

Capability in Competing for a National Quality Award among Small and Medium-sized Companies in Taiwan

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Abstract

The Taiwan National Quality Award (TNQA) has been conducted for 14 years. However, small and medium-sized companies (SMSCs) rarely win the TNQA. This study undertakes a capability analysis to explore how SMSCs do win the TNQA. A survey instrument involving 149 questions extracted from “the 2001 Handbook of Standard Criteria for Evaluation of TNQA” is used to measure the capability of SMSCs in competing for the TNQA. The paper concludes with a summary of the essential qualities required by an SMSC if it is to compete successfully for the TNQA.

Key Words: TNQA, TQM, SMSC

1. Introduction

The economic contribution of small and medium-sized companies (SMSCs) is often neglected in Taiwan. In fact, such companies constitute 98% of the total number of companies in Taiwan (SMEA, 2002) and, over the past four decades, SMSCs have played an important role in the economic development of Taiwan. Indeed, it could be said that they have created the so-called “economic miracle” of Taiwan.

In terms of economic scale, SMSCs are limited by finite financial and human resources, and they therefore find it is difficult to create new production techniques and develop new markets. This, in turn, impedes the long-term economic development of the whole country, and in view of the vigorous global competition now being faced by SMSCs the Taiwanese

government is increasingly concerned about the development of this sector of the economy. A healthy SMSC sector brings at least three benefits for the wider economy. First, it produces growth in the general economy and increased employment. Secondly, it provides a competitive environment, thus helping to construct efficient market mechanisms. Thirdly, it accelerates the expansion of technical skills, thus improving the overall level of technology in industry as a whole (Liao, 2001). Taken together, the economic performance of SMSCs is obviously crucial to overall national economic performance. To create another economic miracle for Taiwan, the importance of SMSCs cannot be overemphasized.

The Taiwan National Quality Award (TNQA) represents the most prestigious national recognition of quality improvement, and is accepted as a measure of excellence in business performance across all sectors. The TNQA criteria allow companies to ascertain their level of quality performance, and indicates areas in which they can undertake quality improvement.

Since Taiwan has become a member of the World Trade Organization (WTO), it has become apparent that SMSCs in Taiwan are becoming less competitive on the global stage. Taiwanese SMSCs need to become more customer-oriented providing higher-quality products and services to satisfy customer demand. The leadership of Taiwanese SMSCs must orientate their companies towards a commitment to high value-added activities. This can be done by implementing total quality management (TQM) in all business activities, and competing for the TNQA is the best way for companies to test whether their efforts to implement TQM have been successful. However, looking back over 13 years, only eight SMSC companies have won the TNQA (CSD, 2003). This study explored why this is so by examining the problems that SMSCs experience in their efforts to win the award. The aim of the study was to provide guidance for SMSCs in their efforts to win this prestigious award.

The study was structured as follows.

- To establish a measurement tool to evaluate the capability of SMSCs in winning the TNQA, the study first designed a questionnaire on the basis of 141 modified questions extracted from "the 2001 Handbook of Standard Criteria for Evaluation of TNQA" (CSD, 2001).
 - The content validity and reliability of the questionnaire was tested before it was mailed to Taiwanese SMSCs.
 - In each question, the SMSCs were requested to supply performance data about "difficulties" and "capabilities" when competing for the TNQA.
 - Through interviews with the previous eight SMSC winners of the TNQA, successful
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experiences were collected as a reference for other SMSCs when competing for the TNQA.

- These previous eight TNQA winners were also requested to complete the questionnaire. After receiving questionnaire responses from winners and non-winners, capability indices for both groups were computed and compared.
- For winners and non-winners, the difficulty indicators in each subcategory (or dimension) of TNQA criteria were also computed and compared.
- The above findings were summarised with a view to forming conclusions about the capabilities required for an SMSC to win the TNQA.

2. TNQA criteria and evaluation

2.1 TNQA criteria

In 2001, the TNQA criteria were modified on the basis of the 2000 Malcolm Baldrige Quality Award, the 1998 Deming Award, the 1999 European Quality Award, and ISO 9000-2000 (CSD, 2001). This was done to ensure that the TNQA continued to be a generalized, prospective, integrated, international award. At the same time, the non-manufacturing sector (including public organizations, private service firms, and the military forces) also became eligible to compete for the TNQA. In addition, in response to the advent of e-commerce and the knowledge-based economy, the 2001 amendments to the TNQA criteria included a reduction from nine categories to seven. The seven categories are listed in Table 1.

Table 1. Criteria of the Taiwan National Quality Award

Category (criterion)	Weight
I. Leadership	0.15
II. Innovation and strategic management	0.11
III. Customer and market development	0.11
IV. Human resource and knowledge management	0.11
V. Information management	0.11
VI. Process management	0.11
VII. Business result	0.30

Flynn *et al.* (1995) indicated that a typical framework for quality management consists of three components—(i) top management support; (ii) quality-management practices; and (iii) quality performance. Su *et al.* (2003) proposed a recursive model of the relationship between TNQA categories and management in which top management support (initiative) drives a quality-management system (system) that creates quality performance (result). The TNQA model takes a similar approach:

- leadership (initiative);
- quality management (consisting of innovation and strategic management, customer and market development, human resource and knowledge management, information management, and process management); and
- business result.

Each category of the TNQA contains several dimensions, and each dimension contains several items. In each item, there are several questions to evaluate how companies conduct TQM. The total number of questions is 550. All questions are listed in “the 2001 Handbook of Standard Criteria for Evaluation of TNQA” (CSD, 2001). Of these, 79 questions are marked with an asterisk which indicates that these questions might not be suitable for evaluating SMSCs. This leaves 471 questions to test the performance of SMSCs in TQM execution.

2.2 Questionnaire design

The survey questions used in the present study were extracted from “the 2001 Handbook of Standard Criteria for Evaluation of TNQA”. Each survey question, as developed by the present authors, was related to a dimension of the TNQA. To test the content validity of each dimension, a five-point Likert-type scale was used to show the respondents’ preferences on each item. Five-point scales were used because research has indicated that they are easily completed by respondents (Matell and Jacoby, 1971; Matell and Jacoby, 1972) and provide reliable data (Lissitz and Green, 1975; Jenkins and Tabor, 1977). The questions were targeted at respondents who were expected to be knowledgeable about the content of each dimension. Respondents were therefore restricted to top management or quality managers.

2.3. Pilot test

To test the validity and reliability of the questionnaire, two steps were undertaken. First, several members of the Chinese Society for Quality (CSQ) in Taiwan were invited to review the survey questions. After their evaluation of each question, it was suggested that three items be deleted because these were too similar to other questions. One was removed from

original dimension 1.2, and the other two were erased from dimension 7.3 (the performance of market development). Following this, the two items left in 7.3 were moved to dimension 7.1. The final total number of questions was 146.

Secondly, to check the reliability of the questionnaires, the CSQ members suggested that a pilot test be conducted by mailing the questionnaires to 100 companies in the Science-Based Industrial Park which claimed to implement TQM programs. Of these 100, 35 companies returned the surveys, giving a response rate of 35%. After this pilot test of survey questions, the Cronbach alpha (Churchill, 1979; Cronbach, 1951) for each dimension was computed to check internal consistency (see Table 2). Cronbach alpha is a commonly used method of evaluating reliability, and a guideline of 0.6 was used for the new scale in this study, with 0.7 or higher being acceptable (Nunnally, 1978; Flynn *et al.*, 1990). As shown in Table 2, the Cronbach alphas of pilot test range from 0.742 to 0.919, thus establishing the reliability of the survey questionnaire. Scale uni-dimensionality was also tested according to the guideline of Carmines and Zeller (1979) in which the first component should explain at least 40% of the variance in the items (Meyer and Collier, 2001). It was found that the variance explained in each dimension was more than 40% (see Table 2). There was therefore no need to add or remove further items from the scale.

3. Difficulty and capability for SMSCs in winning the TNQA

3.1 Sampling

The Corporate Synergy Development (CSD) Center is in charge of TNQA business and owns a databank collecting the files of more than 1000 excellent SMSC in Taiwan. From this databank and with the assistance of CSD, 800 SMSC (390 of which have joined the TNQA in the past ten years) as a select group were requested to fill in questionnaires by mail. Of these 800 requests, 126 questionnaires were completed and mailed back, for an initial response rate of 15.8%. Through follow-up e-mails and telephone calls toward those non-respondents, a further 65 firms also mailed back their responses, providing a final total of 191 respondents and representing a response rate of 23.9%. Among the 191 respondents, 33 claimed that they did not implement TQM programs, and were therefore deemed nonqualified respondents. Of the 158 qualified responses, all questionnaires were fully completed. It was therefore not necessary to replace any missing data.

Table 2. Main survey factor analysis statistics for pilot-test

Category and Dimensions (Category Number in Parenthesis)	percent of variance explained	Cronbach (Number of Survey Questions)
Leadership (1.0)		
Business Concepts/Values (1.1)	77.91	0.801 (4)
Organization Mission/Vision (1.2)	69.43	0.794 (3)
Senior Executive Leadership (1.3)	75.68	0.813 (6)
Total Quality Culture (1.4)	72.13	0.809 (12)
Corporate Citizenship (1.5)	74.70	0.751 (6)
Innovation and Strategic Management (2.0)		
Innovation Values (2.1)	66.97	0.764 (4)
Business Model and Strategic Planning (2.2)	56.19	0.772 (6)
Strategy Development and Deployment (2.3)	64.88	0.873 (4)
Customer/Market Development (3.0)		
Product/Service and Market Strategy (3.1)	76.35	0.907 (3)
Customer and Business Information Management (3.2)	71.29	0.746 (5)
Customer Relationship Management (3.3)	61.56	0.890 (4)
Human Resource and Knowledge Management (4.0)		
Human Resource Planning (4.1)	77.82	0.865 (3)
Human Resource Development (4.2)	74.38	0.849 (4)
Human Resource Usage (4.3)	59.73	0.861 (6)
Employee Relationship Management (4.4)	51.96	0.789 (8)
Knowledge Management (4.5)	60.41	0.772 (5)
Information Management (5.0)		
Information Strategic Planning (5.1)	84.33	0.873 (6)
Network Application (5.2)	70.62	0.927 (4)
Information Application (5.3)	73.45	0.809 (4)
Process Management (6.0)		
Product Process Management (6.1)	58.69	0.875 (10)
Supply Process Management (6.2)	61.74	0.785 (3)
Organizational Relationship Management (6.3)	59.86	0.894 (4)
Business Result (7.0)		
Customer Satisfaction (7.1)	77.38	0.898 (4)
Market Development Performance (7.2)	63.92	0.817 (3)
Financial Result (7.3)	71.54	0.761 (3)
Human Resources Performance (7.4)	75.22	0.919 (3)
Information Management Performance (7.5)	80.16	0.884 (3)
Process Management Performance (7.6)	56.47	0.742 (3)
Innovation Performance (7.7)	69.43	0.841 (3)
Public Relationship Performance (7.8)	61.99	0.889 (5)

3.2 Data collection

In the survey questionnaire, the respondents were asked to answer each question in terms of

a scale from number 0 to 4 indicating the corresponding situation of “difficulty” or “capability” they faced. The larger the number is, the higher the level of the measurement is. The measuring results are computed as “difficulty” and “capability” values shown in Table3.

Table 3. The difficulty and capability of SMSC competing for TNQA

Category and Dimensions	Difficulty	Capability
Leadership (1.0)		
Business Concepts/Values (1.1)	0.9	3.0
Organization Mission/Vision (1.2)	1.6	3.1
Senior Executive Leadership (1.3)	2.5	2.9
Total Quality Culture (1.4)	3.5	2.2
Corporate Citizenship (1.5)	3.1	1.9
Innovation and Strategic Management (2.0)		
Innovation Values (2.1)	3.5	1.9
Business Model and Strategic Planning (2.2)	2.5	2.4
Strategy Development and Deployment (2.3)	2.9	2.3
Customer/Market Development (3.0)		
Product/Service and Market Strategy (3.1)	2.7	2.2
Customer and Business Information Management (3.2)	2.7	2.1
Customer Relationship Management (3.3)	2.9	2.8
Human Resource and Knowledge Management (4.0)		
Human Resource Planning (4.1)	2.4	2.4
Human Resource Development (4.2)	2.8	2.0
Human Resource Usage (4.3)	1.8	3.0
Employee Relationship Management (4.4)	1.9	3.2
Knowledge Management (4.5)	3.1	1.6
Information Management (5.0)		
Information Strategic Planning (5.1)	3.0	1.7
Network Application (5.2)	3.1	1.9
Information Application (5.3)	3.3	1.6
Process Management (6.0)		
Product Process Management (6.1)	2.9	2.8
Support Process Management (6.2)	2.6	2.9
Organizational Relationship Management (6.3)	2.0	2.8
Business Result (7.0)		
Customer Satisfaction (7.1)	2.6	2.7
Market Development Performance (7.2)	2.9	2.4
Financial Result (7.3)	2.2	3.1
Human Resources Performance (7.4)	2.8	2.3
Information Management Performance (7.5)	2.9	2.1
Process Management Performance (7.6)	2.6	2.9
Innovation Performance (7.7)	3.3	2.1
Public Relationship Performance (7.8)	2.9	2.0

4. The successful SMSC demonstrations in competing for TNQA

The TNQA has been successfully held for 14 years. In the past, only 8 companies in the SMSC group won TNQA. In order to better understand how these 8 award-winning SMSC won TNQA, we visited the TNQA winners and tried to find out the reasons behind their successful stories, for their successful experiences could be very helpful for other SMSC in competing for TNQA. After the interviews with those TNQA winners, we generalize some key successful factors for SMSC when competing for TNQA, and they are as follows:

4.1 Leadership

1. Those companies have set up the TQM executive board that is under top management support. The TQM executive board is responsible for supervising all kinds of TQM activities such as Quality Control Circle (QCC), project improvement, employee welfare, on job training (OJT), and so on.
2. Each TQM activity is conducted by specific groups, which are arranged hierarchically. In other words, each hierarchical leader is responsible for taking the lead in solving the TQM problems of his/her own team, and reporting those unsolved problems to the TQM executive board.
3. Several senior supervisors constitute the TQM executive board. The TQM executive board evaluates each unit constantly on how TQM activities are conducted. The evaluations include 5S, computerization, file management and data collection, and so on. The results of each evaluation will be associated with annual performance review so that each unit will take the evaluation results seriously. Each unit is impelled to review the defects listed in evaluation results and make improvements within a specific period of time. The TQM executive board then evaluates again to ensure all the improved measurements are completely put into action.
4. In every meeting and conference, these companies constantly emphasize that how important TQM is, and those who have good performance on conducting TQM activities are also rewarded in public.
5. These companies report to stockholders annually about great financial performance and attribute the performance to well-conducted TQM activities so as to acquire further supports and resources.

4.2 Innovation and Strategic Management

1. The companies are able to make good use of Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) during the phase of product design. The PCs and LAN are also
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utilized in connecting with CAD and CAM operations so that the cycle time of design and production can be decreased on account of the effectively shared information.

2. These companies increase investment on equipments and manpower annually to focus on innovation.

4.3 Customer/Market Development

1. The companies constantly request feedbacks from customers' about the products and services in order to enhance customer satisfaction. Meanwhile, they also try to better understand customers' demands, to collect useful information from competitors and banchmarkers as important references.
2. The companies establish the feedback systems for customer information. The system can analyze the feedback information from customers and then hands down the analysis results to such departments which is responsible for solving customer complaints as the quality management department, R & D department and so on. In addition, the companies periodically hold brainstorming conferences to find the solutions to customer complaints.
3. The companies set up proper channels in communicating with customers so as to insure customers' rights and interests.

4.4 Human Resource and Knowledge Mangement

1. The companies conduct orientation training for each new employee. In the orientation training programs, the trainees must be trained in the production lines or service sites in order to obtain the concept of "Quality Is No.1", and they will also be able to be familiar with the entire production or service processes. Therefore, each member of the company should be responsible for the quality of the product/service and also should be versatile in cooperating with others to produce excellent product/service.
 2. In these companies, employees are given job training constantly. Each employee's training records are filed, and equal opportunities on taking training courses for each member of the companies are assured. Besides, the companies set up a complete training blueprint for each employee, helping trainees develop their TQM conception with custom-made training programs.
 3. The companies set up a QCC in each working unit to execute TQM program. Due to similar working experiences, the members of QCC come from the same working site in order for them to solve their own quality problems by brainstorming. The companies also hold the performance exhibition for those groups having successfully fulfilled TQM targets so as to spread out their successful experiences all over the companies.
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4. The companies carry out an important quality-controlling principle, which is also called 5S campaign. The 5S respectively represents “Sort”, “Set in order”, “Shine”, “Standardize” and “Sustain”. The 5S campaign could create an enjoyable working environment for employees.
5. The companies offer jobs to students not only to support their education, but also to give them the opportunities to practice what they have learned in school.

4.5 Information Management

1. The companies take advantage of computers in dealing with all kinds of business. And they also continuously dedicate themselves to computerization.
2. The companies often collect all kinds of information associated with their business, such as political news, social events, technical knowledge, customers’ responses, and so on. For example, the companies constantly collect and analyze competitor’s product information from professional magazines, seminar and exhibitions as important references for product design.
3. The companies concern themselves over the environmental protection and develop new products to meet the requirements of environmental protection law.
4. The companies use PCs and LAN to connect production department, marketing department and procurement department, as well as integrate and share information in order to increase the efficiency and effectiveness of operations.
5. The companies establish an excellent financial management system to collect and analyze financial information. The cost and expenditure are reasonably pre-controlled monthly under the supervisal of financial management system.
6. The computer information management systems of the companies work out and lead to fast after-sale service, fast delivery of goods, fast payment, fast quoting and fast response of customer’s complaints.

4.6 Process Management

1. The QCCs of the companies implement the Statistic Process Control (SPC) tools to analyze the problems and find out effective solutions.
 2. The companies continuously focus on process improvement to reduce the cost and enhance the quality of products.
 3. The companies constantly improve the design of their machines and enhance the maintenance of equipments to raise productivity.
 4. The companies prefer standardization, such as the standardization of operation, documentation, flow path and inspection. The companies can also set up new standards through the “Plan, Do, Check, Action” (PDCA) cycle to enhance the quality.
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5. The companies take strict measures on Supplier Management, such as necessary investigation in advance and periodical evaluation for their suppliers.
6. The process quality of the company depends on the appropriate schemes for pilot run, complete standard procedures, the precise process control, the adequate analysis of process capability, and overall inspections.
7. The companies show a great capability on logistic management.
8. The companies maintain their manufacturing equipments periodically.
9. The companies periodically calibrate the inspecting equipments, ensuring their accuracy.

4.7 Business Result

1. The companies have positive growth in profits and sound returns on investment annually.
2. The companies dedicate a lot of efforts to Original Brand Manufacturing (OBM). More and more products are completely designed on their own. Not only the companies can develop key components of their products, but t also sell products in their own brands.

5. The comparison of capability in competing for TNQA between TNQA winners and entries

Table 3 shows the capability of TNQA entries in SMSC group in each dimension. Here, we also survey the capability of TNQA winners in SMSC group with the same questionnaire. The comparison of capability between TNQA winners and entries is shown in Table 4. In general, the capability value 4 is defined as perfection, so threshold value should be around 2.5 for SMSC joining the competition of TNQA. We found that no capability values of TNQA winners are less than 2.5 in any dimension. If the score of 3.6 represents the capability of excellence, the TNQA winners perform pretty well in 13 dimensions. However, for the TNQA entries, the capability value is under the threshold value in 18 dimensions, and no excellent performance is shown in any single dimension. Obviously, for the TNQA entries, the capability in those 18 dimensions is urgent to be enhanced, and the 18 dimensions are marked with asterisks in Table 4.

6. The indicator of difficulty for SMSC to win TNQA

In the questionnaire of difficulty survey for this study, the answer 0 means “easy”, 1

means “not difficult”, 2 means “a little bit difficult”, 3 means “difficult” and 4 means “very difficult”. The threshold of difficulty value is 2.5 again. If the difficulty value of certain dimension is over 2.5, it means the SMSC feel difficult to perform well in that TNQA dimension. In Table 3, we found that there are 23 dimensions for SMSC to feel difficult to perform well. Among those 23 dimensions, the SMSC also show low capability indices, which are less than 2.5 in 17 dimensions. In other words, it is really difficult for SMSC to reach the basic demands in those 17 dimensions. The statement “really difficult” indicates that the SMSC not only feel difficult but also actually fall short of the capability in meeting the TNQA requirements. Furthermore, we also defined the difficulty indicator as follow in order to represent the actual “difficulty” situation the SMSC faced in competing TNQA.

Table 4. The comparison of capability value between TNQA winners and entries

Categories and Dimensions	Entries	Winners
Leadership (1.0)		
Business Concepts/Values (1.1)	3.0	3.5
Organization Mission/Vision (1.2)	3.1	3.4
Senior Executive Leadership (1.3)	2.9	3.7
Total Quality Culture (1.4)	2.2*	3.5
Corporate Citizenship (1.5)	1.9*	3.2
Innovation and Strategic Management (2.0)		
Innovation Values (2.1)	1.9*	3.7
Business Model and Strategic Planning (2.2)	2.4*	2.8
Strategy Development and Deployment (2.3)	2.3*	3.8
Customer/Market Development (3.0)		
Product/Service and Market Strategy (3.1)	2.2*	3.8
Customer and Business Information Management (3.2)	2.1*	3.4
Customer Relationship Management (3.3)	2.8	3.7
Human Resource and Knowledge Management (4.0)		
Human Resource Planning (4.1)	2.4*	3.3
Human Resource Development (4.2)	2.0*	2.8
Human Resource Usage (4.3)	3.0	3.2
Employee Relationship Management (4.4)	3.2	3.6
Knowledge Management (4.5)	1.6*	2.6
Information Management (5.0)		
Information Strategic Planning (5.1)	1.7*	3.0
Network Application (5.2)	1.9*	2.8
Information Application (5.3)	1.6*	2.5
Process Management (6.0)		
Product Process Management (6.1)	2.8	3.6
Support Process Management (6.2)	2.9	3.8
Organizational Relationship Management (6.3)	2.8	2.9
Business Result (7.0)		
Customer Satisfaction (7.1)	2.7	3.7
Market Development Performance (7.2)	2.4*	3.8
Financial Result (7.3)	3.1	3.8
Human Resources Performance (7.4)	2.3*	3.4
Information Management Performance (7.5)	2.1*	3.6
Process Management Performance (7.6)	2.9	2.8
Innovation Performance (7.7)	2.1*	3.3
Public Relationship Performance (7.8)	2.0*	3.6

difficulty indicator = difficulty / capability

The bigger the difficulty indicator is, the harder the SMSC meet the TNQA requirements. The difficulty indicators of the 17 dimensions mentioned above are arranged by descendent order in Table 5. In short, the SMSC have to spend a lot of efforts and allocate more resources on those disadvantaged dimensions in order to win TNQA.

7. The essential capability of SMSC for winning TNQA

According to our findings in previous section, we generalize the essential capability of SMSC for winning TNQA as follows.

7.1 Leadership

1. Top management of SMSC must implement TQM programs with determination and involve themselves in TQM activities. By all means all the members of a company should participate in the TQM campaign. All TQM activities must be reviewed periodically with both rewards and punishments so as to remind employees of the importance of TQM.
 2. The SMSC must implement TQM projects with a top-down approach in the whole companies through. Each member of the companies must possess the ability of finding and solving his or her operation problems with PDCA principle. Moreover, the efforts on improvement should be carried on so that the objectives of different levels can be attained one by one, always striving for better results. Thus the high quality goal can be fulfilled through the efforts of all company members.
 3. Top management of SMSC should seek more long-term supports from stockholders on the deployment of TQM projects. Therefore, the top administrations of SMSC have to confidently show a clear vision to stockholders about how company can benefit from TQM. In other words, stockholders might suffer a short-term loss for company's investment on TQM, but will ultimately gain more long-term interests in the long run due to the steady promotion of company's overall quality.
 4. The SMSC must continually invest on employees' job training programs so as to increase their working capability. The human resources should be deemed company's most important assets. Therefore, the SMSC must establish a sound welfare system for employees in order to lower the turnover rate of manpower.
 5. The members of top management must be unanimous on company's overall vision and get rid of the traditional managerial attitude of family business. The top management should also
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build up a fair promotion system to encourage and authorize the employees to pursue further innovation and improvement.

7.2 Innovation and Strategic Management

1. No matter how the economic situation would be, the SMSC must focus on innovation, which is actually an important power for SMSC to exist and develop in the future. High value-added products and services can only be created by innovation.
2. The SMSC should learn how to manage the risk when they conduct the innovation. They must collect accurate and useful information to help them on the risk management.

7.3 Customer/Market Development

1. The SMSC must learn how to segment the markets because they do not have many resources to compete with larger companies.
2. The SMSC must maintain good customer relationship management (CRM). In other words, they should communicate with customers actively to realize their demands and then try to satisfy them. An excellent CRM mechanism should respond well to customers' complaints.
3. The SMSC should take the responsibility for their bad products or services so as to make a good impression on their customers.

7.4 Human Resources and Knowledge Management

1. The SMSC should train employees constantly to truly comprehend the process of production or services, understand who company's real customers are, as well as how to satisfy them. Furthermore, employees should know that the quality and customer satisfaction rest with each member of the company.
 2. Carry out the QCC and continuous improvement (KAIZEN) activity through employees' proposals with effective motivation to encourage employees to work both hard and smart.
 3. The SMSC must build proper communicating channels between managers and employees so that the top management would easily know what the employees need, especially on their career planning. On the other hand, a formal promotion mechanism must be set up to accommodate employees' career planning, and in the future cultivate excellent manpower.
 4. The knowledge should be easily acquired for all employees in the company. In other words, the knowledge management should be carried out more effectively, making the knowledge available whenever.
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7.5 Information Management

1. The SMSC must establish an information center to collect, analyze and integrate information for management and operations.
2. The SMSC must pay attention to the changes of business environment and learn how to manage risk.

7.6 Process Management

1. Teach employees the skills for quality improvement to solve their own problems on quality issues.
2. In order for the SMSC to be more competitive in the market, the advancement of production skills and process improvement will never be overemphasized.
3. Make all process standardized so as to be more efficiently.
4. The price, quality, delivery and flexibility should be all covered when the SMSC select suppliers. Build a long-term relationship with qualified suppliers through proper supplier evaluation procedures.
5. Keep strict maintenance for machines and inspect equipments constantly in order to reduce the defect rate.

7.7 Business Result

1. The sales, profits and returns on investment all should increase annually.
2. The SMSC must well budget the annual disbursement and supervise how it goes.
3. The SMSC should learn how to apply new management concepts and techniques to create their own brands in the markets.

8. Conclusions

In this study, the survey questionnaire which we developed was based on “the 2001 Handbook of Standard Criteria for Evaluation of TNQA” to measure the difficulty and capability for SMSC in competing for TNQA. We also made a comparison between TNQA winners and entries in SMSC group in the capability of winning TNQA. We found that the winners show an excellent performance on 13 TNQA dimensions and intermediate performance on other 17 dimensions. On the contrary, the entries could not meet the basic requirements on 18 TNQA dimensions, and show excellence in no dimensions. Therefore, we

Table 5. The difficulty indicators of 17 dimensions for SMSC winning TNQA

TNQA dimension	Difficulty indicator
Information Application (5.3)	2.06
Knowledge Management (4.5)	1.94
Innovation Values (2.1)	1.84
Information Strategic Planning (5.1)	1.76
Corporate Citizenship (1.5)	1.63
Network Application (5.2)	1.63
Total Quality Culture (1.4)	1.59
Innovation Performance (7.7)	1.57
Public Relationship Performance (7.8)	1.45
Human Resource Development (4.2)	1.40
Information Management Performance (7.5)	1.38
Customer and Business Information Management (3.2)	1.29
Strategy Development and Deployment (2.3)	1.26
Product/Service and Market Strategy (3.1)	1.23
Human Resources Performance (7.4)	1.22
Market Development Performance (7.2)	1.21
Business Model and Strategic Planning (2.2)	1.04

conclude that there is a large capability divergence between TNQA winners and entries. In addition, we found that there are 17 dimensions in which the SMSC are very difficult to fulfill. This is the main cause for the SMSC to fail the competition of TNQA. In other words, for the SMSC, the lack of resources, no effective TQM activities and the absence of TQM culture in companies are the root causes of TNQA incompetence. We suggest that the government provide certain supports to the SMSC in order to encourage them to implement TQM since it takes time for TQM to come into effect.

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