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The human side of total quality management in Taiwan: leadership and human resource management

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Introduction

A recognition that quality is an effective strategic weapon in a competitive market place has forced firms to implement various programmes to pursue improvement of their products or services for the customer's satisfaction. One major focus of these programmes is attention to technical elements, including statistical process control, reliability analysis, and product design, which is certainly necessary and generally yields significant improvement of quality. Contemporary total quality management (TQM) means more than a superior technical system. For enduring success, Hart and Schlesinger[1] commented that "Successful TQM implementation calls for a cultural shift in the organization with a change in values, organizational structure, the way people work together, and the way people feel about participation and involvement". The central idea of TQM is that, to provide superior customer values, managers must think and act to improve organizational systems, rather than only the technical system [2, p. 5]. Thus, executive leadership is regarded as a driving force for the successful implementation of TQM. Equally emphasized is the requirement of employee involvement and teamwork to weave various interdisciplinary efforts into an integrative system.

According to this contention, TQM clearly recognizes the importance of human factors in quality management, including effective leadership, and development and management of human resources[3-5]. This observation is supported by the fact that leadership and human resources management are two dimensions of assessment criteria of quality awards, such as given by the Malcolm Baldrige National Quality Award of the USA, European Quality Award, and National Quality Award of Taiwan. Therefore, it would be inspiring to have a profound understanding of these two dimensions of TQM so that it may reveal the synergy or deficiency of a firm's quality management to guide improvement.

As the economy of the Pacific rim becomes increasingly important, examination of the human components of TQM in Taiwan may provide managerial references for interested parties. The significance of the work is

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enhanced on comparing topics of interest between local Taiwanese firms and foreign firms. The USA and Japan are two countries with major foreign investors contributing to Taiwan's economic development. The distinct managerial practices as observed in US and Japanese investors have had significant influences on local firms[6-8]. Thus, comparisons of the leadership and human resources management of TQM among local firms, US subsidiaries and Japanese subsidiaries may illuminate successful quality management.

The purpose of this work is to examine the quality in leadership and human resources management of TQM in Taiwan. Specifically, the leadership and human resources management of TQM in US subsidiaries, Japanese subsidiaries, and local Taiwanese firms were compared. As a firm's quality management practices may vary with the firm's characteristics (such as industrial sector, employee number, etc.; see Kohse[9] for example), the effect of a company's characteristics on the leadership and human resources management of TQM were also investigated. Furthermore, the relationships between the management effectiveness of the quality department and the leadership of TQM, and between the management effectiveness of the quality department and human resources management were explored. This research endeavoured to examine the following questions to facilitate successful implementation of TQM:

(1) Do the quality of leadership and human resources management of TQM vary in companies of various types (country, private or state-owned)?

(2) What is the relationship between the effectiveness of the quality department and the leadership of TQM, and between the effectiveness of the quality department and human resources management?

(3) Does the quality of leadership and human resources management of TQM differ because of a firm's characteristics (manufacturing or services, employee number, sales revenue, company age, extent of automation)?

Background

In the pursuit of quality improvement, the criteria of a quality award are often used as effective guidance to implement TQM. In particular, the Baldrige Award is uniformly praised as the road map to quality improvement since its institution in 1987[10]. In addition to technical operations, the Baldrige Award clearly provides a direction to deploy effective leadership and human resources management of TQM.

According to the Baldrige Award, the assessment category of leadership examines senior executives' personal leadership and involvement in creating and sustaining a customer focus and visible quality values. Also, it examines how the quality values are integrated into the company's management system and reflected in the manner in which the company addresses its public responsibilities. Hence the category of leadership covers these areas – senior executive leadership, management for quality, and public responsibility and

corporate citizenship. The reader is referred to the Appendix for descriptions of the three areas. The inclusion of leadership in the Baldrige Award is intended to send a clear message: only through personal, visible leadership can high customer satisfaction be achieved[11].

The category of human resources management in the Baldrige Award examines how human resources facilitates successful implementation of TQM. It investigates key elements of how the work force is enabled to develop its full potential to pursue the company's quality and operational effectiveness objectives. Also it examines the company's efforts to build and maintain an environment for quality excellence conducive to full participation, and for personal and organizational growth. Specifically, the category of human resources management includes five areas – human resource planning, employee involvement, employee education and training, employee performance and recognition, and employee wellbeing and morale (see Appendix).

Being aware of the important role of quality in competitiveness, government and industries in Taiwan strive mutually for quality. Firms have implemented various programmes to improve quality. In retrospect, quality control circle was introduced in Taiwan in 1967 and quickly became popular[12, pp. 33-36]. Chang [13] reported that TQM was first introduced into Taiwan about 1980 and became popular after 1987. Recently, ISO-9000 registration has appeared in the annual plans of many firms. Training courses on quality are common in industries. Also, quality courses held by consultant firms are usually fully subscribed to by enthusiastic people. These observations reflect the fact that companies in Taiwan are indeed striving for quality improvement. In the public sector, the Taiwanese government is not less active than industries; it has implemented various programmes to promote the awareness of the strategic role of quality. The institution of The Award for Excellent Quality Cases, National Awards of Excellence, and The National Quality Award by the Ministry of Economic Affairs is an example of this endeavour that encourages improvement of service and product quality.

Although quality has been a major general concern in Taiwan, observations indicate that many senior executives may not fully understand the essence of total quality management, and have made no total commitment to it[13-14]. Chen[15] discovered that quality management in Taiwan focuses more on technical elements, such as statistical process control and product inspection, than on leadership and human resources management compared with that in the USA. A profound investigation of these two elements would facilitate the stride *en route* to total quality management.

In this work, major dimensions of leadership and human resources management stipulated in assessment criteria of the Baldrige Award were used as a framework of the investigation. A firm may exhibit variable quality to implement TQM. To reflect the progress of quality improvement in various aspects, Heaphy and Gruska[16] proposed four stages for each assessment category, i.e. traditional (equivalent to a 10-30 per cent score in the Baldrige

Award), aware (40-50 per cent), improving (60-70 per cent) and outstanding (80-100 per cent) stages. The classification of four stages may serve as a benchmark of quality improvement and is used in the latter context to differentiate a firm's quality of leadership and human resources management of TQM.

Research method

The data reported here were obtained from a questionnaire survey and field interviews conducted between November 1993 and January 1994. In order to obtain meaningful data from those companies that have formal quality management systems, the subjects of this research were selected mainly from the top 1,000 manufacturers and top 300 service companies ranked by China Credit Information Service in 1992. Stratified sampling was designed to cover manufacturing and services industries, and firms of four types – US subsidiaries, Japanese subsidiaries, private Taiwanese, and state-owned Taiwanese. The combination of industry and company type resulted in eight sample categories. The distinction of private and state-owned Taiwanese firms is to reflect the fact that state-owned enterprises constitute a significant portion of the gross national product. Taiwanese firms of these two types might be aggregated to represent local firms as opposed to foreign-invested firms of US and Japanese subsidiaries. For each of the eight sample categories, 25 companies were deliberately selected based on geographical convenience and the like. The target subjects are mainly from major industries in Taiwan, i.e. computer, electronic, auto, machinery, banking, retail, food, maintenance service. A telephone call was made to solicit co-operation before an interview, or a questionnaire was delivered to a target person in charge of quality. Approximately two-thirds of calls yielded consent of interview or survey which resulted in about 170 target subjects. Questionnaires were thus mailed to target subjects and about 80 per cent were returned. In total, 30 companies were interviewed and 111 questionnaires were returned with 105 useful.

The questionnaire for the mail survey consisted of three parts. The first part contained question sets assessing three areas of quality leadership (designated lead 1, lead 2, and lead 3 respectively, see Appendix) and five areas of human resources management of the Baldrige Award (designated hrm 1, ..., hrm 5 respectively, see Appendix). Respondents were requested to rate the perceived quality of leadership and human resources management in their firms on a 5-point scale (disagree very much, disagree, uncertain, agree, agree very much). The mean score of each question set was calculated to represent quality in the respective assessment criteria perceived and was used to examine the effect of company type on TQM, the problem investigated in the first research question.

The second part of the questionnaire contained questions about the management effectiveness of the quality department in the company surveyed, including the morale of quality staff, the relationship between the quality department and other departments, and the overall performance perceived of the quality department. The three measures are in accordance with Negandhi [8]. He proposed a measurement to compare the management effectiveness of

US subsidiaries, Japanese subsidiaries and local firms in Taiwan. Among other measures, the three items mentioned above are abstracted to examine the effectiveness of a quality department, a problem raised in the second research question.

The third part of the questionnaire comprised demographic data containing a firm's characteristics (described in the third research question) that may affect the practices of leadership and human resources management of TQM. Since the extent of automation is an important characteristic of a firm, respondents were also asked to rate the extents of office automation and production automation in their companies compared with competitors (three levels are used in the comparison, i.e. greater than, equal to, and lower than).

To supplement the questionnaire survey, the purpose of the interview was to examine the implementation of TQM in firms from the researcher's viewpoint. Specifically, the interviews collected facts related to leadership and human resources management of TQM in the surveyed companies. A "fact" refers to an incident observed by the interviewer or a narrative described by the interviewee. The target interviewees in this research are persons at the highest level in charge of quality management in the selected companies. A list of structured questions was prepared to facilitate collection of facts. To reflect the level of excellence in quality management in the surveyed company, each fact of leadership and human resources management observed and described in interviews was identified and classified into four stages (i.e. traditional, aware, improving, and outstanding as described previously) by this author in a continuous manner to avoid possible inconsistency. The frequency of facts was tested with chi-square to compare the leadership and human resources management of TQM in companies of various types.

Analyses and results

This section reports results of data analyses of the questionnaire survey and interviews, including a sample profile, results of the questionnaire survey, and findings of the interviews.

Profile of sample

Table I shows major attributes of 105 responding firms. Table II presents major attributes of 30 firms interviewed. The attributes are classified into three levels for the examination of their effects on the human components of TQM. Specifically, company age is classified into three groups to reflect young, middle, and old age respectively, i.e. age less than 15 years; age 15-30 years; and age 30 years and more. The age of a foreign-invested firm hereinafter refers to the years of service of the subsidiary in Taiwan rather than that of its parent company. Similarly, as Table II indicates, employee number (of the whole company) and sales revenue are classified into three groups to reflect the size of the company. The classification criterion is based on considerations whether it is consistent with the common understanding in Taiwan about young or old company, about small or large companies, etc.; and whether the number of

	Taiwan private	Taiwan state-owned	USA	Japan	Total
Company type	32	22	20	28	102
Industry					
manufacturing	16	12	8	20	56
service	14	7	10	6	37
Company age					
<15 (young)	16	0	9	12	37
15-30 (middle)	4	6	7	11	28
>= 30 (old)	11	13	2	3	29
Employee number					
<250 (small)	12	5	7	8	32
250-1,500 (medium)	10	5	8	8	31
>= 1,500 (large)	9	10	3	10	32
Sales revenue					
<20 M US$ (small)	9	5	2	4	20
20-200 M US$ (medium)	8	5	4	11	28
>= 200 M US$ (large)	9	8	4	6	27

Notes:
Number of companies in the entries excludes missing values
Young, middle, and old indicate the relative age of a company
Small, medium, and large indicate relative size of a company

Table I.
Profile of the companies surveyed

	Taiwan private	Taiwan state-owned	USA	Japan	Total
Company type	9	7	8	6	30
Industry					
manufacturing	5	4	4	4	17
service	4	3	4	2	13
Company age					
<15 (young)	3	0	5	5	13
15-30 (middle)	6	2	3	1	12
>= 30 (old)	1	5	0	0	6
Employee number					
<250 (small)	2	0	3	0	5
250-1500 (medium)	5	2	3	6	16
>= 1500 (large)	2	5	2	0	9
Sales revenue					
<20 M US$ (small)	5	3	0	0	8
20-200 M US$ (medium)	2	1	6	6	15
>= 200 M US$ (large)	2	3	2	1	10

Notes:
Number of companies in the entries excludes missing values
Young, middle, and old indicate the relative age of a company
Small, medium, and large indicate relative size of a company

Table II.
Profile of the companies interviewed

companies surveyed is well-distributed into the classified groups for valid statistical analyses. Based on the criterion, for example, a company with employees numbering less than 250 or with sales revenue less than US$20 million represents a small firm. The classification shown in Tables I and II serves in the latter analyses.

Results of questionnaire

Leadership

To investigate the main effect of type of company on leadership (lead 1, lead 2, and lead 3), a one-way multivariate analysis of variance was conducted. In this research, company types refer to three sets, namely:

(1) US, Japanese, and Taiwanese (includes private and state-owned);

(2) Taiwanese and foreign (US and Japanese);

(3) Taiwanese private and Taiwanese state-owned.

The results are presented in Table III. Similar analyses were conducted to examine the main effects on leadership of industry type, extent of office automation, extent of production automation, company age, number of employees, and sales revenue. Table III summarizes the results of the MANOVA tests of the main effects. The MANOVA tests show that, according to the criterion of Wilks' Lambda at 0.05 level, four main effects are statistically significant. They are company age, sales revenue, number of employees, and extent of production automation. A *post hoc* comparison was conducted to discover specific pairs of groups that differ significantly in the four effects. As this research is to investigate the leadership of TQM in Taiwan, this author is

Effect	Wilks' Lambda	*F*	df	*p*-value
Company type	0.9637[a]	0.6037[a]	6	0.7272
	0.9960[b]	0.1297[b]	3	0.9422
	0.9349[c]	1.1615[c]	3	0.3338
Industry type	0.0989	0.3288	3	0.8045
Extent of office automation	0.8827	1.8878	3	0.0853
Extent of production automation	0.7655	3.4787	3	0.0030*
Company age	0.8370	2.7910	6	0.0128*
Number of employees	0.8617	2.3689	6	0.0315*
Sales revenue	0.7048	4.5862	6	0.0003*

Notes:
[a] US, Japanese, Taiwanese
[b] Taiwanese, foreign
[c] Private, state-owned
F statistic for Wilks' Lamba is exact
* significance is at level $\alpha = 0.05$

Table III.
Results of MANOVA test for leadership

concerned with the risk of type I error. Thus, Scheffe's test was chosen for this endeavour because it has the smallest rate of type I error to detect the difference between means among the five widely used multiple comparison procedures – Fisher's, Duncan's, Student-Newwan-Keul's, Tukey's and Scheffe's[17, p. 269]. The results of Scheffe's test at a significant level $\alpha = 0.05$ of these four main effects on leadership are displayed in Table IV. Entries in the table are pairs that exhibit significant difference in leadership. In general, significant differences are observed between young and old companies, small and large companies in terms of either sales revenue or number of employees, and also between extent of production automation. Pictorial representations of the results described above appear in Figures 1-4. Figure 1 projects the effect of sales revenue on leadership. The figure shows a trend that the mean score increases as sales revenue increases. Hence a larger company tends to exhibit greater quality of leadership. Similarly, Figures 2, 3 and 4 portray that larger companies, older companies, and those with much production automation manifest better leadership.

Effect	Extent of production automation	Company age	Number of employees	Sales revenue
Lead 1	equal-lower greater-lower	young-old		small-large
Lead 2		young-old		
Lead 3	equal-lower	young-old	small-large	

Notes:
Small, medium, large indicate company size as shown in Table I
Lower, equal, and greater indicate the extent of automation compared with a firm's competitors

Table IV.
Results of Scheffe's test for leadership

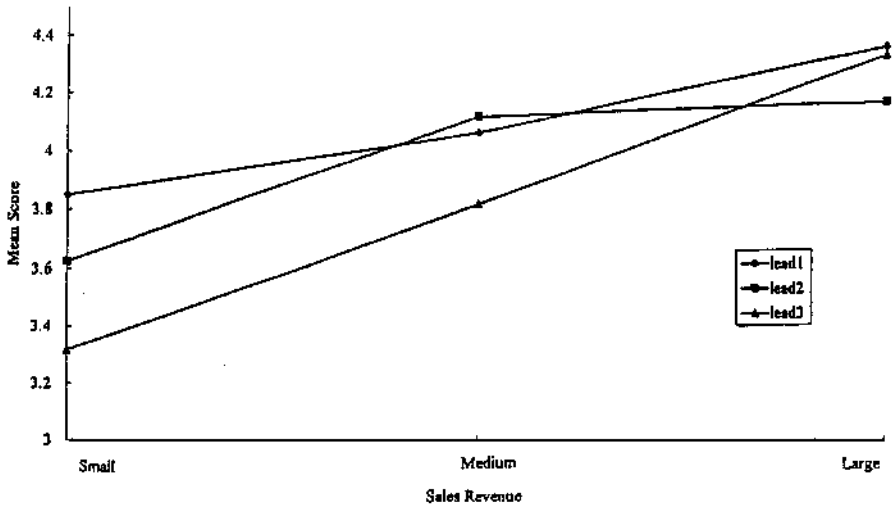

Figure 1.
Effect of sales revenue on leadership

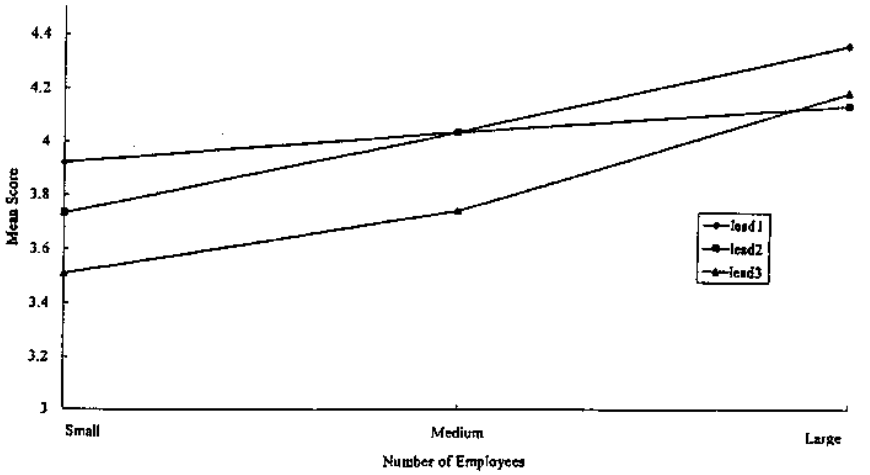

Figure 2.
Effect of number of employees on leadership

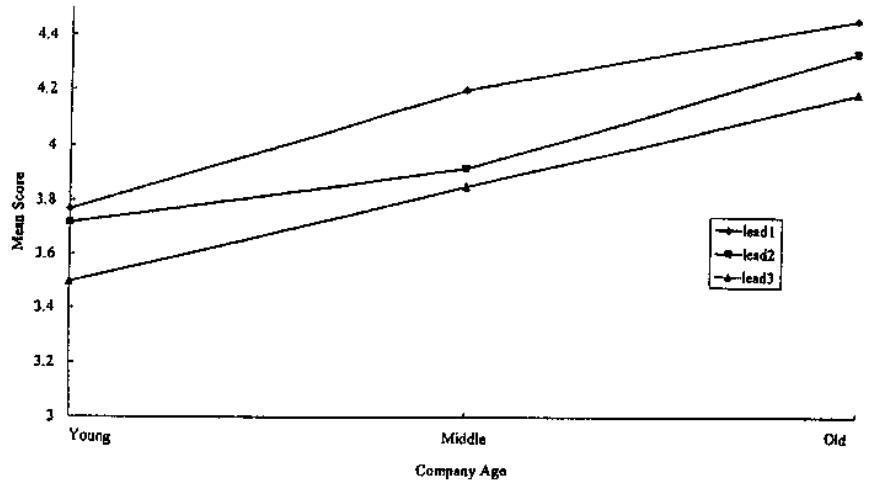

Figure 3.
Effect of company age on leadership

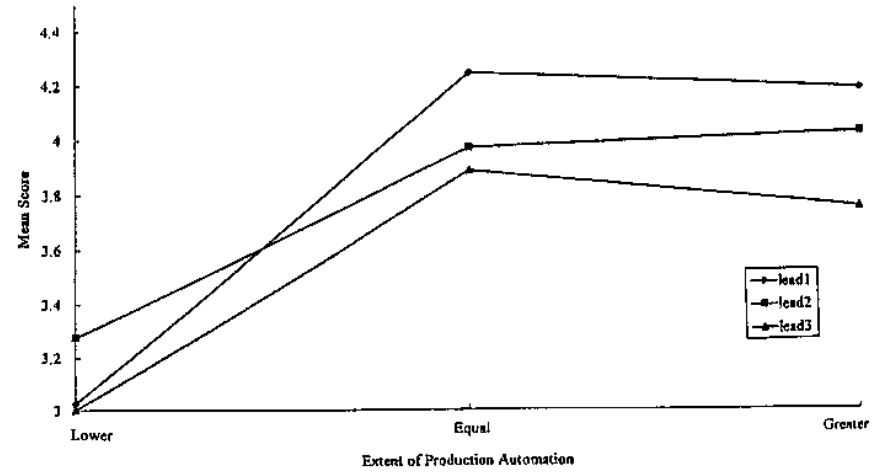

Figure 4.
Effect on extent of production automation on leadership

Human resources management

The analyses of main effects of a company's characteristics on human resources management is similar to that on leadership. The results of MANOVA (Table V) and *post hoc* Scheffe's test (Table VI) at a level $\alpha = 0.05$ reveal that the three significant main effects are company age, number of employees, and extent of production automation. The results of pairwise comparison with Scheffe's test (Table VI) resemble that obtained for leadership. Significant differences are observed for company pairs small-large, young-old, and greater-lower extent of production automation in all areas of human resources management except hrm 4. Figures 5-7 provide pictorial representations of mean scores of hrm 1-5 with respect to the three main effects. The figures indicate that an old company, a large company and a firm with a greater extent of production automation have greater mean scores on hrm 1-5; namely, they perform better on human resources management. This situation is similar to that observed for leadership (Figures 1-4) and is discussed later. Sales revenue shows no significant effect unlike on leadership. Another noticeable result is that all independent variables exhibit no effect on hrm 4. In comparison with hrm 1, 2, 3 and 5, the nature of hrm 4 is oriented more operationally rather than oriented to planning. The implementation of programmes such as employee performance measurement, recognition, promotion, compensation, and reward as addressed in hrm 4 is more likely to draw the attention of both management and employees. Thus, quality in this area might be expected to attain a comparative level industrywide. A similar explanation might apply to the inconsistent findings of the questionnaire survey and the field interview on leadership as to be discussed in the latter context.

Effect	Wilks' Lambda	*F*	df	*p*-value
Company type	0.7993[a]	2.2514[a]	10	0.0166*
	0.8419[b]	3.6052[b]	5	0.0050*
	0.8661[c]	1.4835[c]	5	0.2128
Industry type	0.9229	1.4859	5	0.2024
Extent of office automation	0.8491	1.4662	5	0.1558
Extent of production automation	0.7255	2.4711	5	0.0093*
Company age	0.8027	2.0447	10	0.0314*
Number of employees	0.7809	2.3698	10	0.0117*
Sales revenue	0.8184	1.4754	10	0.1546

Notes:
[a] US, Japanese, Taiwanese
[b] Taiwanese, foreign
[c] Private, state-owned
F statistic for Wilks' Lamba is exact
* significance is at level $\alpha = 0.05$

Table V.
Results of MANOVA Test for human resources management

Effect	Extent of production automation	Company age	Number of employees
Hrm 1	equal-lower	young-old	small-large
Hrm 2	equal-lower greater-lower	young-old	small-large medium-large
Hrm 3	greater-lower equal-lower	young-old	small-large
Hrm 4			
Hrm 5	greater-lower equal-lower	young-old	small-large

Table VI.
Results of Scheffe's test for human resource management

Notes:
Small, medium, large indicate company size as shown in Table I
Lower, equal, and greater indicate the extent of automation compared with a firm's competitors
Company type does not show significant difference in Scheffe's test

Management effectiveness of the quality department

In an organization, particularly in the service industry, there may not exist a quality department. However, there always is a unit or personnel responsible for planning, implementation, auditing, and training and education of quality programmes for the whole system. The management effectiveness of a quality department or its equivalent is crucial to the success of TQM. As a functional department in a firm, a quality department is expected to be influenced by the leadership and human resources management of TQM in the system. In order to obtain quantitative evidence for this reasoning, this research conducted canonical correlation analyses to test the relationship between leadership and the management effectiveness of the quality department, and between human

Figure 5.
Effect of company age on HRM

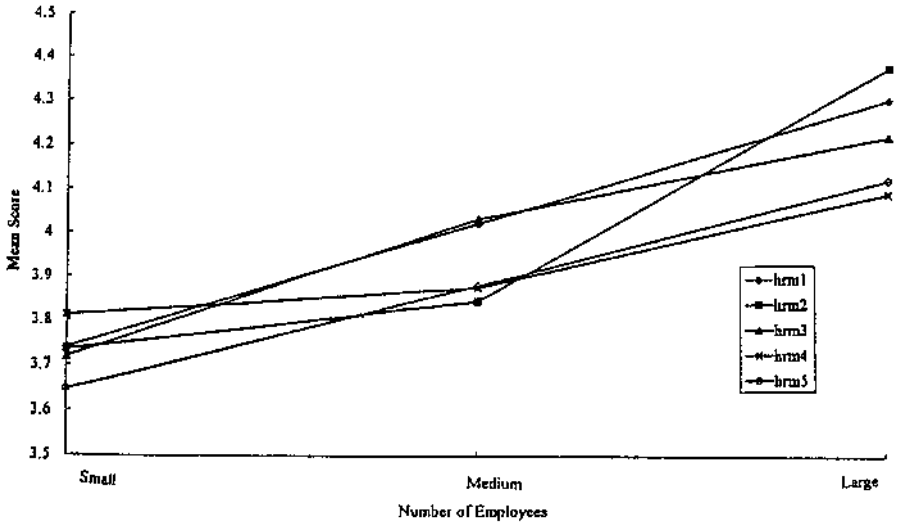

Figure 6.
Effect of number of employees on HRM

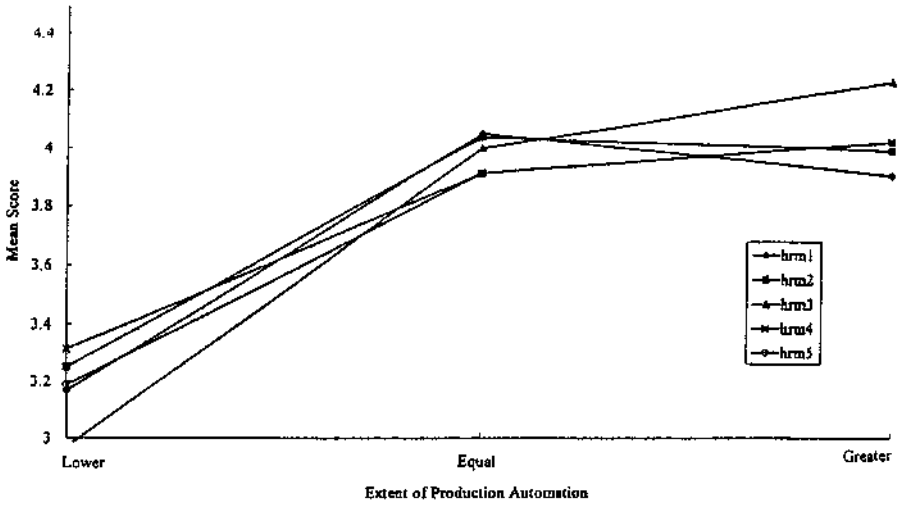

Figure 7.
Effect of extent of production automation on HRM

resources management and the management effectiveness of the quality department.

As mentioned previously, this work focused on employee morale, interdepartmental relationships, and overall performance perceived in measuring the effectiveness of a department. Thus, a linear composite of the three measures – morale of quality staff, the relationship between the quality department and other departments, and the overall performance perceived of the quality department – forms a canonical criterion variate. The predictor variate is a linear combination of leads 1-3 in examining the canonical correlation between leadership and the management effectiveness of the quality department. In this work the approximate *F*-value is used to assess the

significance of the canonical correlation function that consists of the criterion variate and the predictor variate described above. Three canonical functions were extracted, but two functions are statistically significant at level $\alpha = 0.05$; the results are reported in Table VII. The redundancy index (0.3135 and 0.0201) for the first and second functions respectively is a summary measure of the ability of a predictor variate to explain the variation in the criterion variate[18]. Leads 1-3 have a correlation 0.6872 with the effectiveness of the quality department and explain 0.3336 (0.3135+0.0201) variance of the effectiveness of the quality department. A similar analysis might be conducted on human resources management with the predictor variate replaced by a linear combination of hrm 1-5. Results of canonical correlation analyses on human resources management and quality department effectiveness appear in Table VII. The value of correlation is 0.7544 and hrm 1-5 explain 0.3986 (0.3553 + 0.0433) variance of the effectiveness of the quality department. According to results mentioned above, it may be concluded that there exists positive correlation between the effectiveness of the quality department and leadership, and between the effectiveness of the quality department and human resources management.

Result of interview

The purpose of the interview was to assess the quality of implementing TQM in firms from the researcher's rather than practitioner's viewpoint. The results were compared with those obtained from questionnaires. Table II shows major attributes of 30 companies interviewed. From the interviewees' description about their quality management under guided interviews, this author collected facts related to quality management. A "fact" is, as explained earlier, an incident observed by the interviewer or a narrative described by the interviewee. Among them, 155 facts are identified to be relevant to leadership and 119 facts are related to human resources management. Based on the nature of the facts, this author classified these facts into four stages (traditional, aware, improving, and outstanding, as explained earlier) to reflect their quality of leadership or the human resources management of TQM. For example, a report "The company is preparing the certification of ISO-9001, but not everyone is confident of its success" is classified as a fact of leadership at the stage of *awareness*; and a fact "The company is devoted to continuous education in quality and has recently

Table VII.
Results of canonical correlation analysis

	First function		Second function	
	HRM	Leadership	HRM	Leadership
Approximate *F*-value	7.5999	8.4931	2.8472	2.4985
Degree of freedom	15	9	8	4
Level of significance	0.0001	0.0001	0.0054	0.0444
Canonical correlation	0.7547	0.6872	0.4384	0.3072
Redundancy index	0.3553	0.3135	0.0433	0.0201

been granted an award of Excellence in Training & Development by governmental authority" is classified as a fact of human resources management at the stage of *outstanding*.

The distribution of facts of leadership is summarized in Tables VIII and IX. The fraction of each category is shown in Figure 8. Table IX shows that 59 per cent (24 per cent + 35 per cent) of the companies surveyed are at the stages of either tradition or awareness. This observation indicates that there remains room for improvement of the leadership of TQM in Taiwan. The Table also reveals that, although Taiwanese, US, and Japanese companies exhibit the same fraction (13 per cent) of outstanding level of leadership, Taiwanese companies have a significant greater fraction in the category *traditional* stage (31 per cent of Taiwanese vs. 15 per cent of US and 12.5 per cent of Japanese firms). The *traditional* stage represents the lowest quality. This result indicates that local companies may have weaker leadership than US and Japanese subsidiaries. The chi-square test was conducted to further investigate this observation. The result shows that there exist significant differences in leadership at the level $\alpha = 0.1$ of frequency count between local (private and state-owned Taiwanese) and foreign-invested (US and Japanese) firms. This finding is not discernible from results of the questionnaire survey and is discussed in the next section. Tables X and XI show the distribution of facts of human resources management. Table XI reveals that 49 per cent (18 per cent + 31 per cent) occupy the stage of either *tradition* or *awareness*. Compared with leadership, firms in Taiwan have advanced to a higher quality in the area of human resources management. The chi-square test shows no significant effect of company type on human resources management.

Discussion and managerial implications

Comparison between local and foreign-invested firms

Negandhi[8] reported that management practices vary among US subsidiaries, Japanese subsidiaries and local firms in Taiwan. The statistical analyses in this work do not reveal significant differences of quality management among these three parties, as shown in Table III and Table V. However, it is noticed from Table I that foreign firms tend to be young (average company age of

Country	Industry	Traditional	Aware	Improving	Outstanding
Taiwan	manufacturing	13	12	11	4
(private)	service	3	6	5	2
Taiwan	manufacturing	10	3	3	2
(state-owned)	service	1	4	3	3
USA	manufacturing	6	11	8	3
	service	1	10	4	3
Japan	manufacturing	0	7	8	3
	service	3	1	2	0

Note:
Entries are the number of facts related to leadership

Table VIII.
Distribution of facts of leadership

foreign-invested firms is at 18 compared with 30 of Taiwanese firms) and the effect of company age on quality management is significant at level $\alpha = 0.05$ (see Tables III and V). These findings lead to a conjecture that the effect of company age is mainly due to Taiwanese firms. Further investigation revealed that the company age does have significant effect on leadership and human resource management in Taiwanese firms (see Table XII) while this shows no effect on quality management in subsidiaries of US and Japanese firms. This result indicated that though subsidiaries are relatively young they may be able to draw on a lot of experiences from their parent companies and perform well in quality management. The observation indirectly showed that foreign-invested firms manifest superior leadership and human resource management, and could become learning targets for local firms in the implementation of TQM. Conclusions like this may be drawn from other research findings. Huang[19] reported that 37 per cent of companies certified by ISO-9000 standards are foreign-invested firms. If ISO-9000 certification is taken as a base line of quality management, the fraction 37 per cent represents a substantial lead for foreign-invested firms, given the fact that foreign-invested

Country	Traditional	Aware	Improving	Outstanding	Total
Taiwan	27 (31)	25 (29)	22 (27)	11 (13)	85 (100)
USA	7 (15)	21 (46)	12 (26)	6 (13)	46 (100)
Japan	3 (12.5)	8 (33)	10 (42)	3 (12.5)	24 (100)
Total	37 (24)	54 (35)	44 (28)	20 (13)	155 (100

Table IX.
Distribution of facts of human resources leadership

Notes:
Entries are the number of facts related to leadership
Numbers in brackets are percentages

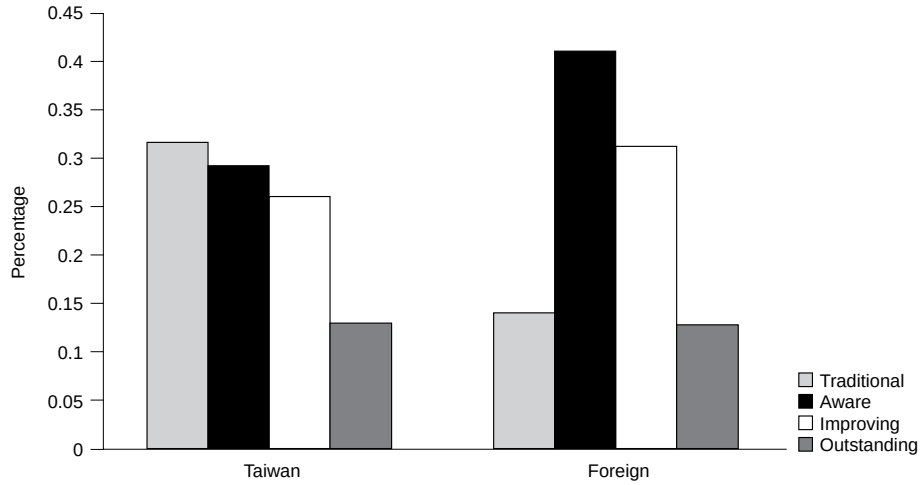

Figure 8.
Distribution of facts of leadership

Country	Industry	Traditional	Aware	Improving	Outstanding
Taiwan	Manufacturing	5	3	9	2
(private)	Service	3	7	5	1
Taiwan	Manufacturing	4	5	5	0
(state-owned)	Service	0	6	5	0
USA	Manufacturing	2	2	11	1
	Service	3	5	9	0
Japan	Manufacturing	1	6	9	0
	Service	3	3	3	1

Note:
Entries are the number of facts related to human resources management

Table X.
Distribution of facts of human resources management

Country	Traditional	Aware	Improving	Outstanding	Total
Taiwan	12 (20)	21 (35)	24 (40)	3 (5)	60 (100)
USA	5 (15)	7 (46)	20 (26)	1 (13)	33 (100)
Japan	4 (15)	9 (35)	12 (46)	1 (4)	26 (100)
Total	21 (18)	37 (31)	56 (47)	5 (4)	119 (100)

Notes:
Entries are the number of facts related to human resources management
Numbers in brackets are percentages

Table XI.
Additional distribution of facts of human resources management

firms constitute only a small proportion of the total number of firms in Taiwan. Furthermore, the gap in leadership of TQM between local firms and foreign-invested firms observed in this research clearly indicates the variable quality management between these two parties. The superiority of foreign firms may reflect that a multinational company positioned in a competitive global market has generally a well established system and has also greater information about quality management. To sum up, management practices in foreign-invested companies might serve as a good reference for local firms.

Executive leadership

In what follows, the inconsistent findings of the questionnaire survey and field interviews in the area of leadership are discussed. Analysis of the questionnaire survey did not result in the conclusion that the type of company has an effect on leadership of TQM. But interviews revealed that there exists a gap of quality of leadership between Taiwanese and foreign firms. The results of the chi-square test presented above and Figure 9 indicate that foreign-invested companies are superior to local companies in leadership. This observation is consistent with Chen's report[15] that Taiwan is weaker in leadership in TQM than the USA. The results of the questionnaire survey are based on respondent self-

measurement on the effectiveness of quality management in their companies. It is thus a result of an insider's judgement. In contrast, the analysis on facts obtained from the interview is a subjective judgement of this author – an outside observer of the company. Thus, the gap apparently reflects the difference between perceptions about the actual meaning of leadership of TQM. It revealed that top executives in the surveyed Taiwanese firms may not be fully aware how to lead their firms towards quality transformation, despite the fact that leadership of TQM is perceived to be successful. A similar situation is observed in Chang's survey[13] on factors of successful TQM in Taiwan; she concluded that companies tend to believe that executive commitment is crucial to a successful TQM while actually not implementing it to the full extent. Also, a gap in leadership was observed by Huang[19] in a survey of companies certified by the ISO-9000 standards in Taiwan; he found that "management responsibility" is perceived as the easiest item to implement and is also among

Leadership	Company age	HRM	Company age
Lead 1	young-old	Hrm 1	
Lead 2	young-old	Hrm 2	
Lead 3	young-old	Hrm 3	young-old
		Hrm 4	
		Hrm 5	young-old middle-old

Table XII.
Results of Scheffe's test for leadership and HRM in Taiwanese firms

Notes:
Results of MONOVA show that the effects of company age on leadership and HRM in Taiwanese firms are significant at level $\alpha = 0.05$.
Entries in the columns of company age are pairs that exhibit significant difference

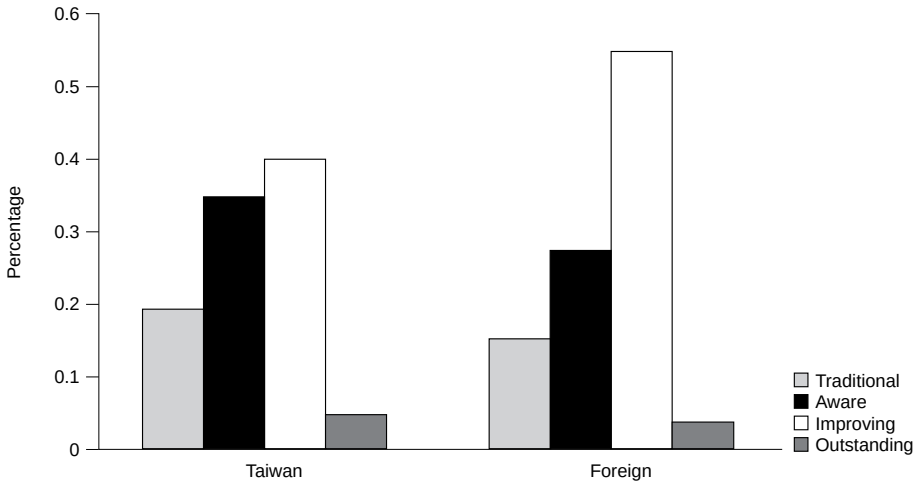

Figure 9.
Distribution of facts of HRM

the top five nonconformities in surveillance assessment. The insufficient deployment of executive leadership of TQM in Taiwanese firms may be due to their lack of a clear conception of TQM. Interestingly, similar observations had been reported in the USA. Cound[20] criticized American managers and noted that "The bad news is that senior executives are remarkably naïve about some significant dimensions of the quality issues, particularly in light of their recognition of its importance."

Top management is regarded as a driver in the implementation of TQM, for example[21,22]. An inadequacy of leadership may impede continuous improvement to strive for outstanding performance. It is thus important for a senior executive to learn continuously about real essences of TQM and the way to implement leadership in the pursuit of TQM. Executives might learn from industry, academia, and government on quality philosophy, method, and tools through sharing information and experience. "Experience in other countries has shown that cross-company and cross-industry networking has a very important element in the pace of learning and implementing quality management methods" noted Thomas Lee, president of the Center for Quality Management[23]. An executive's learning about TQM should be regarded as a strategic issue. The three areas of leadership stipulated in the Baldrige Award and investigated in this research are certainly good points to which an executive should devote more attention.

Human resource management

In contrast to leadership, statistical analyses on results of both questionnaire and interview reveal no effect of company type on human resources management. Areas hrm 1-5 in the Baldrige Award (please refer to Appendix) address management practices about human resources and are more readily assessed than lead 1-3. In the pursuit of TQM, a firm is more likely to focus first on extrinsic and exposed factors. To transform a firm's practices of human resources management is generally easier than to affect an executive's leadership (e.g. his values or behaviour).

Thus, it is not surprising to observe that the quality of human resources management exceeds that of leadership (compare data in Tables IX and XI). This observation again raises the issue of an executive's understanding and learning about TQM. It is commonly understood that pressing an executive to learn is a delicate problem. Senge[24] suggested that a gap between vision and reality may generate a tension that facilitates learning. Thus, it may be wise to periodically expose a firm to external assessment so as to obtain its real status regarding TQM. It may also be effective to challenge an executive with constant competition in the marketplace. The anxiety induced from the sense of crisis may effectively stimulate his internal drive to change towards TQM. This approach is supported by Schein's argument[25] that anxiety of fear, shame or guilt associated with not learning anything new is necessary to start learning.

Company characteristics

For both leadership and human resources management, companies with larger sales revenue, more numerous employees, longer years of service, or greater production automation manifest higher scores. A similar observation in Canadian manufacturers was reported by Kohse[9]. He noted that "large establishments (those with over 200 employees) used considerably more quality management practices than small establishments, especially in the *leadership* category". These observations are consistent with the common belief that a larger company is more likely to have a sound quality system in place. This condition may be partially explained by the fact that a larger firm not only needs a well developed system to manage quality but also tends to have more resources to implement it. Another finding worthy of noting is that a firm with greater production automation performs well in leadership for quality management. An interpretation of this observation is that an executive aggressively seeking competitive advantage through automation is more likely to be involved in the implementation of TQM. A comparable result reported by Kohse is that "High-tech companies facing stiff international competition were more likely to use quality management practices than those in other industry groups"[9]. Globally recognized, quality management is a key competitive weapon for doing business. From the viewpoint of TQM, it is advised to establish a benchmark for effective improvement of quality management. The findings above indicate that companies with larger sales and greater automation may be good learning targets for smaller companies. As a larger firm tends to exhibit better quality management, the discrepancy of quality in TQM described above between local and foreign firms is expected to increase if the sample population is the whole industry instead of the top 1,000. Thus, it is suggestive that the practices of TQM in many foreign-invested companies might serve as good benchmarks for local firms.

Management effectiveness of quality department

Leadership and human resources management are critical human factors for the effective management of TQM. The results of canonical correlation analyses about the effectiveness of the quality department in this research provide quantitative evidence of positive correlation between management effectiveness and the human factors of TQM. In fact, this conclusion is indirectly supported by the finding (data are not reported for brevity) that sales revenue, employee number, and extent of production automation have significant effect (at level $\alpha = 0.05$) on the effectiveness of quality department. This result and the findings (Tables III and V) of the effect of sales revenue, employee number, and extent of production automation on quality management strongly suggest the linkage between the human factors of TQM and management effectiveness of quality department. Top executives commonly delegate authority to quality staff and do not become involved in the actual introduction and management of TQM [26]. The verification of the important role of leadership and human resources management for the effective management of the quality department

should further inspire executives to learn and to deploy leadership and human resources management to the full extent. Hopefully, it may also facilitate the effective implementation of total quality management.

Conclusion

This work examined the leadership and human resources management of TQM in Taiwan. Data were collected from field interviews and a questionnaire survey conducted in US and Japanese subsidiaries, and local firms. Criteria stipulated in the Malcolm Baldrige National Quality Award were used to assess the quality of leadership and human resources management of TQM. The MANOVA test and *post hoc* Scheffe's test were used to detect the variation in leadership and human resources management with respect to several company characteristics. A general observation is that a company with larger sales revenue, more numerous employees, or greater production automation manifests better leadership and human resources management. A chi-square test on data collected from interviews resulted in a conclusion that foreign-invested companies are superior to local firms in leadership. From a canonical correlation analysis, it is concluded that both leadership and human resources management are positively correlated with the management effectiveness of the quality department. Inconsistency between the results of the questionnaire survey and field interviews reveals that top executives of local firms may lack understanding of leadership for TQM. Thus, it is suggested that top executives should take aggressive action to learn in the pursuit of continuous improvement. Furthermore, to establish benchmarks for quality improvement, it is advisable that larger companies and foreign-invested companies are good models for smaller local firms.

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Appendix: Content of leadership and human resources management in the Malcolm Baldrige National Quality Award of the USA

Area	Description
Leadership	
Senior executive leadership (lead 1)	Describe the senior executives' leadership, personal involvement, and visibility in developing and maintaining an environment for quality excellence.
Management for quality (lead 2)	Describe how the company's customer focus and quality values are integrated into day-to-day leadership, management, and supervision of all company units.
Public responsibility and corporate citizenship (lead 3)	Describe how the company includes its responsibilities to the public in its quality policies and improvement practices. Describe also how the company leads as a corporate citizen in its key communities.
Human management resource	
Human resource planning and management (hrm 1)	Describe how the company's overall human resource plans and practices are integrated with its overall quality and operational performance goals and plans and address fully the needs and development of the entire workforce.
Employee involvement (hrm 2)	Describe the means available for all employees to contribute effectively to meeting the company's quality and operational performance goals and plans; summarize trends in effectiveness and extent of involvement.
Employee education and training (hrm 3)	Describe how the company determines quality and related education and training needs for all employees. Show how this determination addresses company plans and deeds as well as supports employee growth. Outline how such education and training are evaluated, and summarize key trends demonstrating improvement in both the effectiveness and extent of education and training.
Employee performance and recognition (hrm 4)	Describe how the company's employee performance, recognition, promotion, compensation, reward, and feedback approaches support the attainment of the company's quality and performance plans and goals.
Employee wellbeing and morale (hrm 5)	Describe how the company maintains a work environment conducive to the wellbeing and growth of all employees; summarize trends in key indicators of wellbeing and satisfaction

Source: 1992 Award Criteria, National Institute of Standards and Technology, Gaithersburg, MD

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