Managing quality: critical links and a contingency model

Germaine H. Saad
Widener University, Chester, Pennsylvania, USA, and
Samia Siha
Kennesaw State University, Kennesaw, Georgia, USA

Keywords *Quality, TQM, Contingency theory, Model*

Abstract *Addresses quality management issues of both conceptual and practical significance. The contribution is twofold: first, conceptual issues and critical relationships which have been overlooked in the current literature are discussed, as well as their policy implications. Second, a contingency approach for managing quality is proposed to guide implementation, and to help reduce the deviations between the desired and the actual outcomes of quality programs. The contingency model developed provides a basis for advancing both theory and practice.*

Introduction

Quality has been recognized as an important issue in both management theory and practice. Nonetheless, quality still means different things to different stakeholders. Its drivers and implications on business performance are not yet fully understood. This paper identifies basic issues and critical relationships in quality, and discusses their management policy implications for practice. Accordingly, a contingency model to guide management of quality is proposed. The plan of study consists of four parts. Part I comprises the problem of interest and pertinent background. Critical interfaces and relationships among quality factors and their policy implications are discussed in Part II. Based on this analysis, a contingency model for managing quality is proposed in Part III. We conclude in Part IV with a summary of the findings, and suggested issues for future research. Relevant background on quality is now presented.

The history of quality is traced back to the ancient Egyptians, who left their quality products in the form of wall paintings and the great pyramids (Evans and Lindsay, 1999). The concept of quality assurance continued in the middle ages in Europe among craftsmen and down to the early twentieth century. In the early 1900s, Henry Ford developed many of the quality management fundamentals and recorded them in his book *My Life and Work* which the Japanese consider their "industrial bible". After the Second World War, Juran and Deming introduced statistical quality control and management quality concepts to the Japanese first and to the rest of the world afterwards.

Pioneering contributions in the area of management of quality include: Deming's teachings and his well-known 14 principles (Deming, 1986), Juran's trilogy which emphasizes planning, control, and continuous improvement (Juran, 1992), and Crosby's ideas: on the definition of quality, as meeting customer requirements; and on what type of quality systems should be used, focusing on prevention rather than correction; and promoting a zero defect goal

International Journal of Operations & Production Management,
Vol. 20 No. 10, 2000, pp. 1146-1163.

that results in obtaining Free Quality (Crosby, 1986). His contributions were instrumental in helping practitioners understand when and how to obtain higher quality, at no extra cost.

Figure 1 illustrates the different phases of the quality evolution. Up to the 1970s the literature on managing quality focused on quality control (QC). Companies define product specifications and inspect them before the product goes outside the "door". It is the "gate keeper" concept. Companies adopted this concept as a reaction to massive call-backs for product deficiency, and a growing number of consumer suits flowing into civil courts around the nation (Berkwitt, 1973). An example of a product protection program to insure that customers are receiving the best quality possible is employed by The Caloric Corporation (Perrine, 1973).

The second phase in the evolution process is quality assurance (QA). This comprised identification of both quality characteristics of the product, and procedures for quantitatively evaluating and controlling these factors. Toellner (1981) explains how to make the QA function acceptable to both the organization top management and the sales department. He stresses the

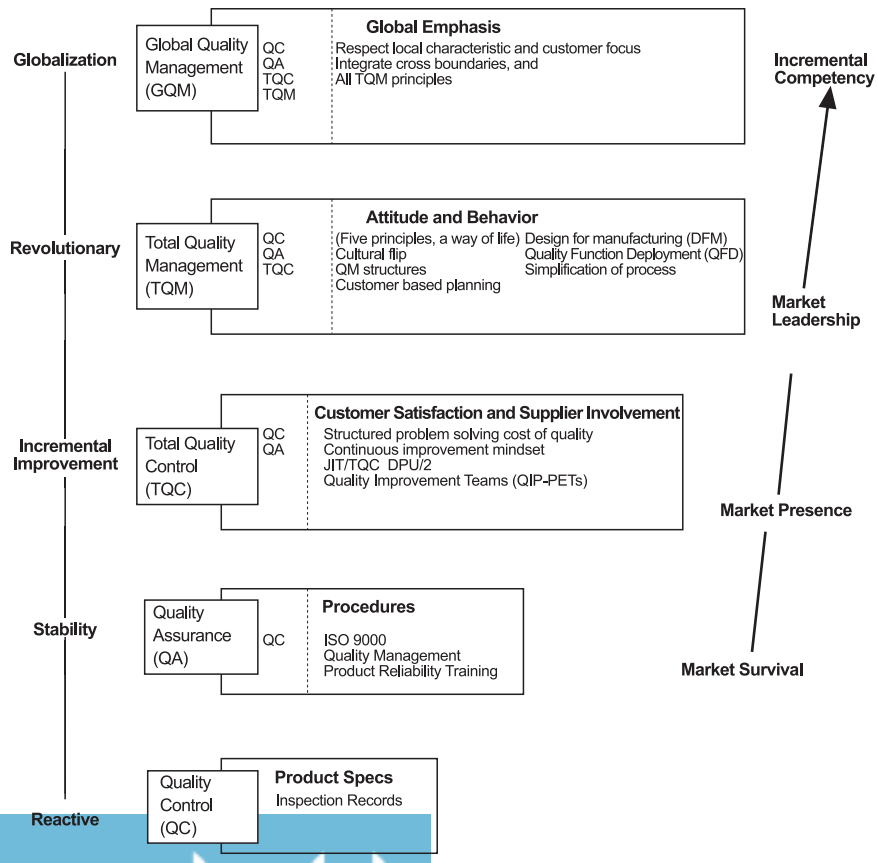

Figure 1.
The evolution of quality

importance of good communication, good methodology, training and perseverance. An early successful application of QA program that took place in the Airforce is described by Myers (1978).

The next phase is total quality control (TQC), a term coined by Feigenbaum (1983). It is the notion that quality is a total organization-wide effort. TQC is a bottom-to-top concept. It enhances productivity, profit, human interaction and customer satisfaction. It stresses communication and considers improving quality at each organizational unit, and at all levels of management (Goldman, 1993). Motorola adopted this concept and their business turned around. As a result of this it was one of the first Malcolm Baldrige National Award recipients (Pena, 1990).

The fourth phase is total quality management (TQM). Here, quality is considered a way of life, affecting the attitude and behavior of everyone. In TQM the customer should be at the heart of planning, and organization-wide involvement is required (e.g. Klekamp (1989); Oakland (1989); Wood (1997)).

There are many success stories resulting from the application of TQM, but there are many failures too. Kolesar (1995) and Tatikonda and Tatikonda (1996) present some reasons for the failure. Kolesar drew a very gloomy picture regarding the future of TQM implementation in the USA. He presented many failure cases based on his direct experience and observation. Kolesar called it partial quality management, and he called on researchers to find out why this is happening and what can be done. Tatikonda and Tatikonda (1996) argue that lack of vision and top management commitment, lack of customer focus, erroneous measures or no measures to track progress of quality, and training employees without specific vision, are the common characteristics of failing companies.

For an extensive review, classification, and analysis of the research on TQM, the reader may refer to Ahire *et al.* (1995). They used a two-dimensional scheme to classify articles on quality; by:

(1) article orientation (conceptual, case study, empirical, analytical, simulation and overview); and

(2) article focus, using the Malcolm Baldrige National Award criteria.

Global quality management (GQM) is the concept emerging most recently. It focuses on a global view of quality, as a means for business competitiveness. It recognizes the challenges and opportunities for quality management when the organization's business is worldwide. Kim and Chang (1995) define GQM as:

> The strategic planning and integration of products and processes to achieve high customer acceptance and low organizational disfunctionality across country markets.

They define its scope as cross-country, where cultural sensitivity is highly recognized. They also stress the global techno-economic network and the global integration of information systems. Others emphasize how the different

perceptions on quality in the different international markets can be used to achieve both economies of scale and economies of scope simultaneously (Saad, 1995).

In the 1990s, a large bulk of the quality literature has been concerned with the relationship between quality management practices and performance measures (see, for example, Reicheld and Sasser (1990); Rabbit and Bergh (1993); Flynn *et al.* (1995); Ricciardi (1996)). For example, in an empirical research of US world-class manufacture, Flynn *et al.* (1995) investigated this relationship. They constructed a framework, which focuses on both core quality management practices, and infrastructure that creates a supportive environment. Their research suggests that a relationship exists between "external" quality and SPC/feedback and product design process, while the "internal" quality is strongly related to process flow management. They conclude that different core quality management practices lead to success in different dimensions of quality.

In another study, Mann and Kehoe (1994) report the result of a comprehensive empirical research on the effect of quality improvement activities on business performance. The quality activities include TQM, ISO 9000; quality tools such as SPC, Taguchi internal audits, and suppliers' improvement activities, among many others. They classify business performance into strategic business performance and operational business performance. Their studies show that all quality activities investigated, particularly TQM, have beneficial effects on both strategic and operational business performance. Ittner (1994) examined the impact of quality on both direct and indirect productivity. He found that, while quality improvement activities increase direct productivity measured by rework, scrap rate, and inventory investment, their impact on indirect productivity is two to three times higher. Process improvement and reduction in factory congestion and confusion explain indirect productivity.

Shetty (1993) analyzed data from the General Accounting Office (GAO) on companies that reached the final round during the first two years when the Malcolm Baldrige Award was given. His study shows that TQM practice affected positively four business performances:

(1) operating measures;

(2) employee relations;

(3) customer satisfaction; and

(4) cost reduction.

However, one of the major challenges to quality management efforts is to find an appropriate balance among "continuity", "revision" and "re-engineering" (Prasad, 1995). This latter study indicates that the key in "managing change" is to establish an optimal balance between the following types of changes: renovation strategy, new technology adoptions, and virtual organization traits. Roth (1994) has another explanation. He believes that most organizations are in

a hurry and the only worthwhile changes are the big ones. This is due to the fact that the career of the CEO depends on his/her ability to achieve big results within the first year. The above empirical studies, among others, trigger important questions on the nature of quality, its drivers, and basic links that have been overlooked. These are addressed next.

Missing links and policy implications

Critical factors and dynamic relationships among quality variables have been overlooked in the current literature. Recognition of such links and relationships advances the understanding of, and provides insights for, effective management of quality. Each of these relationships and their policy implications are now discussed.

The link between the "process" and the "outcome"

In theory, the outcome, or goal, desired should determine the process to be followed to achieve that outcome. We do not question that premise. However, it is important to realize that the actual outcome achieved depends on the actual process followed. Since several uncontrollable factors determine the actual process followed, deviations occur between the desired goals and the actual outcome realized. Such deviations can be drastic in many cases. Thus, in *theory* the outcome desired should determine the process to be followed; yet, in *reality*, the actual process followed determines the actual outcome achieved. Furthermore, in some cases, a quality process may not guarantee a quality outcome. For instance, in health care, the hospital may have high clinical quality (process) in terms of accurate diagnosis and skillful medical care. However, the perceived quality (outcome) from the patient perspective may not be good, because patients consider both the physical and the emotional cure, simultaneously (Zifko-Balgo and Krampf, 1997).

Therefore, it is essential to distinguish between the planning and the execution stages, on the one hand; and between the different perceptions on how quality is defined, on the other. At the *planning stage*, the process followed is a function of the outcome desired. Yet, at the *execution stage*, the outcome achieved is a function of both the customers' perceptions and the process followed. The latter is affected by uncontrollable variables, e.g. uncertainty, and contingency factors, that are not accounted for in the planning phase.

Thus, from an implementation standpoint, understanding of, and preparing for, such contingencies are critical, especially in services and in highly dynamic business environments.

The dual nature and functional relationship of quality drivers

Quality is affected by different variables. These include: time, market segment, place, cost, and customer category and business performance (Saad, 1993, 1995). It should be noted that each of these quality drivers has a dual nature, i.e. each is a cause, and effect, simultaneously. Each may be described as an independent, and as a dependent variable in relation to quality. For instance,

factors such as market segment, place, price, customers' culture and cost, not only affect quality but are also affected *by* quality. In regard to price, for example, consumers' perception of a product's quality is inseparable from the price, since customers focus more on the value received per dollar paid. On the one hand, quality is a function of the price charged but, on the other hand, both price charged and the producers' cost are functions of the quality produced. Hence, quality and price are inseparable and may be viewed as two faces of the same coin. This characterization is true for other drivers of quality, such as market segment, place, and cultures.

Furthermore, the functional relationship between quality and its drivers is not consistent in general. For example, in examining the relationship between quality and business performance over time, empirical evidence shows that a quality focus may result in improved competitiveness in the short run, and reduced profitability in the long run (Rust and Zahorik, 1994). While in other instances, quality improvement effort may harm short-range profits, yet result in higher profits and increased market share in the long run. The conditions for each pattern of quality impacts over time relate to the specific product characteristics, and its elasticity of demand (Saad, 1995).

Therefore, to assure effective management of quality in practice, management has to specify empirically the relationship between quality and its drivers for their pertinent business environment. For instance, with respect to time, not only may quality requirements and expectations differ over time, but also the impact of a specific quality policy may differ in the short run from that in the long run. This fact necessitates that management understand the link between the *rate* and *direction* of change in the quality specifications *vis-à-vis* the change in the *consequences* of the specific quality policy over time. Only then can effective TQM programs be designed accordingly. Setting the appropriate quality policy will be not only a reactive response to market needs, but also a *proactive* policy that triggers desired results. *Proactive* policies are especially important for organizations which seek a sustainable leadership position in the marketplace (Stalk *et al.*, 1992; Saad and Siha, 1995). Empirical results show that a quality product is one that balances customers' perspectives and expectations (Zeithaml *et al.*, 1992). Using this finding, we propose that management adopt a *customized mass production* policy, as a proactive quality policy, whenever possible.

Quality is a "dynamic process" not a "static goal"

Current literature treats quality in dichotomous and sequential modes, yet empirical evidence shows that successful total quality management (TQM) programs are integrative and simultaneous in nature. Therefore, effective implementation of TQM requires cooperative efforts and attitudes across all functional areas of the firm, along with top management – continuous and simultaneous – support to all units. It should also be noted that market characteristics and customer preferences are continuously changing. These facts show the need for a change in theory, viewing quality as a "process"

instead of the traditional view of quality as a "goal". Very few start to recognize this fact (Hermel, 1995). Furthermore, quality standards and attributes should be viewed as a movable target, not a fixed one, i.e. quality is a dynamic process, and is a "vision", not a static goal. In an earlier study by the authors the distinction between the input, output and the vision components of quality has been made using the Analytical Hierarchy Process (Siha and Saad, 1994). This view of quality as a *dynamic process* does not preclude conformance to requirements and to the stakeholders' needs, since these are continuously changing also. Thus, quality is a "dynamic process of value creation".

This perspective of quality has important policy implications for management practice:

(1) Quality as a *value creation process* comprises the creation of: new product usages, time value, place value, intangible values, in addition to the traditional financial and/or direct economic values.

(2) This value creation process should focus on the stakeholders' needs and requirements, not only the "shareholders'" interests. Stakeholders comprise: customers, shareholders, suppliers, government agencies (e.g. EPA), and the general public. The customer category includes both external and internal customers, i.e. the employees.

(3) To create values, management should have a "quality vision". A vision is a partially defined ideal position. This will allow management a needed agility, as it will not be locked in the boundaries of a restrictively defined goal. This notion of quality vision allows managers to deal with quality as a movable target, with the agility needed to respond quickly to the market needs, and mold the strategy according to the changes in those needs.

(4) Management has to delineate the "static" components pertinent to its products and its processes, and distinguish these from the "dynamic" needs. The former are the common needs of all customers, and the product specifications set to meet the fixed attributes of quality. The latter comprise: the vision component of quality, i.e. the flexible and movable targets as explained in (1), (2) and (3) above.

The link between the "organizational" quality and "product" quality: the corporate culture

Empirical evidence shows that TQM programs have failed in many organizations, yet were very effective in others (Hermel, 1995; Rust and Zahorik, 1994). A main reason for failure is the implementation phase. International TQM applications across Europe and in the USA reveal that the role of tangible and visible factors is less important than that of intangible factors and measures. The visible (or tangible) variables such as technology, structure and strategy have a relatively small impact on TQM effectiveness compared with the largely hidden and intangible variables such as: values, attitudes and perceptions.

This empirical evidence suggests the need for a critical distinction to be made between the "management of quality" and the "quality of management". Quality management, i.e. effective management, is a necessary condition for success of the management of quality. The quality of management is driven by the type of organizational culture, and to what extent management is able to influence the employees' attitudes, behaviors and perceptions. Such intangible factors have a dominant impact on both the product and process quality and ultimately on business performance. Wilkinson (1992) suggests that there is tension between the "hard" and "soft" sides of TQM. According to Wilkinson, the "hard" side involves the production techniques, while the "soft" side is concerned with the role of human resources.

In this paper, we denote the *apparent TQM drivers* as the hardware determinants. These include: strategy, structure and technological systems and capabilities (SSS). Yet we characterize the *hidden drivers* as the software determinants. These include: employees' perceptions, attitudes toward change, rapport with management, work climate and quality of management. Our observation of practice confirms an earlier conjecture (Hermel, 1995) that such hidden factors are more critical for successful TQM implementation.

The design vs. implementation of TQM

Effective design of a TQM program is a *necessary*, but not a *sufficient*, condition for successful implementation. The design and implementation phases complement each other, yet their effectiveness is influenced by different determinants. Quality *design* effectiveness depends on economic and technical attributes, yet *implementation* effectiveness and success depend on the quality of the management in charge, and its ability to influence the employees' behavior, perceptions and attitudes. All these are "soft" ingredients needed to realize the technical improvements and economic benefits intended from TQM as indicated above. The TQM change process is like an iceberg; it has a very small visible part (the strategic, structural and technological aspects) and a large hidden part (the values, behaviors, perceptions and implicit paradigms). The implementation success (or failure), in terms of revival and/or transformation, is directly linked to the progressive discovery of those hidden elements. Empirical evidence shows that European companies seem more inclined to take into account that "hidden part" of TQM, while US organizations focus mainly on the direct, "transparent and quantifiable" elements (Hermel, 1995). Thus, to assure effective implementation, management should give special attention to the many hidden and intangible factors that have a dominant impact on TQM success. These hidden factors are represented by both management and labor behavior, as well as their perception and attitudes toward each other and toward the change process resulting from TQM. Based on practice observations, it is our conjecture that, in the long run, an organizational culture (i.e. prevailing norms, values, behaviors and attitudes) is influenced by the quality policy used; but the opposite is true in the short run.

The link between "product" vs. "process" quality

Most of the literature on management of quality is directed toward the product quality. This is quite noticeable from reviewing the existing definitions of quality and its related management policies (see, for example, Skinner, 1986; Garvin, 1988; Starr, 1996). The process quality has been overlooked, especially as to how it relates to the product quality (Betz, 1990).

A large number of companies across Europe, the USA and Japan have been studied (Prasad, 1995) with the focus on competitive priorities. It is found that introducing a new product or adopting a new technology is not the key to differentiation. When products come to market, anyone can copy their salient features. Computers and all "on-the-shelf" tools are commodities that anyone can buy and use. What is difficult to duplicate is how technology fits into the process. The improvements made through development of technology and subsequent product and process renovations can provide a real competitive advantage.

The importance of the link between "product" and "process" quality can best be illustrated by comparing the life cycle of product innovation (PLC) and the life cycle of process innovation (RLC) as depicted in Figure 2.

Typically, the process life cycle is much longer than the product life cycle. Moreover, the process life cycle has a spin-off effect, by being able to generate several byproducts and components used by industries other than the source industry, where the process originated. For example, computer ships that are developed originally as a computer hardware component, are now used in manufacturing many other electronic devices and communication networks.

Figure 2 reflects important strategic implication on:

(1) *Timing of a new technology* adoption. It is suggested that before this starts the limits of the existing process cycle are reached.

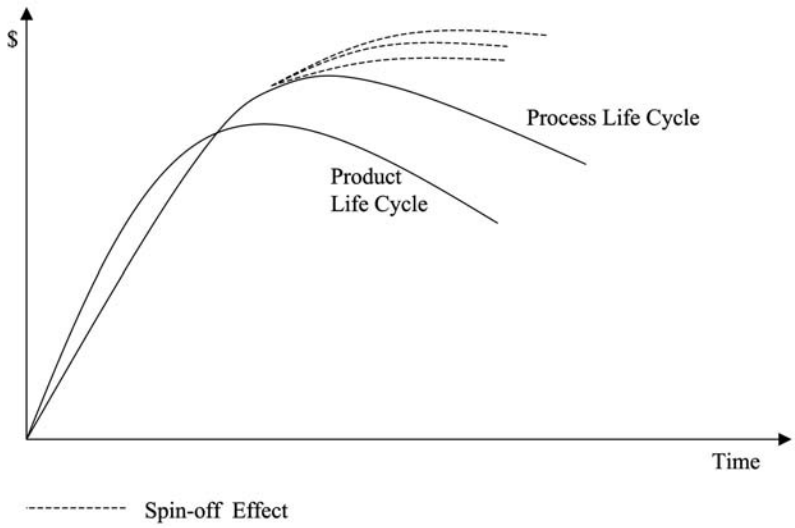

Figure 2.
The relationship between the product life cycle and the process life cycle

(2) *Timing of a new product* introduction should start as early as possible, before the start of the decline phase of existing product(s), and as dictated by the market needs, in terms of the existing and potential ones.

(3) Extending and exploiting all the "spin-off" potential of current processes and technologies should be emphasized as a continuous pursuit, in both theory and practice.

(4) The need to conduct pair-wise assessment of all possible pairs of processes and product(s) is especially valuable for maximizing the realized pay-offs. These assessments should examine the impact of different product and process quality combinations on: profit, market share, and long-range competitiveness of the organization.

Additionally, as a result of the spin-off effect, a process life cycle generates several products and processes. This results in extending the maturity stage of the envelope of all product life cycles as illustrated in Figure 3.

Hence, Figures 2 and 3 highlight the importance of process quality and the need for more research with a "process" focus.

Quality vs. business performance

A prevailing assumption on quality is that improving the quality of the products will result in improving the profit margin and/or market share, and hence boost business competitiveness. This premise is generally accepted in both theory and practice; however, empirical results show that higher quality may not lead to higher profits and better competitive position in the market-

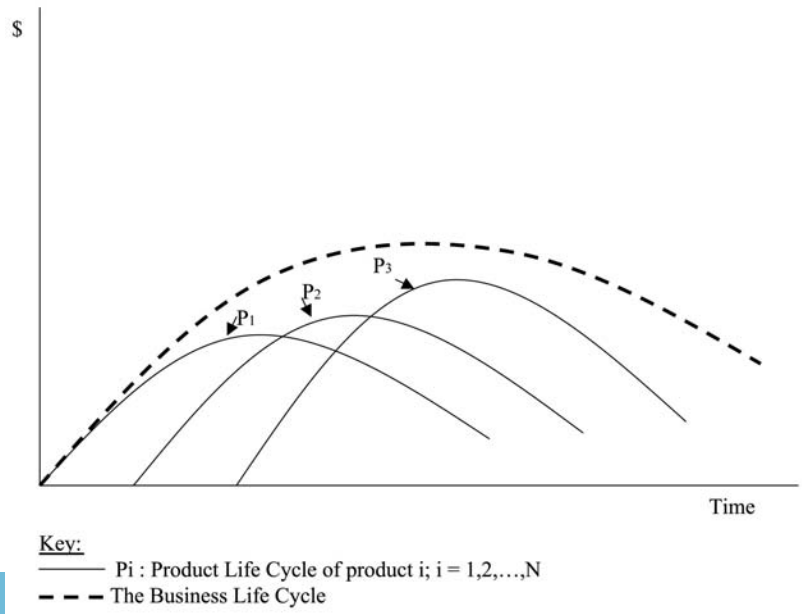

Figure 3.
The relationship between product life cycle and the business life cycle

place (Powell, 1995). The relationships between quality and profitability, on the one hand, and between quality and market share, on the other, are not consistent, and are not yet fully understood. There are many examples of companies which won quality awards but lost financially (Rust and Zahorik, 1994). Wallace Company, a Houston pipe and valve distributor, went out of business after winning the Malcolm Baldrige National Quality Award for small businesses in 1990. Florida Power and Light (FP&L) received Japan's prestigious Deming Prize for quality in 1989. Soon after, they found themselves in financial and moral difficulties, and were forced to eliminate most of their quality programs. IBM adopted a market-driven quality program which led to winning the Malcolm Baldrige National Quality Award in 1990. However, the quality program failed to improve their financial performance and they were forced to lay off thousands of workers.

It should be emphasized that the actual impact of quality improvement on business performance depends on many factors including the elasticity of demand of the pertinent product (as illustrated in Figures 4a and 4b). Other factors comprise: the existence of substitute and/or complementary products, and the real cost associated with improving quality, which in many cases is hidden and not reflected in the accounting statements. For more elaborate analysis of this point the reader is referred to Rust and Zahorik (1994).

To be able to understand the relationship between a particular quality policy or TQM, and business performance, the meaning and impact of quality for each stakeholder have to be accounted for, and both the short- and long-range implications of each quality policy have to be examined. Furthermore, the criteria used for assessing business performance represent an important factor in understanding such impact. This point will be discussed next.

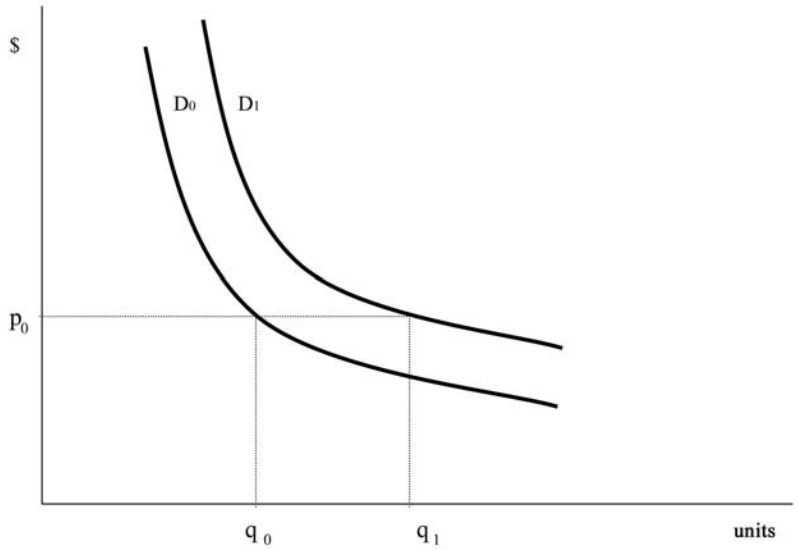

Figure 4a.
Higher quality increases profits and/or market share

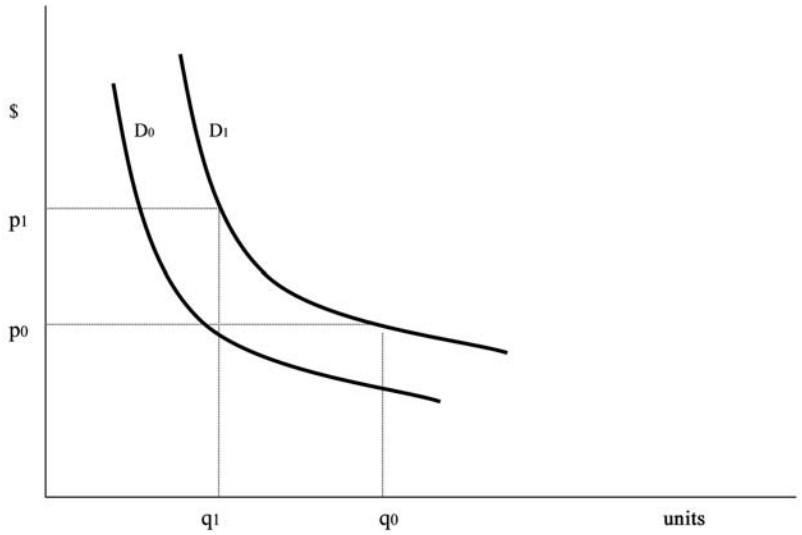

Figure 4b.
Higher quality does not increase profits and/or market share

Optimal quality vs. highest quality

The highest quality (i.e. state-of-the-art quality) is not necessarily the optimal quality that would generate highest profit and growth. Figure 5 illustrates this point. Here Q_H is a higher quality level than Q*, yet Q* is where the highest net revenue and market share are achieved. Hence, despite Q* being a lower level quality than Q_H, Q* is the optimal quality level to be adopted by management. This result holds as long as business performance is judged by highest profits and market share achievement.

The fact that the highest quality does not mean optimal quality is an important concept in understanding the complex relationship between quality and business performance. A change in quality has to fulfill a market need and has to conform to the stakeholders' collective requirements.

Based on the above, Figures 4 and 5 suggest the following guidelines for management practice:

(1) Quality and profits may not be positively correlated. Whenever the increase in quality results in increasing cost per unit, net profit will decrease under constant price policy. Therefore, before adopting a specific quality policy, the pertinent driving factors of quality have to be analyzed. It may be more beneficial to adopt a different pricing scheme for the different and/or the same quality level, to maximize total revenue gained from the different market segments, while minimizing cost at the same time. This would result in achieving both economies of scale and economies of scope simultaneously.

(2) Since the different customer categories are willing to pay different prices for the same product quality, the targeted market is segmented, and the

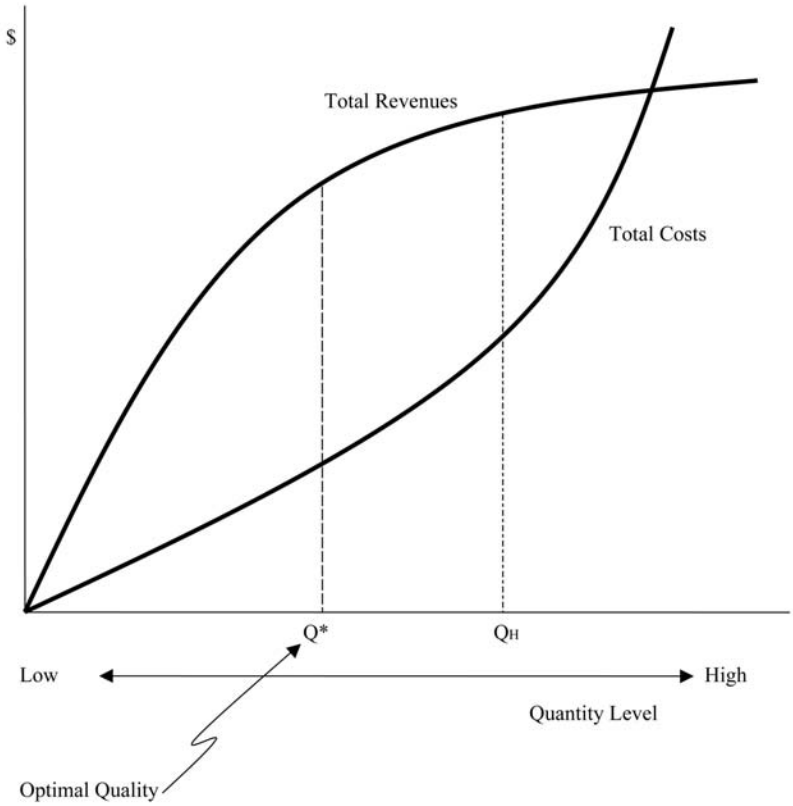

Figure 5.
The relationship between quality and profitability

prices to be charged have to be defined first, and then appropriate quality policy should be set accordingly.

(3) An integrated set of business performance criteria should be used, to account for both short- and long-range competitiveness. Using a limited or a *single* criterion for measuring performance, as net profit, is misleading, to say the least.

The link between incremental vs. drastic quality improvements

While many writers promote continuous quality improvement (CQI) and many corporations have established formal CQI programs, a recent growing voice in the literature promotes discontinuous, i.e. leap frog, quality efforts (see, for example, Ackoff, 1993) and discourages CQI programs on the premise that the focus on marginal improvements in CQI distracts creativity and impedes revolutionary innovations, and hence hinders competitiveness.

Revolutionary quality change results mainly from reengineering, benchmarking, and a corporate culture, which fosters experimentation and encourages creativity. Our conjecture is that continuous marginal quality

improvements complement, and do not compete with, the leap-frog advances in quality. Their coexistence strengthens competitiveness. They reinforce each other, and one should not be used as a substitute for the other.

Thus, management strategy should recognize the link between the "learning" organization and the "creative" one as not mutually exclusive. The corporate culture is a major factor in their coexistence to reinforce each other.

Both continuous and discontinuous ("leap-frog") quality improvements should be fostered. This will minimize the risk of small business innovators kicking the established market leaders. For example, the case of Bill Gates-Microsoft vs. IBM, in the computer software market. When Microsoft started out as a small company, IBM was a relative giant. A few years later, this small firm was able to pull the rug of software and operating systems out from under IBM's legs.

A contingency framework

Based on the important relationships and factors discussed above, a contingency framework is now proposed. This framework is intended to guide management in both the quality policy formulation and the implementation stages.

As indicated earlier, the outcome achieved depends on the process followed, and that process is affected by uncontrollable variables and uncertainty in the planned processes. Therefore, from an implementation standpoint, understanding such contingencies and being prepared for each with the appropriate response is critical, especially in highly dynamic markets and operating environments. The use of contingency planning is an ideal means not only for assuring adherence of the outcomes achieved to those planned, but also preventing undesirable occurrences.

The contingency framework proposed is illustrated in Figure 6. This framework is based on two main premises:

(1) Management policies and actions are controllable and dependent variables. They should be determined according to the behavior of the underlying uncontrollable variables faced. These latter variables are independent and are denoted as the states of nature.

(2) There is no single policy or action that can be defined as "the optimal" alternative for managing quality effectively.

In Figure 6, the states of nature may include:

- Competitors' policies and actions;
- Market condition, i.e. the expected level of demand;
- Possible changes in customers' needs, preferences and requirements;
- Risk factors; for example, new technological developments, and product innovations;
- Short- and long-range impacts, if expected to be in conflict.

If / What	States of Nature (Contingencies)					
	S_1	S_2	. . .	S_j	. . .	S_n
Alternative 1						
Alternative 2						
. . .						
Alternative i						
. . .						
Alternative m						

Key: S_j = The jth state of nature ; j = 1, … , n
Alternative i ; i = 1, … , m

Figure 6.
A contingency framework for managing quality

The alternative policies to be considered by management, i.e. the dependent variables, may include:

(1) An aggressive quality diversification policy to meet diversified needs and requirements of different customer categories, and different market areas' requirements, i.e. mass customization.

(2) A niche quality policy which focuses on a specific segment of the market-place.

(3) A conservative policy, focusing on wide market share coverage that responds to popular quality needs with lowest possible price.

(4) Charging different prices for the same quality offered, using "brand" and "non-brand" name products, to absorb as much as possible from the consumer surplus (CS). CS is the difference between what consumers are willing to pay, and what they actually pay.

Summary and conclusion

Insights on quality characteristics and basic relationships among the variables affecting quality, and those affected by it, have been discussed, along with their pertinent policy implications. Additionally, a contingency framework for managing quality has been developed, to guide policy formulation and implementation.

It is concluded that:

- The distinction between the planning stage and the execution stage is significant. The process used is a function of the outcome desired during the former stage while the opposite is true during the latter one. Therefore, a contingency framework is recommended to reduce the deviations between the planned and the actual outcomes.
- The functional relationship between quality and its drivers varies, in the different industries, as well as over time.
- Quality should be viewed as a dynamic process of value creation. This is necessary for effective strategy formulation, and implementation.
- The intangible drivers of quality have a greater impact on the implementation success of TQM programs than the tangible ones.
- The organization culture and the way it shapes employees' perspective, behavior and attitude have a significant impact on the quality implementation results.
- Business firms should continuously explore possible "spin-off" effects of their processes, to make use of their full potential, and assess their impact on other management decisions. For example, attention must be given to the timing of a new process adoption and/or a new product introduction.
- The relationship between quality and business performance should be assessed in each business environment. Quality policy and programs should be in alliance with the market segments targeted, prices set and the product elasticity of demand. For products with low elasticity of demand, a marginal quality improvement would justify a higher increase in price, since the quantity demanded is relatively not sensitive to change in price.
- The adoption of a continuous quality improvement (CQI) program should not preclude "leap frog" advances in quality. Their coexistence should be encouraged in organizations. A bottom-up approach may be used to promote CQI, while a top-down approach may be used to promote revolutionary changes in quality. Both reengineering and benchmarking are effective means in this regard.

The study has highlighted several open questions for further research. In particular, research is needed to:

- Identify the functional form of the relationships between quality and its drivers in the different business environments. This would provide an empirical foundation needed for advancing theory, and guiding practice.
- Examine the relationship between the quality of the "process" and of the "product" in different industries and service environments.

- Exploit the full potential of the proposed contingency framework for managing quality. This framework provides a starting base for further conceptual and practical extensions.

References

Ackoff, R.L. (1993), "Beyond total quality management", *Journal of Quality and Participation*, March, pp. 66-78.

Ahire, S.I., Landeros, R. and Golhar, D.Y. (1995), "Total quality managment: a literature review and agenda for future research", *Production and Operations Management*, Vol. 26 No. 5, pp. 277-306.

Berkwitt, G.J. (1973), "Quality control, the newest executive", *Dun's Review*, Vol. 199 No. 6, pp. 93-7.

Betz, F. (1990), *Managing Technology*, Prentice-Hall, Inc., Englewood Cliffs, NJ.

Burt, D.N. (1973), "Understanding quality control", *Journal of Purchasing*, Vol. 9 No. 2, pp. 12-24.

Crosby, P. (1986), *Quality Is Free*, MIT Press, Cambridge.

Deming, W.E. (1986), *Out of the Crisis*, MIT Center for Advanced Engineering Study, Cambridge, MA.

Evans, J.R. and Lindsay, W.M. (1999), *The Management and Control of Quality*, Southwestern Publishing Company, Cincinnati.

Feigenbaum, A.V. (1983), *Total Quality Control*, 3rd ed., McGraw-Hill, New York, NY.

Flynn, B.B., Schroeder, R.G. and Sakakibara, S. (1995), "The impact of quality management practices on performance and competitive advantages", *Decision Sciences Journal*, Vol. 26 No. 5, pp. 659-91.

Garvin, D.A. (1988), *Managing Quality*, The Free Press, New York, NY.

Goldman, A. (1993), "Implications of Japanese total quality control for Western organizations: dimensions of an international hybrid", *Journal of Business Communications*, Vol. 3 No. 1, pp. 29-47.

Hermel, P. (1995), "The new faces of total quality in Europe and the United States", POMS Colloquium, Pittsburgh, PA, October 7-9.

Ittner, C.D. (1994), "An examination of the indirect productivity gains from quality improvement", *Production and Operations Management*, Vol. 3 No. 3, pp. 153-70.

Juran, J.M. (1992), *Juran on Quality by Design*, The Free Press, New York, NY.

Kim, K.Y. and Chang, D.R. (1995), "Global quality management: a research focus", *Decision Sciences Journal*, Vol. 26 No. 5, pp. 561-8.

Klekamp, R.C. (1989), "Commitment to quality is not enough", *SAM Advanced Management Journal*, Winter, pp. 13-36.

Kolesar, P.J. (1995), "Partial quality management: an essay", *Production and Operations Management*, Vol. 4 No. 3, pp. 195-200.

Mann, R. and Kehoe, D. (1994), "An evaluation of the effects of quality improvement activities on business performance", *International Journal of Quality & Reliability Management*, Vol. 11 No. 4, pp. 29-44.

Myers, G.G. (1978), "A formal program for quality assurance", *Air Force Comptroller*, Vol. 122 No. 1, pp. 18-19.

Oakland, J.S. (1989), *Total Quality Management*, Heinemann Professional Publishing Ltd, London.

Pena, E. (1990), "Motorola's secret to total quality control", *Quality Progress*, Vol. 23 No. 10, pp. 43-5.

Perrine, L.E. (1973), "A product protection program: quality control package standardization consumer relation", *Traffic Management*, Vol. 12 No. 4, pp. 28-32.

Powell, T.C. (1995), "Total quality management as competitive advantage: a review and empirical study", *Strategic Management Journal*, Vol. 16, pp. 15-37.

Prasad, B. (1995), "A structured approach to product and process optimization for manufacturing and service industries", *International Journal of Quality & Reliability Management*, Vol. 12 No. 9, pp. 123-38.

Rabbitt, J.T. and Bergh, P. (1993), *The ISO 9000 Book*, Quality Resources, White Plains, NY, p. 2.

Reicheld, F.F. and Sasser, W.E. (1990), "Zero defection: quality comes to services", *Harvard Business Review*, Vol. 68 No. 5, pp. 105-11.

Ricciardi, P. (1996), "Avoiding the pitfalls of performance measurement", *Journal of Quality and Participation*, Vol. 19 No. 1, pp. 66-9.

Roth, B. (1994), "The view from the top and successful quality processes", *Journal of Quality and Participation*, Vol. 17 No. 6, pp. 46-9.

Rust, R. and Zahorik, A. (1994), *Return on Quality*, P. Robus Publishing Co., Chicago.

Saad, G.H. (1993), "Managing quality and productivity: perspectives and directives", in Sumanth, D., Edosomwan, J.A., Poupart, R. and Sink, D.S. (Eds), *Productivity & Quality Management Frontiers IV*, Institute of Industrial Engineers, Norcross, GA, pp. 588-96.

Saad, G.H. (1995), "Market segmentation impact on quality management and business performance", in Sumanth, D. *et al.* (Eds), *Productivity & Quality Management Frontiers V*, Institute of Industrial Engineers, Norcross, GA, pp. 569-75.

Saad, G.H. and Siha, S.M. (1995), "Managing quality: missing links and methodical analysis", POMS Meeting, Pittsburgh, PA, October 7-9.

Shetty, Y.K. (1993), "The quest for quality excellence: lessons from the Malcolm Baldrige Quality Award", *SAM Advanced Management Journal*, Vol. 58 No. 2, pp. 34-40.

Siha, S. and Saad, G.H. (1994), "An analytical hierarchy approach for analysis and evaluation of service", *Decision Sciences Proceedings*, Honolulu, Hawaii, pp. 1917-19.

Skinner, W. (1986), "The productivity paradox", *Harvard Business Review*, Vol. 64 No. 4, pp. 55-9.

Stalk, G., Evans, P. and Shulman, L.E. (1992), "Competing on capabilities: the new rules of corporate strategy", *Harvard Business Review*, March-April, pp. 57-69.

Starr, M.K. (1996), *Operations Management*, Boyd & Fraser Publishing Company, New York, NY.

Tatikonda, L.U. and Tatikonda, R.J. (1996), "Top ten reasons why your TQM effort is failing to improve profit", *Production and Inventory Management Journal*, Vol. 37 No. 3, pp. 5-9.

Toellner, J. (1981), "Building management acceptance of quality assurance", *Total Quality Management*, Vol. 28 No. 5, pp. 100-02.

Wilkinson, A. (1992), "The other side of quality: soft issues and the human resource dimension", *Total Quality Management*, Vol. 3 No. 3, pp. 323-9.

Wood, M. (1997), "The notion of the consumer in total quality management", *Total Quality Management*, Vol. 8 No. 4, pp. 181-94.

Zeithaml, V.A., Parasuraman, A. and Berry, L. (1992), *Delivering Quality Service: Balancing Customers' Perspectives and Expectations*, The Free Press, New York, NY.

Zifko-Balgo, G.M. and Krampf, R.F. (1997), "Managing perceptions of hospital quality", *Marketing Health Services*, Vol. 17 No. 1, pp. 28-35.