Analytic Hierarchy Process approach in determining the percent weightings of these principles and the self-assessment questions which form part of the ISO 9004:2000 Standards. Of particular interest is a weakness of these enterprises in formulating policies addressing the needs and expectations of shareholders and the society in terms of the community and the public affected by the organisations or its products. This paper makes a contribution to the body of knowledge in the field of quality management in Trinidad and Tobago where such work is limited. It adds value by empirically measuring TQM implementation through determining the extent to which its criteria are implemented in ISO 9001 certified SMEs.

Key Words: ISO 9004:2000; ISO 9001:2000; SMEs, Trinidad and Tobago

1. Introduction

Many small and medium-sized enterprises (SMEs) worldwide have adopted the ISO 9001:2000 Standard as a means of attaining some forms of quality management. The empirical analysis, of the extent to which ISO 9001 certified SMEs are successful in attaining total quality management (TQM), will therefore be of particular interest since it can be used to identify strengths and weaknesses in their journey towards quality excellence. ISO 9001:2000 and ISO 9004:2000 were two quality standards stipulated by the technical committee ISO/TC 176. They were developed together in order to promote ease of transition and efficiency within an organisation. ISO 9001 is the quality management standard comprising of certifiable compliance requirements while ISO 9004 is a standard not being certifiable but providing guidelines beyond the requirements set in ISO 9001 in order to consider both ef-

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fectiveness and efficiency of a quality management system (QMS) [1].

Among various prominent operations improvement approaches, Ahire and Ravichandran [2] contend that TQM is the most prominent one. Debate is intense whether those organizations, having been certified to the ISO standards, have been able to reap the benefits of TQM. Adopting the ISO (International Organisation for Standardisation) standards may provide a foundation on which organisations build their TQM programmes. Moreover, self-assessment is usually performed by the management an organisation and provides fact-based guidance to the organisation on where resources to be invested for its improvement [3]. This is of particular importance to SMEs since they are characterised as having scarce resources which must be allocated in the most efficient and effective manner in order to derive maximum benefits. Annex A of the ISO 9004 Standard gives self-assessment guidelines and questions that can be used to identify areas of weaknesses to which scarce resources could be allocated. In this context, this paper examines empirically the extent to which the quality management principles (QMPs) of the ISO 9004:2000 have been implemented in three invited SMEs in Trinidad and Tobago.

2. Relevance of Quality Management Principles

Russell [4] contends that ISO 9001:2000 is based on eight quality management principles that reflect best business practices. These are:

- 1) *Customer Focused Organisation*: Small and medium enterprises (SMEs) must understand that they depend on their customers and therefore determine current and future customer needs, meet customer requirements and strive to exceed customer expectations;
 - 2) *Leadership*: SMEs top management must establish unity of purpose and direction. They must create and maintain the internal environment in which people can become fully involved in achieving the organisation's purpose;
 - 3) *Involvement of People*: Employees at different levels must be recognised as the essence of the organisation and strategies put in place to ensure their full involvement so that the organisation can derive maximum benefits from their abilities;
 - 4) *Process Approach to management*: A desired result is achieved more efficiently when related resources and activities are managed as a process;
 - 5) *System Approach to Management*: Identifying, understanding and managing a system of interrelated processes for a given objective improves organisational effectiveness and efficiency;
 - 6) *Continual Improvement*: The "Plan- Do-Check-Act" is applied to processes. The *Plan* establishes the objectives and processes necessary to deliver results in accordance with customer requirements and the organisations' policies; the *Do* implements the processes;
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the *Check* monitors and measures processes and product against policies, objectives and requirements for the product and reports the results; and the *Act* takes actions to continually improve process and system performance.

- 7) *Factual Approach to Decision Making*: Effective decisions are based on the analysis of data and information; and
- 8) *Mutually Beneficial Supplier Relationship*: Organisations and their suppliers are inter-dependent, and a mutually beneficial relationship enhances the ability of both to create value.

These principles are comprehensive and fundamental rules (or beliefs) for leading and operating an organisation, aimed at continually improving performance over the long term by focusing on customers while addressing the needs of other stakeholders [1]. These rules could be used to evaluate the maturity of QMS in organisations. The criteria of ISO 9004:2000 consist of the eight QMPs that have applied the compliance requirements of the ISO 9001:2000 Standard. Annex A of the Standard also consists of a set of self-assessment questions (SAQs) to which these criteria are attained in organisations [3]. For the purposes of this study, these questions represent the objectives of ISO 9004:2000.

3. Conduct Self-Assessment Study Using AHP Methodology

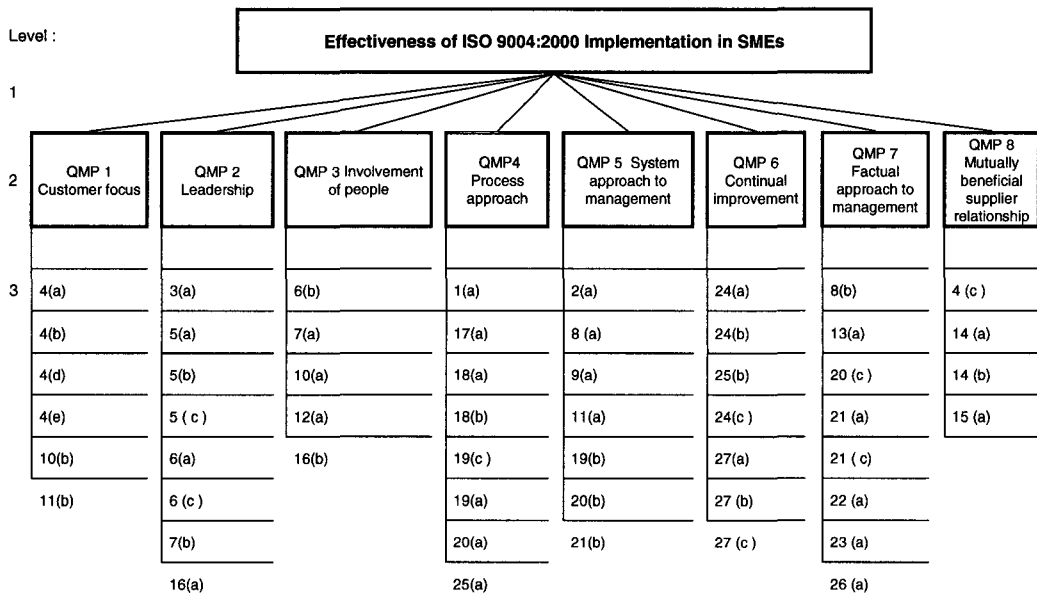
3.1 Adopting Analytic Hierarchy Process Approach

The Analytic Hierarchy Process (AHP) approach advocates decomposing a complex problem into a multi-level hierarchical structure of characteristics and criteria with the last hierarchical level constituting the decision alternatives. These alternatives are compared with one another to determine the objectives of the problem [5, 6]. Organizing in a hierarchy serves two purposes: 1) it provides an overall view of the complex relationship inherent in the situation; and 2) it helps decision makers assess whether the issues in each level are of a same order of magnitude, so homogeneity in comparisons is preserved [7]. Saaty [6] suggests the guidelines on the selection of the different levels of criteria and construction of the hierarchy. These are: 1) representing the problem as thoroughly as possible; 2) considering the environment surrounding the problem; 3) identifying the issues or attributes contributed to the solution; and 4) clarifying the necessary participants associated with the problem.

3.2 Developing an Analytical Framework

Based on the goal established for this study, a list of performance criteria and objectives were identified in line with the compliance requirements of ISO 9004. These criteria are

represented by the QMPs as well as the objectives by the SAQS of Annex A [3] and are structured into a hierarchy with respect to their importance. An analytical framework was then developed for facilitating the study, as depicted in Figure 1. The framework consists of three levels, namely the goal (i.e. Level 1), the QMPs (i.e. Level 2) and their respective self-assessment objectives (Level 3). The goal was to assess the effectiveness of QMP implementation in ISO 9001 certified SMEs. Each QMP criterion comprises several objectives and benefits towards the attainment of ISO 9000 certification.



Remarks: Level 3 represents the objectives by SAQs as they are numbered in Annex A of the ISO 9004:2000 Standard(For a brief description of individual objectives, see also Table 2)

Figure 1. An Analytical Framework for QMP Self-Assessment Study

Empirical information and data were obtained through the combined judgments of individual evaluators from individual SMEs in order to make a trade-off and to determine priorities. Both the objective and subjective judgments of top management were included. Invited evaluators in each SME under study were asked to carefully evaluate the criteria of each hierarchical level by assigning relative scales in a pair-wise fashion with respect to the goal of the model. With a set of semi-structured questions, the interviewees were asked to assess a pair-wise comparison among eight QMPs and 53 objectives. A nine-point scale was used to assign the relative scales and priority of weights of criteria [6]. Experience has confirmed that the scaling mechanism reflects the degree to which one could distinguish the intensity of relationships among the levels of decision criteria and elements [6, 8].

3.3 Selecting the Participating SMEs

Three SMEs hiring less than 100 people each and operating in Trinidad and Tobago were invited to participate the study. Table 1 depicts the characteristics of these three companies (i.e. A, B and C) against a list of 25 selection criteria based largely on Ghobadian and Gallear [9]. These criteria were chosen to reflect the unique characteristics of SMEs, in terms of their structure, procedures, behavior, culture, processes, people and contacts endemic to the country. A “Y” means that the company possesses the characteristic, while an “N” means that it does not.

Table 1. Selection of Participating SMEs

No.	Lists of Selection Items	Company		
		A	B	C
	Resources			
1	Willingness and resources available to implement ISO 9001	Y	Y	Y
2	Had little prior knowledge of quality management systems	y	Y	Y
3	Require upgrade from ISO 9001:1994 to ISO 9001:2000	N	N	N
	Profile			
4	Number of employees less than 100	Y	Y	Y
5	Company less than 5 years old	N	Y	N
6	Company between 5 and 15 years old	Y	N	N
7	Company greater than 15 years old	N	N	Y
8	Job shop type	N	Y	Y
9	Batch production type	Y	N	N
10	Continuous flow	N	N	N
11	Service	N	N	N
12	Project type	N	Y	Y
13	Certified at present	Y	Y	Y
14	HSEQ requirements	N	Y	Y
	Ownership			
15	Family owned	Y	N	Y
16	Government owned	N	N	N
17	Sole proprietary	N	Y	N
18	Public company	N	N	N
19	Division	N	N	Y
20	Skilled based	N	Y	Y
21	Established by entrepreneur	Y	Y	Y
	Location			
22	Based in an industrialised area	N	Y	N
23	Based in the East West Corridor	Y	N	N
24	Based in Central	N	N	Y
25	Based in South	N	N	N

Remarks: “Y” means Yes ; “N” means No

Company A was less than 5 years old operating as a job shop, Company B was greater than 15 years involving in batch production while Company C was mainly conducting project work by use of skilled contracted labour. None of them had previous knowledge of quality management systems. These companies had a fluid organisational structure with key personnel performing many functions. In all cases, top management was in close contact with the main customers and had direct input and contact with the key suppliers.

3.4 Determining the Priority Weights of Criteria

Pair-wise comparison is a key step in an AHP model to determine priority weights of criteria and provides a rating for alternatives based on qualitative factors [6, 7]. The normalised weight priorities of the different hierarchies of criteria of evaluators' views were computed using the computer software Expert Choice [10]. The relative importance of each criterion was rated on a measurement scale to provide numerical judgments corresponding to verbal judgments. Priority means the relative importance or strength of influence of a criterion in relation to other criteria that is place above it in the hierarchy. The normalised eigenvalues method is recommended when the data is not entirely consistent [5, 8].

Since different levels of hierarchies were interrelated, a single composite vector of normalised weights for the entire hierarchy was determined, using the vector of weights of the successive hierarchy. The geometric mean of evaluators' scores were then combined the pair-wise comparison judgment matrices. Both local priorities (i.e. relative to the parent elements) and global priorities (i.e. relative to the goal) were generated. These were represented by total and sub-total of priority scores. Each set of comparative judgments would be entered into a separate matrix to derive the 'local priority' (i.e. the preferences with respect to the specific criterion). The weights of the criteria and its sub-criteria would be derived in a similar fashion. The process would continue until all comparison judgment matrices were obtained. All acquired data and information were then analysed [10].

4. Analysis of Findings

In total, 12 interviews were conducted with senior personnel including Chief Executive Officers, general managers, production managers and customer service managers in three specially selected SMEs. These personnel are responsible for and/or involved in quality management practices and performance measures in their organisations. Their views provide a wide spectrum of experience and expertise within their organisations and across various industry sectors in Trinidad and Tobago.

4.1 Effectiveness of ISO 9004 Implementation

The overall percent priority of ISO 9004 effectiveness was 50.3% for Company A, 55.0% for Company B, and 55.1% for Company C, respectively. This reflects the level of achievements of the SME towards the Level-1 goal of effective QMP implementation through ISO 9001:2000. The inconsistency indices of the AHP analysis for Companies A, B and C were 0.02, 0.04, and 0.02, respectively. These fall within the acceptable level of 0.10 as recommended by Saaty [8], which indicated that the evaluators assigned their weights consistently in examining the priorities of decision criteria and assessing the effectiveness of QMP implementation.

4.2 Prioritisation of Objectives with QMPs

The average % priority for the three participating companies is represented in descending order of magnitude of each self-assessment objective and corresponding QMP (see Table 2). A closer examination of the average individual objectives helped identify specific areas of strengths and weaknesses. The top five objectives were:

- The organisation considers the potential benefits of establishing partnerships with suppliers (i.e. SAQ 4(c) = 4.7%);
- Management involves suppliers in the identification of purchasing needs and joint strategy development (i.e. SAQ 14(a) = 3.6%);
- Top management ensures that responsibilities are established and communicated to people in the organisation (i.e. SAQ 7(a) = 3.4%);
- The organisation identifies customer's needs and expectations on a continual basis (i.e. SAQ 4(a) = 3.3%); and
- Management ensures that the competence of people in the organisation is adequate for current and future needs (i.e. SAQ 10(b) = 3.1%).

Whereas the four weakest objectives were of priority weight less than 1.0%. These include:

- The Quality Policy ensures that the needs and expectations of customers and other interested parties are understood (i.e. SAQ 5(a) = 0.4%);
 - Management ensures the use of systematic improvement methods and tools to improve the organisation's performance (i.e. SQA 27(c) = 0.7%);
 - The Quality Policy is translated into objectives which consists of measurable goals (i.e. SQA 6(a) = 0.8%); and
 - Management has defined other interested party's related processes to ensure consideration of interested party's needs and expectations (i.e. SQA 18(b) = 0.9%).
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Table 2. Local % Priority of Self-Assessment Objectives

Self-Assessment Objectives	ISO 9004 SAQs	QMP	Rank	% Priority
The organisation considers the potential benefits of establishing partnerships with suppliers.	4(c)	8	1	4.7
Management involves suppliers in the identification of purchasing needs and joint strategy development.	14(c)	8	2	3.6
Top management ensures that responsibilities are established and communicated to people in the organisation.	7(a)	3	3	3.4
The organisation identifies customer's needs and expectations on a continual basis.	4(a)	1	4	3.3
Management ensures that the competence of people in the organisation is adequate for current and future needs.	10(b)	1	5	3.1
Management promotes partnership arrangements with suppliers.	14(b)	8	6	2.8
Top management ensures that input to the realisation processes takes account of customer and other interested parties needs.	21(a)	7	7	2.7
Management ensures the awareness of people in the organisation about the link between product quality and costs.	16(b)	3	8	2.6
The organisation ensures conformity of purchased products from specification through to acceptance.	20(c)	7	9	2.5
Top management plans for resources to be available in a timely manner.	9(a)	5	10	2.3
Management has defined customer-related processes to ensure consideration of customer needs.	18(a)	4	10	2.3
Management applies the process approach to achieve the effective and efficient control of processes, resulting in performance improvement.	1(a)	4	12	2.2
Management considers environmental issues associated with the infrastructure.	11(b)	1	12	2.2
The organisation ensures the availability of the necessary natural resources for its realisation processes.	15(a)	8	12	2.2
Management controls the measuring and monitoring devices to ensure that correct data are being obtained and used.	22(a)	7	12	2.2
Management ensures the collection of customer-related data for analysis, to obtain information for improvements.	24(a)	6	12	2.2
Management promotes involvement and support of people for improvement for the effectiveness and efficiency of the organisation.	10(a)	3	17	2.1
Top management has defined purchasing processes to ensure purchased products satisfy the organisation's needs.	20(a)	4	17	2.1
Realisation processes are managed from inputs to outputs.	21(b)	5	17	2.1
The organisation identifies people's need for recognition, work satisfaction, competence and personal development.	4(b)	1	20	2.0
Objectives are deployed to each management level to assure individual contribution to achievement.	6(b)	3	20	2.0
Management ensures that the infrastructure is appropriate for the achievement of the objectives of the organisation.	11(a)	5	20	2.0
Management ensures that appropriate information is easily available for fact-based decision-making.	13(a)	7	20	2.0
Management plan, provide, control and monitor the financial resources necessary to maintain an effective and efficient quality management system and to ensure the achievement of the objectives of the organisation.	16(a)	2	20	2.0
The organisation analyses nonconformity for lessons learned and process and product improvement.	25(b)	6	20	2.0
Management ensures the availability of resources needed to fulfill objectives.	6(c)	2	26	1.9
Activities such as verification and validation are addressed in realisation processes.	21(c)	7	26	1.9
Purchasing processes are managed.	20(b)	5	28	1.7

Table 2. Continued

Self-Assessment Objectives	ISO 9004 SAQs	QMP	R	% Priority
Management uses corrective action for evaluating and eliminating recorded problems affecting its performance.	27(a)	6	28	1.7
Top management demonstrates its leadership, commitment and involvement.	3(a)	2	30	1.6
The organisation identifies other interested parties' needs and expectations that can result in setting objectives.	4(d)	1	30	1.6
The communication of quality requirements, objectives and accomplishments contribute to the improvement of the organisation's performance.	7(b)	2	30	1.6
Management ensures the work environment promotes motivation, satisfaction, development and performance of people in the organisation.	12(a)	3	30	1.6
Top management applies the process approach to ensure the effective and efficient operation of the realisation and support processes and the associated process network.	17(a)	4	30	1.6
The organisation ensures that statutory and regulatory requirements are considered.	4(e)	1	35	1.5
The organisation controls process and product nonconformity.	25(a)	4	35	1.5
Documents and records are used to support effective and efficient operation of processes of the organisation.	2(a)	5	37	1.4
The Quality Policy considers the organisation's vision of the future.	5(c)	2	37	1.4
The management review activity evaluates information to improve the effectiveness and efficiency of the processes of the organisation.	8(b)	7	37	1.4
The organisation analyses data to assess its performance and identify areas for improvement.	26(a)	7	37	1.4
Top management has defined design and development processes to ensure they respond to the needs and expectations of the organisation's customers and other interested parties.	19(a)	4	41	1.3
Activities such as design review, verification, validation and configuration management are considered in the design and development processes.	19(c)	4	41	1.3
Management promotes the importance of measurement, analysis and improvement activities to ensure that the organisation's performance results in satisfaction of interested parties.	23(a)	7	41	1.3
The organisation uses self-assessment of the quality management system for improving the overall effectiveness and efficiency of the organisation.	24(c)	6	41	1.3
Design and development processes are managed in practice, including the definition of design and development requirements and the achievement of planned outputs.	19(b)	5	45	1.2
Management uses preventive action for loss prevention.	27(b)	6	45	1.2
The Quality Policy leads to visible and expected improvements.	5(b)	2	47	1.1
Top management ensures that valid input information is available for the management review.	8(a)	5	47	1.1
Management ensures the collection of data from other interested parties for analyses and possible improvement.	24(b)	6	49	1.0
Management has defined other interested party's related processes to ensure consideration of interested party's needs and expectations.	18(b)	4	50	0.9
The Quality Policy is translated into objectives which consists of measurable goals.	6(a)	2	51	0.8
Management ensures the use of systematic improvement methods and tools to improve the organisation's performance.	27(c)	6	52	0.7
The Quality Policy ensures that the needs and expectations of customers and other interested parties are understood.	5(a)	2	53	0.4
Total:				100.0

The findings suggest that the overall policy of the SMEs under study may not adequately address the needs and expectations of customers and other interested parties. Since the priority weights of the objectives addressing the needs and expectations of customer and end-users are adequately dealt with, the study findings suggest that the other interested parties' needs and expectations are not adequately addressed.

The local and global priorities of the different QMPs and associated self-assessment objectives for the individual companies are depicted in Table 3. Each is implemented to varying degrees at certification. At this point, an independent certified auditor from an internationally recognised body determined if the compliance requirement of ISO 9001:2000 have been effectively implemented. This would be reflected by the QMPs and objectives with the highest percent priority. Similarly, the QMPs and objectives with low percent priorities would represent the requirements would have not been properly implemented. Those with the lowest can be considered as areas of weaknesses, and therefore represent areas for improvement.

Table 3. Average Priority % of the QMPs and Objectives

QMP	ISO 9004:2000 QMP	Item	ISO 9004:2000 SAQs	Company A	Company B	Company C	AVG % Priority
				% Priority	% Priority	% Priority	
1.	Customer Focus	1	4(a)	2.1	4.5	3.3	3.3
		2	4(b)	1.7	2.1	2.1	2.0
		3	4(d)	0.6	2.4	1.7	1.6
		4	4(e)	0.6	2.3	1.5	1.5
		5	11(b)	0.6	4.0	1.9	2.2
		6	10(b)	1.5	3.6	4.2	3.1
2.	Leadership	7	3(a)	3.2	1.0	0.7	1.6
		8	5(b)	0.0	0.7	0.6	0.4
		9	5(c)	1.6	0.8	1.0	1.1
		10	5(a)	1.8	1.5	0.9	1.4
		11	6(a)	1.3	0.6	0.5	0.8
		12	6(c)	2.8	1.5	1.3	1.9
		13	7(b)	2.8	0.9	1.2	1.6
		14	16(a)	3.2	1.4	1.5	2.0
3.	Involvement of People	15	12(a)	2.6	0.9	1.2	1.6
		16	6(b)	3.0	0.9	2.0	2.0
		17	7(a)	6.6	1.8	1.9	3.4
		18	10(a)	3.9	0.9	1.4	2.1
		19	16(b)	4.3	1.8	1.8	2.6
4.	Process Approach	20	1(a)	2.4	1.0	3.1	2.2
		21	18(a)	2.1	2.1	2.7	2.3
		22	17(a)	1.2	0.9	2.8	1.6
		23	19(c)	0.9	1.1	1.8	1.3
		24	18(b)	0.6	0.8	1.2	0.9
		25	19(a)	0.9	1.2	1.9	1.3
		26	20(a)	1.9	1.8	2.7	2.1
		27	25(a)	1.3	1.6	1.5	1.5

Table 3. Continued

QMP	ISO 9004:2000 QMP	Item	ISO 9004:2000 SAQs	Company A	Company B	Company C	AVG % Priority
				% Priority	% Priority	% Priority	
5.	System Approach to Management	28	2(a)	1.2	1.8	1.2	1.4
		29	9(a)	2.9	2	2.1	2.3
		30	11(a)	1.9	1.8	2.4	2.0
		31	19(b)	0.9	0.9	1.7	1.2
		32	20(b)	1.7	1.7	1.7	1.7
		33	21(b)	2.3	1.8	2.2	2.1
		34	8(a)	0.9	1.4	0.9	1.1
6.	Continual Improvement	35	24(a)	2.1	3.0	1.5	2.2
		36	25(b)	1.7	2.8	1.4	2.0
		37	24(b)	0.8	1.5	0.8	1.0
		38	24(c)	1.5	1.6	0.8	1.3
		39	27(a)	1.8	2.1	1.2	1.7
		40	27(b)	1.1	1.2	1.2	1.2
		41	27(c)	0.5	1.2	0.5	0.7
7.	Factual Approach To Decision Making	42	8(b)	1.2	1.6	1.4	1.4
		43	23(a)	1.0	1.2	1.6	1.3
		44	22(a)	2.4	2.3	2.0	2.2
		45	13(a)	1.5	3.6	0.9	2.0
		46	21(c)	2.6	1.6	1.4	1.9
		47	21(a)	2.8	1.9	3.4	2.7
		48	20(c)	2.5	2.3	2.8	2.5
		49	26(a)	1.7	1.1	1.4	1.4
8.	Mutually Beneficial Supplier Relationships	50	4(c)	4.0	3.6	6.6	4.7
		51	14(a)	0.9	6.1	3.8	3.6
		52	14(b)	1.7	3.6	3.2	2.8
		53	15(a)	0.9	2.2	3.5	2.2

With respect to the individual companies, the greatest strengths in Company A were Involvement of People (20.4%); Leadership (16.7%) and Factual Approach to Decision Making (15.7%). Scarce resources should be allocated to the weakest areas of Customer Focus (7.1%); Mutually Beneficial Supplier Relationship (7.5%) and Continual Improvement (9.5%). Under the level of QMPs, the strongest self-assessment objectives for Company A were SQAs 7(a), 16(b) and 4(c), representing an average priority of 6.6%, 4.3% and 4.0%, respectively. The weakest objectives were SQAs 5(b) and 27(c) with an average priority of 0.0% and 0.5%, respectively.

For Company B, the greatest strength were the QMPs Customer Focus (18.9%); Factual Approach to Decision Making (15.6%) and Mutually Beneficial Supplier Relationships (15.5%). Scarce resources should be allocated to the weakest areas of Involvement of People (6.3%); Leadership (8.4%) and System Approach to Management (11.4%). With respect to these QMPs, the three strongest objectives for Company B were SQAs 14(a), 4(a) and 11(b) with

an average priority of 6.1%, 4.5% and 4.0%, respectively. Nevertheless, two objectives under Leadership (i.e. SQAs 6(a) and 5(b)) received lesser emphases with an average priority of 0.6% and 0.7%, respectively.

For Company C, the greatest strengths were the QMPs Process Approach (17.7%); Mutually Beneficial Supplier Relationships (17.1%) and Factual Approach to Decision Making (14.9%). Scarce resources should be allocated to the weakest areas of Continual Improvement (7.4%); Leadership (7.7%) and Involvement of People (8.3%). By examining the average priority of self-assessment objectives, both SQAs 4(c) and 10(b) were the strongest with 6.6% and 4.2%, respectively; whereas the weakest objectives were SQAs 6(a) and 27(c), both were of an average priority of 0.5%.

There were contrasting areas of strengths and weaknesses among SMEs under study. Involvement of people was the strongest area in Company A, while it represented as greatest weakness in Companies B and C. This suggests that although both had almost identical degree of implementation, the areas needed for continual improvement was starkly different. Nevertheless, Table 4 ranks the average global priority of QMPs for Companies A, B and C in descending order of % priority. Overall, the QMP of the greatest strength were Factual Approach to Decision Making (15.3%); Customer Focus (13.6%) and Mutually Beneficial Supplier Relationships. The AHP results show that three QMPs in general should be targeted for improvement, namely Continual Improvement (10.1%); Leadership (10.1%) and Involvement of People (11.7%).

Table 4. QMPs in Descending Order of Priority Weighting

QMP	ISO 9004:2000 QMP	Average Global Priority for Companies A, B and C in Descending Order of % Priority Weighting
7.	Factual Approach to Decision Making	15.3
1.	Customer Focus	13.6
8.	Mutually Beneficial Supplier Relationships	13.4
4.	Process Approach	13.2
5.	System Approach to Management	11.8
3.	Involvement of People	11.7
2.	Leadership	10.9
6.	Continual Improvement	10.1
	Total	100.0

5. Conclusions

Nowadays, many organisations including SMEs are adopting the ISO 9001:2000 Standard

as the preferred vehicle to quality management system implementation. This standard could be used in conjunction with the ISO 9004:2000 in order to have an effective and efficient QMS that continually improves the performance of the organisation. The ISO 9004:2000 uses the fundamental rules and beliefs of eight quality management principles and an efficient and effective QMS depends on the extent to which these QMPs are implemented. In order to continually improve quality operations, today's companies must be aware of their organisational strengths and weaknesses with respect to the extent of implementation of the QMPs.

Using the AHP methodology, this paper empirically determined the extent to which the QMPs were implemented in three SMEs which were recently certified to the ISO 9001:2000 Standard. This was represented in terms of percent parity weightings of the QMPs and their respective objectives. The three SMEs were on average 53.5% compliant to the QMPs and related objectives. The findings suggest these SMEs, on one hand, generally put strong emphasis on and could attain three QMPs including Factual Approach to Decision Making, Customer Focus and Mutually Beneficial Supplier Relationships while the QMPs with the lowest percent priority were Continual Improvement, Leadership, and Involvement of People on the other hand. There is still much for SMEs to achieve with respect to a compliance to the requirements of ISO 9004:2000.

SMEs have different strengths and weaknesses. Of particular interest is the weakness in formulating policy addressing the needs and expectations of owners/investors (such as shareholders, individuals or groups, including the public sector) and the society in terms of the community and the public affected by the organisation or its products. This suggests that SMEs under study could allocate more resources in strengthening the softer aspects of their QMS. This paper makes a contribution to the body of knowledge in the field of quality management in Trinidad and Tobago where such work is limited. It is anticipated that other SMEs in Trinidad and Tobago and elsewhere may apply the findings of the empirical research to design, implement and continually improve their QMS.

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