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**TQM Critical Factors:
The Recipe for Successful Implementation**

**TQM: Theoretical Insights
Part 2**

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Abstract

The objective of this paper is continue exploring the types and significance of various models of TQM implementation, particularly those based on National Quality Awards and those which are empirically based. In related to the later, the paer discusses in great details various critical factors identified by several in depth research studies and found to impinge significantly on the effectiveness of TQM implementation.

Key Words: Critical factors, Malcolm Baldrige national Quality Award, European Excellence Model, +Leadership, Policy and Strategy, Process Management, Customer Satisfaction

Models Based on Quality Awards

Several countries have developed quality awards to promote an awareness of productivity and quality, foster information exchange, encourage organisations to adopt quality and productivity improvement strategies, recognise firms that have instituted successful strategies, and provide role models for other businesses in the country (Evans and Lindsay, 2001). Many studies have demonstrated that excellence models are an effective approach to TQM implementation (Vokurka et al., 2000). These studies have also emphasised that in pursuit of TQM, organisations have turned to quality award programmes, because they offer models and tools for implementing strategy and benchmarking best practices, performing self-assessment, and achieving improvements, not to mention the recognition they offer. However, Vokurka et al. (2000) clearly advised users that use of models should not be considered a panacea to all problems. Instead, the award models should be used to provide a foundation for assessing and encouraging TQM in the global market place.

The Malcolm Baldrige National Quality Award

Productivity growth of the American manufacturing sector slowed dramatically during the late 1970s and 1980s, while overseas competitors, particularly in Japan, became increasingly competitive. One of the most remarkable features of the Japanese was the incredibly high quality of their products (Arvinder et al., 1997).

In the early 1980s, the Federal government and the business sector put in a real effort to restore productivity growth in America. In October 1982, a Bill was signed by President Reagan, which recommended a study of how the government might reward productivity and competitiveness. In 1983, the National Productivity Advisory Committee (NPAC) (a Presidential appointed group) recommended the formation of a National Modal for Productivity Achievement. In the private sector, the idea of a National Quality Award as the focal point of the quality revolution was put forward to labour, management and government by the American Society for Quality Control (ASQC). Finally, on 20th August 1987, President Reagan signed the Malcolm Baldrige Quality Improvement Act, named after the recently deceased US Secretary of Commerce. According to the Baldrige criteria, the aim of the award was to:

- Promote quality awareness and its impact on competitiveness.
- Sharing information on successful quality strategies and the benefits derived from implementing these strategies.

- Propose a set of criteria that can be used by business, industrial, government and other enterprises in evaluating their own quality improvement efforts.

Since its inception in 1987, the Malcolm Baldrige National Quality Award (MBNQA) criteria have evolved from being simply a measurement of organisational quality to a guideline for companies moving toward performance excellence (Pannirselvam and Ferguson, 2001).

Evans and Lindsay (2001) point out that the Baldrige Award criteria are built on a set of core values and concepts derived from real world experiences that can be applied to any type or size of organisation. The ten core concepts and values (NIST, 1999) are:

1. Customer driven quality
2. Leadership and commitment
3. Employee participation and development
4. Fast response
5. Design quality and prevention
6. Long range view of the future
7. Management by fact
8. Employee participation and development
9. Corporate responsibility
10. Result orientation

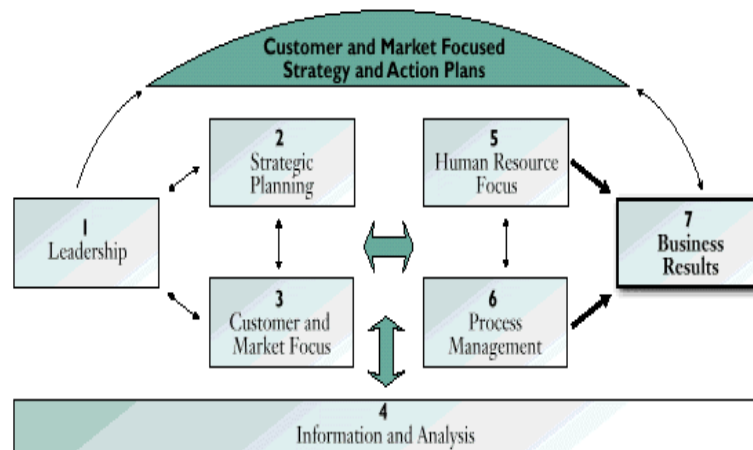
These core values are embodied in seven categories, which form the basis for assessment. These categories are as follows:

1. Leadership
2. Strategic Planning
3. Customer and Market Focus
4. Information and Analysis
5. Human Resource Focus
6. Process Management
7. Business Results

Figure 1 shows the dynamic relationship among the seven categories of the award evaluation criteria.

Figure 1: The Dynamic Relationship between the Award Evaluation Criteria

Baldrige Criteria for Performance Excellence Framework: A Systems Perspective



Source: NIST (1999)

Table 1 illustrates the examination items of each category.

Table 1: 1999 Criteria for Performance Excellence – Item Listing

1999 Categories/Items	Point Values	
1. Leadership		125
1.1 Organisational Leadership	85	
1.2 Public Responsibility and Citizenship	40	
2. Strategic Planning		85
2.1 Strategy Development	40	
2.2 Strategy Deployment	45	
3. Customer and Market Focus		85
3.1 Customer and Market Knowledge	40	
3.2 Customer Satisfaction and Relationships	45	
4. Information and Analysis		85
4.1 Measurement of Organisational Performance	40	
4.2 Analysis of Organisational Performance	45	
5. Human Resource Focus		85
5.1 Work Systems	55	
5.2 Employee Education, Training & Development	25	
5.3 Employee Well-Being and Satisfaction	25	
6. Process Management		85
6.1 Product and Service Processes	55	
6.2 Support Processes	15	
6.3 Supplier and Partnering Processes	15	
7. Business Results		450
7.1 Customer Focused Results	115	
7.2 Financial and Market Results	115	
7.3 Human Resource Results	80	
7.4 Supplier and Partner Results	25	
7.5 Organisational Effectiveness Results	115	
TOTAL POINTS		1000

Source: NIST (1999)

The MBNQA framework has three basic elements, from top to bottom and is divided into seven categories. The three basic elements are:

1. Strategy and Action Plan (top of figure). This yields the set of customer and market focused performance requirements. This is derived from short- and long-term strategic planning that must be met and exceeded for the organisation's strategy to succeed. Strategy and Action plans guide the overall resource decisions and drive the alignment of measures for all work units to ensure customer satisfaction and market success.

2. System. The system comprises the six Baldrige categories (centre of the figure) that define the organisation, its operation and its results.

Leadership (Category 1), Strategy Planning (Category 2), and Customer and Market Focus (Category 3) represent the leadership trial. These categories are placed together to emphasise the importance of a leadership focus on strategy and customers. Senior leaders must set organisational direction and seek future opportunities for the organisation. Human Resources Focus (Category 5), Process Management (Category 6), and Business Results (Category 7) represent the result trial.

An organisation's employees and its key processes accomplish the work of the organisation that yields its business results. All actions point toward Business Results – a composite of customer, financial and operational performance results, including human resource results and public responsibility.

3. Information and analysis (Category 4) is critical to the effective management of the organisation and to a fact-based system for improving company performance and competitiveness. Information and analysis serves as a foundation for the performance management system.

The criteria are designed to help companies enhance their competitiveness through focus on results-oriented goals:

1. Delivery of ever-improving value to customers, resulting in market-place success;
2. Improvement of overall organisational performance and capabilities.

In order to win the award, a high degree of quality awareness and commitment to quality must be demonstrated. When a firm applies for this award, other benefits emerge, e.g. feedback on its quality efforts, which then aids in assessing the success of its implementation.

The MBNQA is considered the best standard and general model for implementing and operating TQM (Brocka and Brocka, 1992; Evans and Lindsay, 2001),

The European Quality Award

In 1991, the European Foundation for Quality Management (EFQM) in partnership with the European Commission and the European Organisation for Quality announced the creation of the European Quality Award (EQA). The award was designed to increase awareness throughout the European Community, and business in particular, of the growing importance of quality to their competitiveness in the increasingly global market and to their standard of living (Evans and Lindsay, 2001).

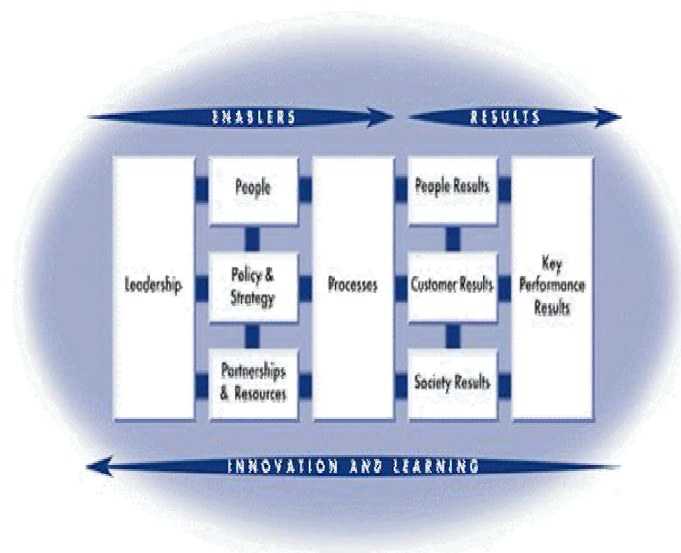
The European Quality Award consists of two parts: The European Quality Prize (EQP) and the European Quality Award (EQA). These are managed by the European Foundation for Quality Management (EFQM) in conjunction with the European Organisation for Quality (EOQ) (EFQM, 1999).

The EQP is given to companies that have demonstrated “excellence in the management of quality as their fundamental process for continuous improvement” (EFQM, 1999).

The European Quality Award (EQA) is given to the most successful applicant “the most accomplished exponent of TQM in Europe” (European Foundation for Quality Management, 1996; Self-assessment 1996 Guidelines for Companies).

The EFQM excellence model consists of nine criteria, five of these are ‘enablers’ and four are ‘results’. The ‘enabler’ criteria cover what an organisation does; they are those elements of the business that need to be optimised to achieve the desired goals. The ‘results’ criteria cover what a company has achieved and is achieving. Figure 2 shows the framework for the European Quality Award.

Figure 2: The EFQM Excellence Model (2000)



Source: EQFM (2000, www.asq.org)

There are 500 points allocated to the enablers and 500 points to the results. The criteria have been weighted according to their relative importance, however, it has been noted that the weightings are arbitrary numbers which represent the consensus of some important experts (Finn and Porter, 1994).

The EQA is based on the assessment of 9 criteria and 32 sub-criteria. The EQA is open to a wide variety of organisations operating in Europe. There are four award categories:

1. Large businesses
2. Operational units of companies
3. Public sector organisations
4. Small and medium sized enterprises

The Deming Prize

The Union of Japanese Scientists and Engineers (JUSE) instituted the Deming Prize. In 1950, Deming invited JUSE to give seminars on statistical process control, one year later the Deming Prize was instituted to encourage productive activities and promote the use of statistical methods as a management tool.

There are two prizes, which are awarded annually. The first, (the Deming Application Prize), is awarded to companies, divisions and small enterprises that have achieved distinctive performance improvement through the application of company-wide quality control. The second (the Deming Prize) is for individuals. This is awarded in recognition of outstanding contributions in the area of research and education (Evans and Lindsay, 2001).

The Deming Application Prize consists of a checklist of 10 major categories, as shown in Table 3 each of the major categories is then divided into sub-categories.

The Deming Application Prize is awarded to all companies that meet the prescribed standard. Evans and Lindsay (2001) assert that only a small number of awards are given each year, which they believe to be an indication of the difficulty of achieving the performance required. The objectives are to guarantee that the company has completely set up the process in such a way that it will continue to improve even after the prize is awarded.

The Deming prize has gone through several stages of evolution and in 1984 it became international, thereby allowing overseas companies to apply.

Table 3: Deming Application Prize

1.Policies	<ul style="list-style-type: none"> • Policies pursued for management, quality and quality control • Method of establishing policies • Justifiability and consistency of policies • Use of statistical methods • Transmission and diffusion of policies • Review of policies, and the result achieved • Relationship between policies, long-and short-term planing
2.The organisation and its operation	<ul style="list-style-type: none"> • Explicitness of the scope of authority and responsibility • Appropriateness of delegations of authority • Interdivisional co-operation • Committees and their activities • Use of staff • Use of quality circle activities • Quality control diagnosis
3.Education and dissemination	<ul style="list-style-type: none"> • Education programmes and results • Quality and control consciousness/understanding • Teaching of statistical concepts and methods • Grasp of the effectiveness of quality control • Education of related companies • Quality circle activities
4.Information gathering, communication and its utilisation	<ul style="list-style-type: none"> • Collection of external information • Transmission of information between divisions • Speed of information transmission • Data processing, statistical analysis of information

5. Analysis	<ul style="list-style-type: none"> • Selection of important problems and themes • Appropriateness of analytical methods • Utilisation of statistical methods linkage with industry intrinsic technology • Quality analysis and process analysis • Utilisation of analysis results • Action taken on improvement suggestions
6. Standardization	<ul style="list-style-type: none"> • System of standards • Methods of establishing, revising and abolishing standards • Actual performance in establishing, revising and abolishing standards • Contents of the standards • Utilisation of technology • Utilisation of standards
7. Control/management	<ul style="list-style-type: none"> • Management systems for quality and in related areas such as cost, delivery and quantity • Control points and control items • Utilisation of statistical methods and concepts, such as control charts • Contributions of QC circle activities • Status of control/management activities • In-control situations
8. Quality assurance	<ul style="list-style-type: none"> • New product and service development methods • Preventative activities for safety and product liability • Degree of customer satisfaction • Process design, process analysis and process control and improvement • Process capabilities • Instrumentation and inspection • Management of facilities, vendors, procurement and services • Quality assurance system and its diagnosis • Utilisation of statistical methods • Quality evaluation and audit • Status of quality assurance
9. Effects (result)	<ul style="list-style-type: none"> • Measurement of effects • Tangible effects such as quality, service, delivery, cost, profit, safety and environment • Intangible effects • Conformity of actual performance planned effects
10. Future planning	<ul style="list-style-type: none"> • Concrete understanding of current situation • Measures for solving defect problems • Future promotion plans • Relationship between future plans and long-term plans

Models Based on Empirical Studies

Identification of critical factors of quality management derives from empirical research. These investigations of quality have contributed to further understanding of the basic principles of TQM. Understanding the components of quality and establishing a “paradigm” of success has characterised TQM research and analysis. In addition to the research described in this section, an outline of the methodologies used in empirical research is described.

Garvin (1983) published the first empirical investigation of quality management factors. Nine US and seven Japanese window air conditioner manufactures were examined. Quality management practices and their associated impact on performance were studied. Garvin used self-report questionnaires and on-site observations. The management practices examined included: quality programmes, policies, and management attitudes; quality information systems; product design; production and employee policies; and supplier management. Surrogate measures examined were assembly line reject rate and the rate after delivery service calls. Garvin's conclusions are as follows:

- Management's top priority for manufacturing is quality. Quality issues are part of the regular meeting agenda.
- The quality department had direct access to top management. Some companies had Vice Presidents responsible for Quality.
- Quality is customer-driven. Definition of quality derives from customers' perspectives. Production, marketing, and design do not define quality.
- Performance appraisal of employees aligns with defect-free output, not total output.
- Comprehensive goal deployment at all levels creates consistent improvement.
- Superior quality information systems support effective monitoring and improvement of quality. Data reports to management are timely, detailed, and accurate.
- Reliability of engineering techniques, thorough review and testing of new designs prior to production, along with the involvement of all affected departments in the review process, support product design.
- Training of new employees in all job aspects, including SPC, problem identification and remedial techniques, support reduction of variation.
- Quality techniques and control charts control all production processes.
- Communication effectiveness ensures production that operates smoothly and is defect free.
- Commitment to quality in product and service, value for money, and manufacturing capability define the selection of supplies, through close monitoring and quality audits (Garvin, 1983).

Saraph et al. (1989) conducted one of the first empirical efforts to validate an instrument for integrated quality management. They developed 120 requirements for organisational quality improvement. The prescriptions were generated from the literature review of quality management. A factor analysis produced eight factors of quality management that measure the quality practice of an organisation were indicated, following the grouping of requirements according to similar characteristics (Badri et al., 1995; Quazi et al., 1998). The factors were:

1. The role of management leadership and quality policy;
2. Role of the quality department;
3. Product/service design;
4. Process management;
5. Supplier quality management;
6. Quality data and reporting;
7. Employee relationships;
8. Training.

Follow-up empirical investigation of the factors followed development of representative measurement items. After pre-testing, 78 measurement items

remained for study according to a five-point interval rating survey using a total of 162 quality and general managers. Following reliability and item analysis, and internal consistency analysis, critical factor items were reduced to 66 in number (Badri et al., 1995).

Saraph et al. (1989) finally organised critical factors into eight encompassing factor groups with accompanying elaboration. In their presentation of critical factors or “organisational requirements of quality management” they established a representative synthesis of the quality management literature. The instrument developed was supported as being useful for evaluation of quality management in either manufacturing or service organisations. Criterion-related validity was established; the critical factor specification and measurement capacities achieved were posited as facilitating management comprehension of quality management practices. The comprehensive critical factor analysis encouraged research to test and clarify the theory of quality management. The perceptions of quality management and the decision-makers’ identification of required improvements of quality management efforts were evaluated. The weakness of the instrument is that it excluded at least two important constructs: customer focus and use of SPC (Ahire et al., 1996).

Motwani et al, (1994) examined quality practices in India using an empirical approach. First, a further synthesis of the literature of quality concepts and identification of quality factors was carried out to create an organisational evaluation framework. Second, a field survey examined the level of conformance to identified practices in Indian manufacturing. Results were seen as potentially assisting management to:

1. Increase the understanding of quality management practice;
2. Determine the current quality position of an organisation;
3. Assign organisational responsibilities;
4. Monitor quality and improvement programmes.

It was hoped that quality management research would yield the following benefits:

1. Test the reliability and validity of the Saraph model within the international context;
2. Identify the critical factors used by researchers to structure their models and theories;
3. Develop a database for cross-cultural comparison.

The identified critical factors were further intended to provide quality management guidelines for manufacturing in India (Motwani et al., 1994).

Hypotheses derived from the following nine critical factors distilled from quality management literature were tested:

1. Top management;
2. Quality policies;
3. The role of the quality department;
4. Training;
5. Product design;
6. Vendor quality management;
7. Process design;
8. Quality data;
9. Feedback and employee relations.

Quality managers and general managers were surveyed using Saraph et al.'s (1989) instrument. Results of the study indicated that top management assisted in quality policy development but not in implementation. Quality issues were not reviewed regularly at top management meetings. Quality policies were found to be directed toward customer satisfaction, they were well documented with specific documentation for each department. All personnel were aware of their responsibilities. Policies also addressed goals of compliance with government regulations; market share growth; and the organisation's profit and reputation (Motwani et al., 1994).

The role of the quality department involved formulating and refining quality improvements in conjunction with all other departments. All business facets were covered and summary reports of processing and inspection drawn up. Training emphasis for quality was present and supported generally by survey respondents. Some complaints were registered that sophisticated training was wasted on "illiterate workers" (Motwani et al., 1994).

Systematic product design was not supported as a quality improvement factor. Research and development departments and activities were limited. "Lack of sufficient interaction between the research and development department and the quality assurance and manufacturing departments" was described (Motwani et al., 1994).

Vendor quality management was determined as a key factor for improvement and success. Availability of alternative vendors, however, was generally deemed preferable. Price, with minimum acceptable quality, was the predominant preference for more than 90% of respondents. Nevertheless, a feedback system for raw material quality was determined, as was technical assistance to vendors and visitations to vendors by plant personnel. Comprehensive process design was confirmed along with product quality. Organisational help was provided by the Indian Statistical Institute. Statistical techniques were used extensively to:

1. Determine acceptance/rejection for both manufactured and purchased products;
2. Ascertain quality standard rationality;
3. Point out and correct process discrepancies (Motwani et al., 1994).

The availability and use of quality data were confirmed as critical components of the quality programmes in Indian organisations. Quality-cost reporting systems were reported as efficient. Data was available throughout the organisations and regularly updated. Data was displayed in control charts at workstations. Management of quality was revealed as being highly dependent upon data access. Feedback and employee involvement was not supported as being critical factors to the attainment of quality. Quality circles, although introduced, had become non-functioning in many cases. Quality performance appreciation at all levels was lacking. Quality performance was not necessarily the basis for employee promotions. Rewards did not prove sufficient to motivate superior quality performance. Rewards, however, tended to be random and were not found to be consistent policy components (Motwani et al., 1994).

For the study of quality management in Indian organisations, researchers determined three major implications. The research method (derived from Saraph et al., 1989) employed was determined as useful for analysing an organisation's quality management in terms of principles established in the literature. The approach, as in

the Indian study, can help to establish alternate models or variations in quality management implementation. Contrasts between empirical findings concerning organisations and identified criteria provide a basis for more intensive organisational study and possible improvement. Finally, after improvements are put in place, the approach is again applicable to evaluate new positions, levels of improvement and cost-effectiveness. The general conclusion of the study was that all critical factors of the Saraph et al. model were not necessary for quality management success: "...quality levels were obtained even in the absence of top management support, proper product design, and continual feedback about quality processes" (Motwani et al, 1994). It is also suggested that in terms of practical application universal acceptance, or at least wide knowledge of critical quality factors consistent with Saraph et al, (1989) and Garvin (1983) encourage "management regardless of their position [to] expect an organisation to implement these critical quality factors to a great extent" (Motwani et al 1994,).

Badri et al. (1995) examined Saraph et al.'s organisation quality requirements in a more "broadly based" environment than Saraph's investigation. Results from 84 randomly selected firms in the UAE indicated that the constructs developed by Saraph did indeed measure the traits intended. Problems for quality implementation in the UAE were newness of exposure to, and use of the concept of quality; low levels of expertise and skill development, preference for alternative suppliers' dependence on "cheap" expatriate labour from Third World countries and postponement of automation. Follow-up interviews revealed only two of the 424 participating firms had tried quality circles, and then only as experiments carried out by an international agency. Programmes were soon abandoned due to their high cost and insufficient results. Large firms successfully used open communication and employee participation as means of employee involvement.

Quality factors given high practice ratings by both manufacturing and service industries were:

1. Acceptance of quality responsibility;
2. Visibility and effectiveness of the quality department;
3. Top management commitment to quality-training for all;
4. Building employee quality awareness;
5. Interdepartmental co-ordination of product / service development;
6. Consideration of implementation predictability issues;
7. Regulate in-process and final inspection/review;
8. Effective supervisor problem solving.

Saraph et al.'s (1989) findings, synthesis and approach were further confirmed through examination of UAE management with the following important proviso:

"To develop a true profile of quality management in UAE firms, workers and managers at the different levels of the organisation should also be surveyed. In addition, customer satisfaction should be taken into account to understand and evaluate the practice ratings better through "adequacy" ratings as seen by customers." (Badri et al 1995)

Capon et al. (1994) examined six key measures of TQM success "using the Baldrige framework. Twelve TQM projects at Colt International, UK were carried out. A "company-wide picture" or measurement was sought reflecting the "holistic nature of TQM" which requires "customer, shareholder, and competitor reactions".

The six TQM success measures were: -

1. Customer perceptions of service;
2. Encouragement of continuous improvement;
3. Process consistency, both administrative and mechanical;
4. Cost effectiveness of the quality programme;
5. Ease of understanding and updating (Capon et al., 1994).
6. Baldrige criteria were summarised for the study as:
 1. Management involvement;
 2. Strategic quality planning;
 3. Employee involvement;
 4. Training;
 5. Process capability;
 6. Customer perceptions.

The study concluded that 10-15% improvement per month is likely with TQM programme measurements. Participant opinions expressed during the study indicated five key TQM success factors:

1. Team leaders enthusiasm and determination;
2. Management setting TQM as a priority;
3. Measuring success.
4. Involve customers in meetings
5. Early success in achieving improvements.

Monitoring, measuring, and displaying improvement results increases the TQM success rate, following Baldrige Award recommendations (Capon et al., 1994).

Ramirez and Loney (1993) conducted an empirical study to investigate, which factors mentioned in the literature, were critical factors for TQM success. This study covered US companies from the manufacturing and service sectors recognised for their quality achievements in the Malcom Baldrige National Quality Award (MBNQA).

The survey was based on a list of 22 items that were considered in the literature as critical to TQM. The study aimed to identify the factors needed for a successful quality process.

A questionnaire survey of 63 persons (26 quality consultants and 37 managers of quality award winning organisations including MBQNA winners) took place in order to rate each of the 22 factors on a three-point scale. Respondents were required to give a level of importance to each quality factor relying on their experience of the implementation of a quality management process in their firms. Using the three-point scale, each respondent was asked to indicate if the factor was:

1. Neutral regarding the factor;
2. Important but not essential to Total Quality Management process;
3. Critical and absolutely essential to the successful implementation of TQM.

Remirez and Loney assigned scoring weights of 1, 2 and 3 for neutral, important, and critical respectively. Applying this scoring approach, each factor was given a numerical value for its criticality. The results of this study showed that 10 factors out of 22 were found to be critical, 7 factors important and 5 factors neutral. The *critical* factors were classified as Tier 1 Factors, the *important factors* were classified as Tier 2, and the *neutral factors* were classified as Tier 3.

Tier 1 factors were;

1. Management commitment;
2. Customer satisfaction;
3. Clear vision statement;
4. Culture change;
5. Education;
6. Participation management;
7. Strategic planning;
8. Goal clarity;
9. Error prevention;
10. Top management steering committee.

Tier 2 factors include:

1. Problem solving;
2. Measurement;
3. Problem identification;
4. Goal setting;
5. Recognition programme;
6. Quality control circles;
7. Vendor partnership.

Tier 3 factors include:

1. Project improvement process;
2. Publicised successes;
3. Statistical process control;
4. Cost of quality;
5. Zero defect attitudes.

Tier One factors are associated with management support and related activities. Tier Two factors are associated with shop floor activities whilst Tier Three factors represent important techniques and tools such as statistical process control, cost of quality and attitude towards achieving zero defects.

This study of Ramirez and Loney contributes significantly to the body of knowledge of quality management. The study suggests a hierarchy of factors that can be used to plan for the implementation of TQM.

Black and Porter (1996) noted that, up to the time of their writing, the literature was “*patchy*” in its understanding and that extant empirical studies (Saraph et al., 1989) notably were derived from this deficient coverage. They surmised that:

A set of criteria based on the perception of actual industrial practitioners might be more valid. One way to obtain such a framework would be to make a post hoc synthesis of Saraph et al.’s items from the collected perceptions of respondents. Alternatively, improved measurement methods could be employed to determine the relative importance of interrelationships between different items.

To develop an empirical framework from TQM practitioners’ perception and experience, the Baldrige Award Model framework was modified through additional literature review to account for the model’s perceived variables. Seven variables were added:

1. Use of specific improvement tools;
2. Customer-supplier chain concept and department purpose analysis;
3. Use of specific organisation structures to support quality improvement;
4. Management of suppliers;
5. Determination of quality costs;
6. Encouragement of company quality culture;
7. Active management leadership. (Black and Porter 1996)

The European Foundation for Quality Management (EFQM) was queried as to its ratings of the final 39 items according to the item's "magnitude of importance" in relation to "assessment and improvement of quality systems and documentation" (Black and Porter 1996).

Factor analysis of the 204 valid questionnaires returned extracted 10 critical factors. In comparison with the Saraph model, the study covered a wider domain. New areas were covered in customer satisfaction orientation, teamwork structures, and communication of improvement information. The factors derived do not match the Baldrige model categories, but do correspond to established literature. Black and Porter's critical factors are:

1. Corporate critical culture;
2. Strategic quality management;
3. Quality improvement;
4. People and culture management;
5. Operational quality planning;
6. Supplier partnership;
7. Teamwork structures;
8. Customer satisfaction orientation;
9. Communication improvement information.

Thiagarajan (1996) used a descriptive approach in the context of his study. This involved the best organisations agreeing to a set of quality factors critical to a successful implementation of TQM. He identified 22 critical quality factors, which were stratified into three tiers according to their level of criticality.

This study aimed at constructing a generic framework of TQM implementation in Malaysia based on the following critical categories:

1. Institute leadership;
2. Maximise internal stakeholders' involvement;
3. Manage by customer- driven processes;
4. Adopt continuous improvement.

This study confirms the critical quality factors that are reported in the other empirical studies but also represents a departure from them. It is concerned not only with identifying the critical factors of TQM implementation but also with their level of criticality, how the critical factors are implemented and deployed and the foundation elements of the implementation process.

The Flynn et al. (1994) study, built on the Saraph et al. study, focused on a plant rather than an organisation as the unit of analysis and utilised the perceptions of both line and managerial level employees. Seven dimensions of quality management were identified mainly from the empirical and practitioner literature. The study was based on a sample of 42 manufacturing plants from the machinery, transportation

components and electronics industry located in the US. The constructs identified by this instrument include team-oriented scales, namely, selection for teamwork potential and teamwork, customer interaction, and cleanliness and organisation, which are not found in other instruments (Motwani, 2001). However, this instrument excludes employee empowerment and benchmarking scales found in the Ahire et al. (1996) instrument.

Ahire et al (1996) identified 12 constructs of integrated quality management strategies through an empirical survey of 371 manufacturing firms in the Midwest region of the USA. This instrument is based on a thorough review of the concepts and literature of TQM. Their constructs include:

1. Top management commitment;
2. Customer focus;
3. Supplier quality management;
4. Design quality management;
5. Benchmarking;
6. Statistical process control;
7. Internal quality information usage;
8. Employee empowerment;
9. Employee involvement;
10. Employee training;
11. Product quality;
12. Supplier performance.

Based on these factors, a framework to identify the effects of integrated quality management strategies on a firm's product quality was suggested.

The work of Powell (1995) provided valuable insights into the "soft issues" of TQM. He developed a TQM measurement instrument based on exhaustive review of the TQM prescriptive literature, and revised the scale through repeated discussion and site visits with consultants and quality executives. The final scale contained 47 items covering 12 variables. Powell explored TQM as an optional source of sustainable competitive advantage and found that the most generally acceptable features associated with TQM, such as quality training, process improvement, benchmarking etc., may not be that useful for effective TQM implementation. However, certain tacit, behavioural, hard-to-define features, such as open culture, employee empowerment, and executive commitment, are vital for an environment conducive to TQM.

Zeitz et al. (1997) attempted to clarify the necessary distinction between TQM practices as a management programme and TQM as related to organisational culture. The view, set out in 1997, was that TQM practices seen as "formal, programmatic, and behavioural" must be differentiated from "attitudes, firmly held beliefs, and situational (and often not formally sanctioned) interactions". To maintain this distinction, knowledge and judgement are required to account for cultural factors, which, legitimately, are involved in the support for the implementation of TQM. Some cultural dimensions must exist as prior conditions to TQM implementation; others "facilitate acceptance and adoption" (Hunt's study, cited in Zeitz et al., 1997). At the other end of the spectrum, cultural change, in many interpretations, is the logical outcome for "TQM programmatic efforts" (Schmidt and Finnegan's study, cited in Zeitz et al., 1997). Ten supportive cultural dimensions were identified, these were:

1. Communication;
2. Resolution;
3. Empowerment;
4. Innovation;
5. Challenge;
6. Commitment;
7. Rewards;
8. Expectation;
9. Cohesion;
10. Trust.

Non-cultural TQM dimensions were also identified. These were:

1. Quality philosophy;
2. Quality planning;
3. Management leadership;
4. Quality supervision;
5. Continuous improvement;
6. Quality procedures;
7. Equipment adequacy;
8. Quality training;
9. Employee suggestions;
10. Customer orientation.

A factor analysis of results from 886 respondents indicated that 7 TQM and 5 culture dimensions accounted for most of the scale variance.

The 7 TQM items were:

1. Management support;
2. Suggestions;
3. Use of data;
4. Suppliers;
5. Supervision;
6. Continuous improvement.
7. Customer orientation.

The 5 culture dimensions were:

1. Job challenge;
2. Communication;
3. Trust;
4. Innovation;
5. Social cohesion.

All 12 dimensions were viewed as consistent with TQM literature. The chief benefit of the instrument to organisations was seen as assessing the cultural readiness of the organisation for the implementation of TQM. The specific barriers to TQM included "lack of proper fit between people and structure, in which we include inconsistency between the culture and the demands of a formal TQM programme". The study supports findings that, when fully implemented, TQM benefits quality, productivity, and employee development "but TQM is often not well implemented" (Zeitz et al., 1997).

Tamimi (1998) claimed to have empirical evidence to show that the identified quality factors are statistically independent and that this contradicts the notion that management selectively implements TQM. Total quality management itself was claimed to be a higher order factor emergent from components or critical factors operating in unison. Working from Deming's philosophy, TQM is holistic and so can only be understood as a whole. Also from Deming, failure may largely result from considering the TQM programme as offering a menu from which one then selects. Successful TQM management was found to depend on "implementing the quality management strategies holistically rather than piecemeal".

Anderson and Sohal (1999) found that "strategic planning, information, and human resource management" were only intermediate factors for small-to-medium-sized companies in Australia. Customer focus was regarded as being especially critical for companies emphasising flexible delivery. Data reflecting customer needs "analysed and presented in a manner understandable by all members of the company" was viewed as critical. Leadership was viewed as especially critical when quality is a greater concern than flexibility in delivery. "Strong customer focus, quality system or good information and management, provided the greatest positive influence on the quality of outputs" (Anderson and Sohal, 1999).

Forza and Filippini (1998) working from a definition of TQM as "orientation towards quality, TQM links with customers, TQM links with suppliers, process control, human resources" examined the structure of TQM practices in relation to customer satisfaction and quality conformity. The model used for examination of relationships is derived from established approaches of theory building and evaluation for theory. Manufacturing plants were studied according to a random sampling. Results of the study indicated "the existence of two distinct paths of direct influences which lead, respectively, to customer satisfaction and quality conformance".

The model distinguished between direct and indirect linkages and "between the various levels and performance". Only two types of performance (customer satisfaction; quality conformance) were examined. Results of model testing indicated that the role of human resources in obtaining quality appeared less important than stated in the literature. The suggestion may have been that system design has a "general orientation towards quality, adequate coordination between design and production and design and marketing, strong linkages with suppliers and customers, adequate procedures for process control". This may be more critical for TQM than human resources for achieving both customer satisfaction and quality conformance. The model may indicate that attention to management system design should increase. Customer satisfaction concerns "downstream relations with customers" – including their involvement in the quality process. Quality conformance is dependent on "adjustments to process control". Control in turn depends on stable inputs, dependent upon "closer upstream links with suppliers". For both satisfaction and conformance, leadership and quality orientation are the primary levers for TQM success. Cause-effect relationships between TQM levers and quality conformance and customer satisfaction were judged as requiring longitudinal studies.

Mohanty and Lakhe (1998) analysed 18 critical factors from the TQM literature in terms of industry in India. Interpretation of the results of the study (based on a survey instrument derived from prior assessment of TQM capability in designated organisations) indicated an increasingly complex picture of critical factors extending from organisational deficiency. Researchers suggested a pattern of contradiction and conflict between TQM intentions and perceived results: TQM programmes are detached from overall organisational functions because organisations cannot articulate critical factors; short-term agendas are routine, even though firms

annunciate long-term strategic planning; crisis management only delays TQM adoption; diagnostic phases are necessary but not forthcoming; Indian firms and management “neither have proactive approaches nor internal diagnostic tools, nor even [an] organisational help mechanism”(Mohanty and Lakhe, 1998).

Lack of understanding concerning TQM and an organisation’s ability to create committed leadership to revitalise the organisation from the inside out were needed. Quality must build within before it can provide quality outside of itself. TQM was not incorporated into appraisal systems. Collective working between management and employees was not established. “Collective working is the bedrock upon which truly world-class organisations have been built” (Mohanty and Lakhe, 1998). Synergistic integration between buyers and sellers was not established. “Total system-wide transformation through managerial actions which include the redesign of work systems, redefinition of managerial rules; re-evaluation of managerial competencies” could not be built because:

“Implementation [of] TQM in a bureaucratic organisational setting is entirely difficult, where top managers relinquish their hierarchical authority and traditional powers and move into a new landscape where power, authority, responsibility and information are much more widely shared.” (Mohanty and Lakhe, 1998)

The “*new landscape*” of TQM (Mohanty and Lakhe, 1998) cannot result until management decides to learn from subordinates and recognise their ability to process new information and skills. Management in the Indian context was found to have a technology-driven mindset. For TQM, researchers felt that a “socio-technological systems approach” was necessary. The changing social situation and relationship of workers are “inextricably bound together”. Innovation and reengineering emerge from the constant transformations within this system. Strategy and culture building must be linked together. Three essentials for Indian organisations are:

- Total restructuring of the age-old ritualistic management system and making them compatible with the processes of TQM.
- Re-examination of the organisational mission in line with the real-time strategic changes.
- A massive long-term investment in human resources development (Mohanty and Lakhe, 1998).

Initially decentralisation, empowerment, delegation and accountability in relation to those producing or delivering the service are required. Fundamental issues of shared goals, teamwork, autonomy, and rewards require attention. Audits to assess organisational capabilities are vital. Integration of management systems with resource management and budgets is required. The control system must be a ‘closed loop system’ of deployment of resources and feedback. The instructions of senior management stiffen organisational commitment, motivation, and results. TQM facilitates:

“corporate and functional strategic deployed to the total business, activities, tasks, and human resources, and feedback is obtained through the performance measurement system to enable appropriate management decisions.” (Mohanty and Lakhe, 1998)

Using the 8 critical factors employed by Saraph et al. (1989) and Quazi et al. (1998) examined 33 manufacturing and service firms in Singapore. The Singapore context was considered useful for international comparative study of quality factors because of the deep economic transformation of the country since independence from Great Britain. Since the structural shift from acute dependence “on entrepot trade to one with a dynamic manufacturing sector and sophisticated service sector” Singapore companies felt compelled to emphasise and upgrade quality to compete on an equal global footing (Quazi et al., 1998).

The conclusions derived from the study focused initially on the widely held perception among TQM researchers and practitioners that TQM had evolved to act as more of a competitive framework for management and not so much as a statistical and quality control function. “All functions of a firm’s value chain through marketing and after-sales service” are encompassed (Quazi et al., 1998). The Singapore context appeared to reflect higher levels of TQM deployment than those found in the Badri study (1995) in the UAE, since the firms used were “firmly entrenched” in TQM prior to the study. Construct validity for the 8 critical factors differed from both Badri et al. (1995) and Saraph et al. (1989). Badri et al. found all eight factors to be uni-factorial; Saraph et al. had found seven to be uni-factorial; Quazi et al. found only three uni-factorial factors and five multi-factorial ones.

Quazi et al. (1998) confirmed that Saraph et al.’s approach was appropriate for self-assessment. Sohal and Terzioviski (2000) found a high success rate of TQM deployment among Australian organisations. Factors critical for success were identified as those which integrated TQM philosophy into all activities to create positive attitudes. Leadership training throughout the organisation is viewed as facilitating group leadership, which enables management to communicate vision and effectively spearhead and gain acceptance of change. Strategic alliances with customers and suppliers for continuous feedback and integration of customer, supplier, organisation, rewards and performance indicators for quality and customer satisfaction are also seen as being important along with an appropriate alignment of rewards and indicators.

Studying TQM implementation in Thailand with an initial focus on limitation of adoption by Thai-owned companies. Krasachol, and Tannock (1998) noted support in the literature for culture change in organisations as a requirement to effect TQM adoption. TQM change models should be culturally feasible. Four paradigms cognisant of culture factors were studied extensively, including a meta-paradigm “which informs and enables movement between” the other ones (Whittle’s study, cited in Krasachol and Tannock, 1998). The four paradigms are set out below:

1. **Visionary Total Quality (VTQ)** is a strongly top-down management-led approach. Culture change is promoted to be the strategic quality vision and ideology of top management, which is communicated clearly and widely to all levels of employee. People are seen as programmable pawns. Providing management development and training for quality is one of the key issues in this model. The strategic quality programme is usually led and driven by the most senior executives.
2. **Learning Total Quality (LTQ)** emphasises a bottom-up style of organisational culture change. People are seen as willing participants. Employee empowerment and involvement are the key factors in TQM implementation. The natural work team is one of the important features emphasised in the LTQ organisation. The approach to TQM implementation is

not explicitly strategic. Human resources or personnel specialists tend to drive the process.

3. **Planning Total Quality (PTQ)** is concerned with rational and systemic approaches to TQM implementation. An explicit programme is introduced to provide systematic direction in TQM implementation. Project teamwork is one of the key activities in this model. Members of the project teams are trained to apply problem-solving tools and techniques in order to improve quality performance effectively. The PTQ approach tends to be introduced and developed by engineers or technologists, and the activity is mainly focused on manufacturing or production.
4. **Transformational Total Quality (TTQ)** is the meta-paradigm that allows an overview of the type and status of the organisational approach to TQM. Companies may reach a "saturated" stage of diminishing returns using any of the paradigms above, when TQM progress starts to falter. From the viewpoint of the TTQ paradigm, TQM implementation is a cyclical process by which a company can choose the most suitable of the other models and move between them as necessary to rejuvenate the process and improve organisational performance. TTQ views people as purposive agents, and activities are typically speculative, involving reframing, empowerment and paradigm shifts.

It should be emphasised that practical TQM implementations are unlikely to be based entirely on one paradigm. It might be expected, however, that they would show a tendency towards one or more of the implementation paradigms.

Even with acknowledgement of differences between implementation paradigms, Krasachol and Tannock (1998) maintained that results of their study (3 case studies of Thai organisations) identified five common features for the implementation:

- *Top management commitment.* It is acknowledged that TQM implementation cannot be successful without top management commitment and support. In all these three companies, it was obvious that quality activities were fully supported and led by top management.
- *Effective communication within the organisation.* Good and effective communication between management and staff is considered vital for TQM implementation. Although the three companies used different approaches and media to communicate with employees, all of them had effective ways of disseminating TQM information.
- *Problem-solving tools and techniques.* These tools and techniques are known to be effective methods to help employees improve their work and to assist motivation and involvement. TQM companies have to facilitate and empower their employees so that they can apply these tools effectively. All three companies used these methods extensively.
- *Group activity.* "Working as a team" is at the heart of TQM. All the studied companies emphasised the importance of group activity in their TQM programmes.
- *Employee training and development.* Human resource development is considered to be a key success factor in TQM implementation. Effective training programmes were a feature of all three companies studied.

Kraschol and Tannock (1998) suggested that social factors of a given particular culture, the Thai culture in this case, are facilitative of TQM implementation and adoption: "The Thai national culture has many of the social qualities which should support effective implementation of a variety of approaches to TQM". In addition to such socio/cultural forces or contexts (presumed, one must suppose, in the researchers' thinking, to importantly shape organisational culture) economic factors and conditions, national, regional, and global were viewed in the study as conducive to successful TQM implementation.

The Asian currency and economic crisis, which started in 1997, has yet to run its course at the time of writing. The likelihood is that the Thai manufacturing industry with those of the other ailing "Asian Tigers" will recover its health and increasingly focus on the achievement of competitive advantage through high quality, as well as cost/productivity efforts which aim to take advantage of favourable exchange rates (Sayles, 1998). Izumi and Whitfield (1997) suggest that "as Asian countries and states become more industrialised, stratified markets begin to become more unified, and the labour costs of 100 percent inspection increase, the requirement of TQM implementation will likewise increase".

Conclusions

TQM has evolved as a strategic management approach or philosophy as a response to more competitive market forces, especially global competition. TQM has sought to enhance operating efficiency through continuous improvement of organisational systems. Quality achievement has become an important measure of organisational success in both manufacturing and services. Throughout paper and part 1 as well, definitions of quality, TQM, and the philosophy of 'quality gurus' were reviewed. Through the extensive literature review, many critical success elements of TQM implementation are identified based on reviews of various models, Quality Awards, and the conceptual frameworks of academics, practitioners and also with empirical studies. These factors include senior management commitment and leadership, quality policy, training, product/service design, supplier quality management, process management, customer focus, customer satisfaction, benchmarking, statistical process control, employee empowerment, and strategic quality management etc.

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