

KEY FACTORS ON CONSTRUCTION OF COMPETITIVENESS USING THE PERSPECTIVE OF FINANCIAL ALLOCATION AND TQM - TAKING AN EXAMPLE OF EDUCATIONAL TRAINING INSTITUTES IN TAIWAN

Prof. Ming-Lang Wang

Department of Industrial Management, Chung Hua University, Hsinchu, Taiwan
707, Sec.2, WuFu Rd., Hsinchu, Taiwan 300, R.O.C.

marlon@chu.edu.tw

Mr. Kang-Wei Wang*

Ph.D. Program of Technology Management, Chung Hua University, Hsinchu, Taiwan
707, Sec.2, WuFu Rd., Hsinchu, Taiwan 300, R.O.C.

w6211082000@yahoo.com.tw

Durgesh Samadhiya

Chung Hua University, Taiwan

dksamadhiya@gmail.com

*Correspondence author

TQM (total quality management, TQM) helps organizations to improve customer satisfaction and to enhance product quality and operation efficiency. This study integrates management activities of TQM into the method of quality function deployment (QFD), using indicators of financial expenditures in the strategy of operation. With the methods of QFD, the indicators of financial expenditures are used as management techniques for the first time to discuss the factors of educational training institutes in Taipei, Taiwan. The study finds that the key success factors include the expenses of copyright, education and training, advertisement and insurance, and teaching and administrative employees. Also, this finding shows the nature of this kind of institute operation. Through financial indicators, these institutes can enhance competition, attract potential customers, create service differentiation from the peers, and make more accurate planning for operation activities, quality management, and financial requirement to provide the needs of customers.

Key words: total quality management (TQM), quality function deployment (QFD), educational training institutes, financial indicators.

1. Introduction

Quality management is the key factor of business competition and sustainable operation. To increase business competition and customer satisfaction, top management, control and continuous improvement of quality should be prioritized as the objectives and goals of management (Chang, 2008; Hansemark and Albinsson, 2004; Shamdasani et al. 2008). Total quality management (TQM) is one of the best methods in the area of improving organizational performance and customer

satisfaction. Globally, quality management originated from the manufacturing industry (Ou-Yang and Tsai, 2014) and then banking industry (Chen, 2009; Petnji et al. 2011), health care industry (Sanchez et al. 2006), the government (Suarez-Barraza et al. 2009), and educational institutions (Murad and Rajesh, 2010; Asif et al. 2013; Todorut, 2013; Baig et al. 2015), and so on. However, it's relatively new to apply quality management to the educational institution with functions of service and education.

There is a famous saying in TQM: Do the right things, right the first time, every time (Baig et al. 2015). TQM is a systematic approach involving teamwork, management leadership, customer opinion, administrative employees, continuous improvement, education, and training, etc (Murad and Rajesh, 2010; Vinni, 2011). Moreover, through the participation of all employees and the continuous improvement of organizational processes, TQM helps to generate products and services of high quality to cater to the needs and satisfaction of customers (Pina and Selles, 2008). Coate (1993), Engelkemeyer (1995), Owlia and Aspinwall (1997) comprehensively discussed the reasons of unsuccessful application of TQM to the educational area. According to Matthews (1993), unsuccessful application of TQM to the educational area resulted from the lack of common definition of customer, standard of quality, academic freedom, and so on, causing the difficulties in implementation. Some studies find that TQM is a systematic process not applicable to all environments. Therefore, systematic regulations should be set up in accordance with the local environment, nature, and culture (Sousa and Voss, 2001; 2008).

Thinking outside the box, Asif et al. (2013) integrated the difficulties in implementation and found that the key success factors of institution of higher education include 'leadership', 'vision', 'measurement and analysis', 'process control and evaluation', 'programs design and resources allocation', and 'stakeholder focus'. According to relevant studies, the application of TQM to the educational area is mature and feasible in order to improve quality and competition. However, due to the

resource of revenue, the results of quality improvement are usually adversely affected (Salini and Turri, 2016).

TQM-related researches and application have indicated that organizational behaviors and management activities are key success factors; even so, the framework for financial factors has not been mentioned. Consequently, this study aims to close the gap and to develop a method of applying the allocation of financial resources to TQM. This study basically relies on the theory framework of financial resources and discusses that for institutions what decisions result in the factors of competitive advantages and continuous improvement of quality. Therefore, financial activities are analyzed through account names in financial statements and top management skills of educational training institutes are confirmed through financial indicators derived from financial activities. Moreover, the method of quality function deployment (QFD) is utilized to analyze customer needs and management skills to find out key factors of successful implementation of educational training institutes and to allocate weight to the criteria of TQM financial items.

This study aims to discuss that when implementing TQM with financial resource factor, educational training institutes find the key success factors for continuous improvement of education and service quality. The method of QFD is utilized to enhance the decision-making efficiency of top management and to confirm the difference and critical factors and weights of top management caused by each financial expense item. In terms of asset allocation, this framework establishes a dynamic and creative structure for continuous

improvement of quality. This framework is more suitable for explaining the strategic activities of business and organization and provides a new perspective of quality management for the areas of business and academic community.

2. Total quality management

Due to low fertility and the rapid change of business environment, educational training institutes shows increasing need for education and service quality in Taiwan. Quality management plays an important role in the operation and development of the institutes. Educational training institutes must improve education and service quality continuously to attract students and parents and to maintain the competitive advantages. Therefore, educational training institutes need to use TQM to advance operation efficiency and effectiveness. TQM is an operational process while businesses and organizations can implement the cycle of plan-do-check-act to maintain competitiveness and to achieve operational goals through annual quality management planning. Among TQM-related researches, some discussed the key success factors of improving education quality through TQM implementation (Asif et al.2013; Zabadi, 2013), some emphasized key success factors of service department implementing TQM(Mensah et al. 2012), and others held that implementing TQM can enhance organizational efficiency(Calvo-Mora et al.2014).

Bryan (1996) made the full definition of TQM: top management not only commits itself to quality improvement but also provides all employees with quality education and training. Some studies have shown TQM can be applied to the educational area and each educational

training institute has its unique method to evaluate and assess the educational quality (Houston,2007). From the viewpoint of teachers, schools should continuously improve educational quality implemented by responsible quality department (Manzoor et al. 2012).All institutes should implement quality guarantee (Saba,2009). Sahney et al.(2004)proposed that the improvement of educational quality system can be divided into 2 dimensions: inputs and outputs. Inputs include process, teacher and students, administration employees, and physical facilities; while outputs include earnings, satisfaction, employment, and examination results.

Asif et al.(2011; 2013)concluded 6 success factors of higher education implementing TQM: leadership, vision of higher education institution, program design, process control and improvement, measurement and evaluation, and stakeholder focused approach. Key success factors of service industry implementing TQM consist of top management leadership, strategic planning, process management and continuous improvement, information and analysis, customer focus, and human resource management(Lam et al. 2012; Talib et al. 2013; Voon et al. 2014; Maksimovic and Pecujlija, 2014; Calvo-mora et al.2014). According to the above-mentioned studies, TQM can be applied to the areas of service and education and the common key success factors include top management leadership, process management, product design, continuous improvement, customer need, participation of administrative employees, and so forth to maintain competitive advantages and to advance the organizational efficiency and effectiveness of business and organization.

In terms of educational quality, we should consider the quality of teachers, environment provided to students, service quality students need and the relevant evaluation system (Isani and Virk, 2005). Implementing TQM in educational area helps students to enter job market in the future (Soni et al. 2000). According to the study by Soria-Garcia and Martinez-Lorente (2014), the most crucial factors of implementation of quality management in educational area in Spain include commitment and participation of top management in schools, quality culture, information and communication of quality, quality design of educational products and services, process management, education and training, and participation of students and administrative employees. The implementation of TQM can decrease operating costs, increase product innovation and enhance the market share and operating revenues (Bolboli and Reiche, 2013). Hence, educational training institutes are encouraged to open new markets by strategic activities. But also, competition promotes the imitation of the most successful competitors (Teixeira et al.2012).

The studies of the implementation of TQM in educational area have shown that firstly the key success factors of TQM were emphasized, and then the researches focused on the quality information indicated by key factors, the correlation between implementation of TQM and the performance, and the strategic activities utilized to open new markets. Although continuous quality improvement plays the most important part in maintaining competitiveness of business and organization, items needed to be improved usually cannot be implemented due to limited resources

(Chen, 2009). There has been TQM-related study discussing the influence of financial allocation on TQM. Therefore, using financial resource allocation as the strategic activities, this study aims to discuss key factors when educational training institutes implement TQM and to find out the strategic factors and activities on business and organization.

3. The application of financial indicators to QFD

3.1 Studies about QFD

To cope with the increasing competition, it is more and more important for businesses or service providers to utilize efficient quality techniques and quality management system. The use of quality tools, technologies and management activities can advance the performance of businesses or organizations. Hauser and Clausing (1988) came up with QFD, also named house of quality (HOQ), and the framework is referred to in Fig. 1. This method aims to design products catering to the needs of customers. The design process is to connect the customer needs with technological requirements, product requirements, manufacturing procedures, manufacturing management, service processes, and so on. The relationships between each process are shown by matrix which can be widely used in product development and quality improvement (Garibay et al. 2010; Evans, 2005; Chan and Wu, 2002). QFD confirms the quality throughout various stages starting from the stage of development and design to meet the quality requirements for customer satisfaction. QFD deals with the customer demands (What to do) and the management techniques (How to do) and results in the target value of management

techniques (How much), to control the potential and external quality requirements of customers and to highlight the quality of planning and design.

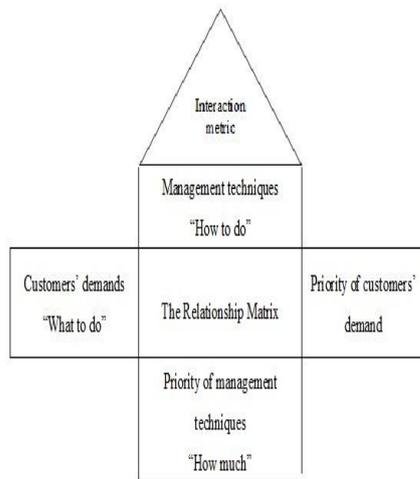


Fig. 1: QFD framework (Hauser and Clausing, 1988)

Based on experience, the advantages of implementing QFD include: 1. decrease of design change by 30~50%, 2. decrease of design cycle by 30~50%, and 3. decrease of initial cost by 20~60%. According to Jiang et al. (2007), benefits resulted from QFD can lower the manufacturing costs, raise customer satisfaction and increase market share. In terms of applying QFD to the area of operation and management, Chen (2012) pointed that using QFD in medical and healthcare should improve the priorities of healthcare service quality. Saadonet al. (2015) found that businesses using QFD to design internal training courses can change the responsiveness, learning drive and working behavior of employees, thus improving the competitiveness of the businesses. In determining the service demands of an aging population, Chen (2016) proposed the indicators of management techniques

include: 1. education, and training, 2. space planning, 3. medical facilities, 4. human resources, 5. transportation facilities, and 6. recreational activities.

In the area of education, using QFD to change the design and content of the courses can keep abreast of the times and enhance the school competitiveness and student satisfaction (Alina and Roxana, 2011). On curriculum redesign in higher education, Prabhushankar et al. (2014) found that the indicators of management techniques include: product design and development, CIM, thermal engineering, manufacturing analysis, advanced robotics, dynamics of machines, industrial engineering, rapid prototyping, Java and Dot Net, computer headword, risk management, design of experiment, facility planning and design, industrial psychology, and principles of lean manufacturing. QFD-related studies are consolidated in Table 1 (Cecilia et al. 2010; Chen et al. 2011; Kuo et al. 2014). The objectives of management techniques include the decrease of product development time, the improvement of product quality and the increase of business competitiveness.

Judging from QFD-related studies, each management techniques include financial resources and management activities that businesses need. Although these studies clearly describe the meaning of management activities, they cannot reveal the connection between management activities and financial resources. Sivasamy et al. (2016) advanced that the framework of QFD should be adjusted when implemented in different industries to enhance the accuracy and correctness of the results of QFD techniques. There hasn't been TQM-related study using financial resources as the management techniques. Hence, this study

uses financial resources as the management service and education quality and techniques to analyze the importance and complement the shortcomings of the priorities of expenses in the improvement of implementation of QFD.

Table1 QFD-related studies

Time	2010	2011	2014	2014	2016
Author	Garibay et al	Chen and Chou	Kuo et al	Prabhushankar et al	Chen
Research topics	Digital library	Improve library service quality	Health food development	Curriculum Redesign in Higher Education	Determining the service demands of an aging population
Management techniques	Website design	Regular education and training for employees	The study	Product design and development	Education and training,
	Website arrangement	Implement the case exercise	Trend survey	CIM	Space planning,
	Links updating	Build service knowledge system	Competitive product analysis	Thermal engineering	Medical facilities,
	Online help	Regular implement collection purchasing.	Consideration of firms' techniques	Manufacturing analysis	Human resources,
	Internet connection	Regular hardware maintenance.	Establishment of product development	Advanced robotics	Transportation facilities,
	Searching tools	Regular review meeting	Functional setting of product	Dynamics of machines	Recreational activities
	Budget	Alliance and exchange with the other libraries.	Technical investigation and design	Industrial engineering	
	Selection of	Collect readers' opinion by	Manufacturing and functional test	Rapid prototyping	

digital resources	questionnaires.		
	On-the-spot inquiry	Departmental communication and specifications of modification	Java and Dot Net
	Setup standard operation processes	Suppliers' material preparation	Computer headword,
		Concern about mass production factors	Risk management
		Sample manufacturing and modification	Design of experiment,
		Communication among production units	Facility planning and design,
		Cost control	Industrial psychology,
		Quality test standard	Principles of lean manufacturing
		Cooperation with distributors	
		Marketing strategy and market positioning	
		Consumers information feedback	

3.2 Financial expenses as the management techniques

Upon establishment or during operation, all organizations and businesses need funds. What assets should be acquired by these funds? That's the issue of resource allocation. Due to limited resources, businesses should allocate the resources to items generating the highest revenues and earnings. According to the resource dependency theory, administrative structure reflects effects to ensure a stable flow of resources and to manage problems and uncertainties associated with exchange transaction (Tolbert, 1985). In regard to the organizational behavior in the university, Lepori et al. (2013) suggested that the university is driven by the search for scarce resources.

Salini and Turri (2016) evaluated the differences of universities by revenue data and used it as the indicator to explain that firstly that after receiving and executing funds and other resources, the universities can attract external resources. Revenue data include reliable and comparable data for the purpose of academic research activities, governmental subsidy priorities and external research resources. Secondly, revenue data shows organizational behaviors and activities of universities. For instance, if a university receives a large amount of research funds, it seems to have more research activities. At last, revenue data shows all the school activities such as teaching, research, student service and management and school properties.

From the above-mentioned studies, we know that using revenue data as the evaluation indicator can reveal the characteristics of a university, its autonomy, its diversity of financial resources, and its future development. Although revenue data show the characteristics and financial resources of a university (Eastman, 2006), the allocation and benefits of financial resources of the university are still unknown. Kaynak (2003) utilized financial data to verify the business performance and found that financial data is

related to the performance of marketing and quality. Financial expenses result from payments of specific business goals. Financial expenses data can explain organizational activities and behaviors and can be used to estimate the redundancy of organizational resources and the allocation and application of financial resources. Use of financial expenses data helps to accurately disclose the strategic planning, human resource, research and development, marketing and advertising, and IT equipment acquisition. In terms of resources theory, organizations and businesses manage to keep the stable mobility of resources, to efficiently handle the troubles and to solve the uncertain problems. Because the expenses statistics are standard and comparable, the data are reliable and measurable. Consequently, using the expenses data in this study can decrease the uncertainty and error of the data resources. This study will use financial expenses data as the evaluation indicator to complement the shortcomings of not showing the allocation of financial resources and insufficiency of quality activities of the revenue data.

4. A case study

4.1 Framework of study

In Taiwan, the birth rate has decreased and the fertility is low because of the result of family planning, the increase of economic pressure, the change of social values, the impact of modern technology, late marriage and childbearing, and so on. According to the statistics data by Ministry of Education in Taiwan, the number of first-grade students in 2015 was 205,000, down from 246,000 in 2010. However, information also shows that the number of all kinds of educational training institutes was 18,815 in 2015, up from 10,686 in 2006. In respect of the institutes for entry examination in to further grades, the number was 10,917 in 2015, almost doubled by 5,534 in 2006. This means Taiwanese students attend significantly more courses after school to gain professional knowledge and certificates than before.

The entry threshold to build an educational training institute is not high. However, the stronger is always the winner while the weaker is always the loser. It usually takes 2 to 3 years to establish the good reputation. Therefore, during the first 2 to 3 years, it is very difficult to make both ends meet. Upon poor operation, insufficient enrollment, or lacking funds, the ownership is most likely to be failed and transferred during this stage. As a result, participants of educational training institutes must gain much knowledge of operational activities and allocation of financial resources.

In spite of the factors of low fertility, market orientation, performance responsibility, huge competition, and survival crisis, the number of educational training institutes in Taiwan has

increased in recent years, suggesting that operating educational training institutes is still potentially profitable. In Taiwan, educational training institutes gather in Taipei City where people are most populated, political and economic activities are most active, and residents are best educated. For this reason, the study will use educational training institutes for further studies in Taipei to be the objects of study and discuss the research results of TQM, service and teaching quality by relevant literature review. It will explore new solutions to the operation of educational training institutes from the perspectives of financial resources and will utilize QFD to find the key success factors of TQM and operational strategies. The conceptual framework is shown in Fig. 2.

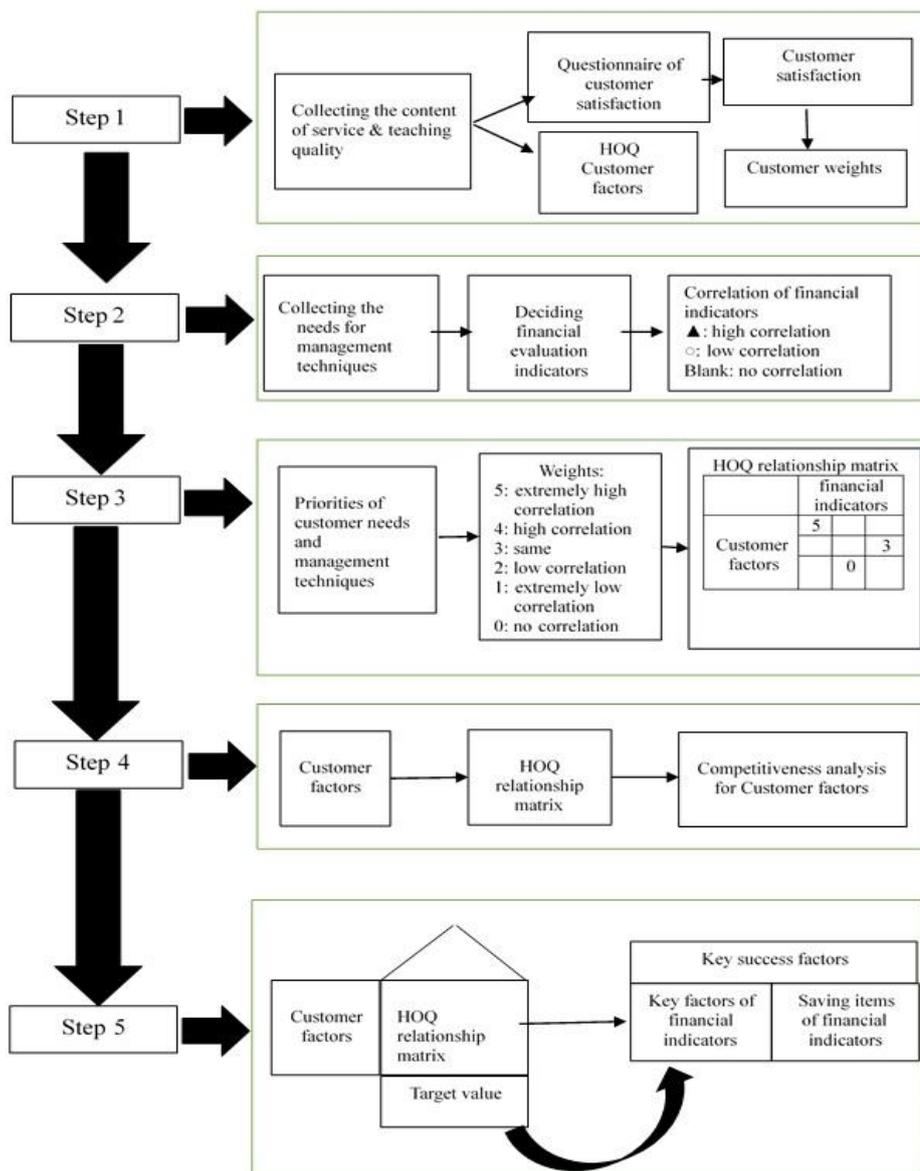


Fig. 2. Conceptual framework

4.2 Design of the questionnaire

This study employed the PZB service quality theory to design the questionnaire and the SERVQUAL scale revised by Parasuraman et al. (1988) to design 11 questions. Five-scale of Likert scale was employed. The scores ranged from 1 to 5. Score 5 means extremely high correlation while score 1 means no correlation. The content validity of the questionnaire was tested by 3 administrative supervisors, 3 teachers and 3 students from several educational training institutes. The Aiken coefficient of content validity was calculated and the coefficient for each question

was over 0.7, suggesting the high validity of the questionnaire. Consequently, the questionnaire of the 11 questions designed was employed. This study employed KMO Measure of Sampling Adequacy and Bartlett’s Test of Sphericity. KMO value was 0.904 and value of Bartlett Test of Sphericity was 2420.37 with the significance=0.000. The results indicate that the questionnaire can be used to perform the factor analysis. Moreover, after deriving and analyzing common factors from factor analysis, 2 primary factors are selected: service quality and teaching

quality. The 2 primary factors can explain 65.13% of the total variance. According to the validity analysis, Cronbach's α coefficient was 0.913 while over 0.7 means high correlation as shown in Table 2. Hence, 11 questions of the questionnaire were employed to test the students' satisfaction of educational training institutes and the customer factors of HOQ.

This study used students of 4 educational training institutes in Taipei as the samples. Formal questionnaire survey was conducted from 1st Feb to 30th March 2016. The total number of the questionnaires was 250 while that of the valid samples was 178, with the effectiveness rate of 75.8%.

Table 2 Test of the Questionnaire Design

Question	KMO	Cronbach's α	Rotation Component Matrix		Aspect
The institute provides you with good software teaching facilities.			0.18	0.85	
The institute provides you with good hardware teaching facilities.			0.13	0.88	
The institute provides you with studying environment good for learning.			0.54	0.53	Service Quality
The website of the institute updates from time to time.			0.32	0.63	
The institute has professional teaching employees.			0.52	0.55	
The institute provides students with helpful handouts and teaching materials.	0.904	0.913	0.66	0.45	
The institute initiates to arrange the training course.			0.52	0.42	
The teachers have much practical experience of teaching.			0.84	0.22	Teaching Quality
The teacher can promptly answer the questions students come up with.			0.79	0.25	
The teachers educate diligently and enthusiastically.			0.82	0.18	
The teachers can make good use of teaching facilities and resources to aid the teaching.			0.84	0.20	

4.3 Management techniques-financial indicators

The main purpose of the establishment of business is to make the profit. It is the fastest way to understand internal and external operating activities of the business through its financial statements. The data derived from the financial statement can be analyzed and transformed to become the strategic data. Financial statements can help to forecast the financial condition and operating performance of the business in the future. Also, financial statements help to diagnose the operating problems and to improve the quality of product or service. Facing with the challenges of highly competitive environment and low fertility, educational training institutes in Taiwan have been always working hard in enhancing service and teaching quality effectively. Among the financial statements, income statement is an indispensable one that shows the financial activities and operating results of the business during a certain period of time. In income statement, operating costs means costs attributable to the sale of products or the provision of services of the operating activities during a fiscal year. They usually include the human resources, factors of operation and management, acquisition and replacement of equipment, and so on. Therefore, this study used financial expenses as the evaluation indicators to verify the key success factors of total quality management and operational strategies of the educational training institutes. The account names of the income statement are explained as follows:

1. Operating cost: namely cost of goods sold or

cost of production, including material costs of manufacturing products such as product cost, service cost, salary, overtime expense, utilities, rental fee, maintenance expense of equipment, freight, royalty, tariff, and so forth.

2. Operating expense: expenses from the sale of goods or the provision of services such as expense of research and development, management expense, selling expense, and so on.

3. Non-operating expense: expenses from the activities other than the registered operating items such as interest expense, the loss of disposal of fixed assets, etc.

The account names of the income statement can fully disclose various operating activities of the business. Hence, this study employed operating costs and operating expenses as the indicators of management techniques. They include the salary of teachers, salary of administrative employees, rent expense of the office, expense of office equipment, maintenance expense of equipment, expense of IT equipment, utilities, communication expense, supplies expense, travelling expense, entertainment expense, advertising expense, education and training expense, insurance expense, royalty expense, and expenses of research and development (shown in Table 3). The management techniques affect each other; that is, the change of one technique usually affects the other. In this study, relationships among the management techniques are shown by ▲: high correlation, ○: low correlation and blank: no correlation.

Table3 Summary of the account names of financial expenses and their definitions

Account names of the expense	Definition
Salary of teachers	Salary and allowance paid to teachers in the organization
Salary of administrative employees	Salary and allowance paid to administrative employees in the organization
Rent expense of the office	Expenses arising from the rental of place and office of other organizations and to be regularly paid according to the agreement
Expense of office equipment	Expenses of the acquisition, maintenance and repair of the office equipment
Maintenance expense of equipment	Expenses of the acquisition, maintenance and repair of the electric equipment and facilities for the use of operation
Expense of IT equipment	Expenses of acquisition and settlement of the computer facilities for the use of operation (including the one-time package, operating system software and the subsequent revision, upgrade and application system development and planning with the benefit more than 2 years)
Utilities	Expenses of water, electricity and gas for the use of operation
Communication expense	Expenses of postage, telephone, telegraph, digital communication for the use of operation
Supplies expense	Expenses of stationery, copy paper and fax paper for the use of operation
Travelling expense	Expenses of long-distance travelling for the use of operation
Entertainment expense	Expenses of treating and giving gift for the use of operation
Advertising expense	Expenses of advertisement for the use of operation
Expense of education and training	Expenses of the tuition, incidental, material, accommodations and transportation of the education and training for current employees
Insurance expense	Expenses of insurance required by laws or as needed for the operation activities and assets managed
Royalty expense	Expenses of royalty required for the use of operation
Expense of research and development	Expenses of research, improvement and experiment for the development of new products and the improvement of production technology and service technology

4.4 Establishment of the relationship matrix

QFD, an interactive process of product development, integrated customer factors and management techniques, coupled with the participation of department of product development, to set up the relationship matrix. In this study, the correlation of relationship matrix between customer factors and management techniques ranges 6 scales from score 5 to 0. Score 5 means extremely high correlation, score 1 means extremely low correlation and score 0 means

no correlation. The manager, teaching employees and administrative employees play a central role in educational training institutes since they directly face the customers, listen to their voices, and thoroughly understand the customer needs. As a result, this study will use the manager, teaching employees, and administrative employees (their basic data as shown in Table 4) to set up the relationship matrix of quality factors of service and education and management techniques.

Table4 Basic data of the participants

Item	Category	Number of participants
Job	Manager	3
	Teaching employees	3
	Administrative employees	3
Age	Over 50 years old	2
	40-50 years old	4
	30-40 years old	2
	Under 30 years old	1
Education	Ph. D	1
	Master	6
	Bachelor	2
Experience	Over 10 years	5
	6-10 years	2
	1-3 years	2

5. Empirical analysis

5.1 Student satisfaction to the educational training institutes

In this part, we will discuss the student satisfaction to the quality factors of service and education offered by the educational training institutes. As shown in Table 5, in terms of service quality, students are most satisfied with “The institute has professional teaching employees”. While less satisfied with “The institute provides you with good software teaching facilities”. The standard deviation of factor of service quality was from 1.37 to 1.38 in “The institute provides you with good software teaching facilities”, “The institute provides you with good hardware teaching facilities”, and “The institute provides you with studying environment good for learning”, suggesting that the participating students share more common opinion on these factors. The standard deviation of “The website updates from time to time” and “The institute has professional teaching employees” was 1.46, suggesting that the participating students have more diversified opinion on these factors. The satisfaction survey showed the attitude of students while the results of the standard deviation revealed the real thoughts of students. Hence, there was no significant difference for students satisfied with software, hardware, and studying environment of the educational training institutes. However, students show significant difference in aspect of website updates and professional teachers. Consequently, software, hardware and studying environment of the educational training institutes are the key factors to

attract and keep students. Moreover, website updates and professional teachers are key factors to attract potential students and compete with the peers.

In terms of teaching quality, the average score was around 3.6~4.0, suggesting that students are generally satisfied with the teaching quality provided by the educational training institutes. The standard deviation of “The institute provides students with helpful textbooks, handouts and teaching materials” was 1.34, suggesting that the participating students share more common opinion on these factors. The standard deviation of “The teachers educate diligently and enthusiastically” was 1.64, suggesting that the participating students have more diversified opinion on these factors. Therefore, satisfied with textbooks, handouts and teaching materials used by the teachers, students show no significant difference. For the educational training institutes, textbooks, handouts and teaching materials are the key factors to keep students while the teaching attitude of teachers are key factors to attract potential students and compete with the peers.

Since students attend classes in the educational training institutes to learn more knowledge, to obtain the certificate, and to have further studies, it is reasonable that service and teaching quality have a significant influence on the operation of educational training institutes. Specifically, professional teachers and teaching attitude of teachers are key factors to compete with the peers and attract potential students.

Table 5 Student satisfaction to the educational training institutes

Aspect	Question	Average	Standard deviation	Variance
Service Quality	The institute provides you with good software teaching facilities.	3.7	1.38	1.90
	The institute provides you with good hardware teaching facilities.	3.9	1.37	1.87
	The institute provides you with studying environment good for learning.	3.9	1.38	1.89
	The website of the institute updates from time to time.	3.9	1.46	2.12
	The institute has professional teaching employees.	4.0	1.46	2.15
Teaching Quality	The institute provides students with helpful textbooks, handouts and teaching materials.	3.8	1.34	1.79
	The institute initiates to arrange the training course on holidays or after school.	3.6	1.48	2.18
	The teachers have much practical experience of teaching.	3.9	1.49	2.22
	The teacher can promptly answer the questions students come up with.	3.9	1.53	2.34
	The teachers educate diligently and enthusiastically.	3.8	1.64	2.71
	The teachers can make good use of teaching facilities and resources to aid the teaching.	4.0	1.55	2.41

5.2 QFD - key success factors

5.2.1 Operating procedures

QFD transforms customer needs to specific product functions and systematically and interactively connects customer needs with function factors to ensure that the ultimate products meet the customer needs. The first step in constructing QFD is to confirm the customer needs, that is, the customer factors. According to the questionnaire in this study,

customer factors include 5 questions concerning service quality such as the good software for learning provided by the institutes and 6 questions regarding teaching quality such as the textbooks, handouts and teaching material used by teachers are useful in learning, as shown in Table 6. The students evaluated the importance of each customer factor, expressed their real voice and showed how they think of the importance of the customer factors.

Table 6 Customer factors

Aspect	Question	Importance	Original weights	Percentage	Priority
Service Quality	The institute provides you with good software teaching facilities.	3.7	192.4	8.7%	7
	The institute provides you with good hardware teaching facilities.	3.9	163.8	7.4%	10
	The institute provides you with studying environment good for learning.	3.9	195	8.9%	6
	The website of the institute updates from time to time.	3.9	191.1	8.7%	8
	The institute has professional teaching employees.	4.0	244	11.1%	2
Teaching Quality	The institute provides students with helpful textbooks, handouts and teaching materials.	3.8	178.6	8.1%	9
	The institute initiates to arrange the training course on holidays or after school.	3.6	205.2	9.3%	5
	The teachers have much practical experience of teaching.	3.9	237.9	10.8%	3
	The teacher can promptly answer the questions students come up with.	3.9	132.6	6.0%	11
	The teachers educate diligently and enthusiastically.	3.8	212.8	9.7%	4
	The teachers can make good use of teaching facilities and resources to aid the teaching.	4.0	248	11.3%	1

The second step is to determine the management techniques and their relationship. Management techniques, the efforts organization should make to satisfy customer factors, are generally provided by the designer. In this study, after interviewing about operating costs and expenses with manager, financial, and administrative employees of the educational training institutes, we found that the account names of income statement can fully disclose all the operating activities of the businesses. Therefore, 16 financial indicators including salary of teachers are employed as management techniques in this study. Each financial expense not only represents the operating activities but also has influence on the related management activities and the overall allocation of financial resources. Through the relationship among the financial indicators, the financial relationships are identified, operating activities of the organization are understood, and the optimal strategy of allocation and management of

financial resources are obtained.

The third step is to determine the relationship between customer factors and management techniques. The relationship matrix shows how much the nature of product contributes to and has influence on each customer need. Hence, the study coherently showed the indicators and factors of service and teaching quality so that the management techniques of the institutes can meet the student needs and operating competitiveness. According to the feedback from participants, hardware facilities for learning have extremely high correlation to financial indicators such as expense of office equipments, education and training expense, and royalty. However, software facilities for learning have extremely low correlation to financial indicators such as rent expense of the office, travelling expense, entertainment expense, and advertising expense, as shown in Table 7.

Table7 Relationship of customer factors and management techniques

Financial indicators	Salary of teachers	Administrative Salary of the	Rent expense of the	Expense of office	Maintenance	Expense of IT	Utilities	Communication	Supplies expense	Travelling expense	Entertainment	Advertising expense	Expense of Royalty	Insurance expense	Research and	
The institute provides you with good software teaching facilities	4	3	1	5	4	4	3	3	4	1	1	1	5	4	5	4

The fourth step is to determine the competition analysis for customer factors. As mentioned in Table 5, the customer satisfaction of each factor was shown and the average numbers were used to be the weights of the importance of customer factors. According to the matrix of satisfaction of customer factors and management techniques, the first 3 indicators include “The teachers can make good use of teaching facilities and resources to aid the teaching”, “The teachers have much practical experience of teaching”, and “The teachers educate diligently and enthusiastically”. Therefore, service and teaching quality are key operational factors and affect the operation of organization mutually. For this reason, to increase student satisfaction, the institutes should preferentially allocate financial resources to these 3 indicators.

5.2.2 Empirical analysis

This study collected and arranged the factors of customer needs for the educational training institutes during the stage of service design, transformed the financial expenses into management techniques, and

then connected the relationship between customer needs and management techniques, and finally verified the factors of operation of business. The complete QFD structure was shown in Fig. 3. As far as the operation is concerned, therefore, the educational training institutes should prioritize the expense of education and training, royalty expense, salary of teaching and administrative employees, advertising expense and insurance expense. Besides, it is important to diminish the travelling expense, entertainment expense, communication expense, utilities expense, and expense of rent of office. The study showed the results of the 2 stages where the financial indicators are transformed to be the TQM strategy and detailed working plan and to be the encouragement for the organization to go beyond the competitors. To support methodology application in practice, the institutes would use financial indicators to strategically develop new market and allocate financial resources to improve activities of quality management and the employee implementation plan.

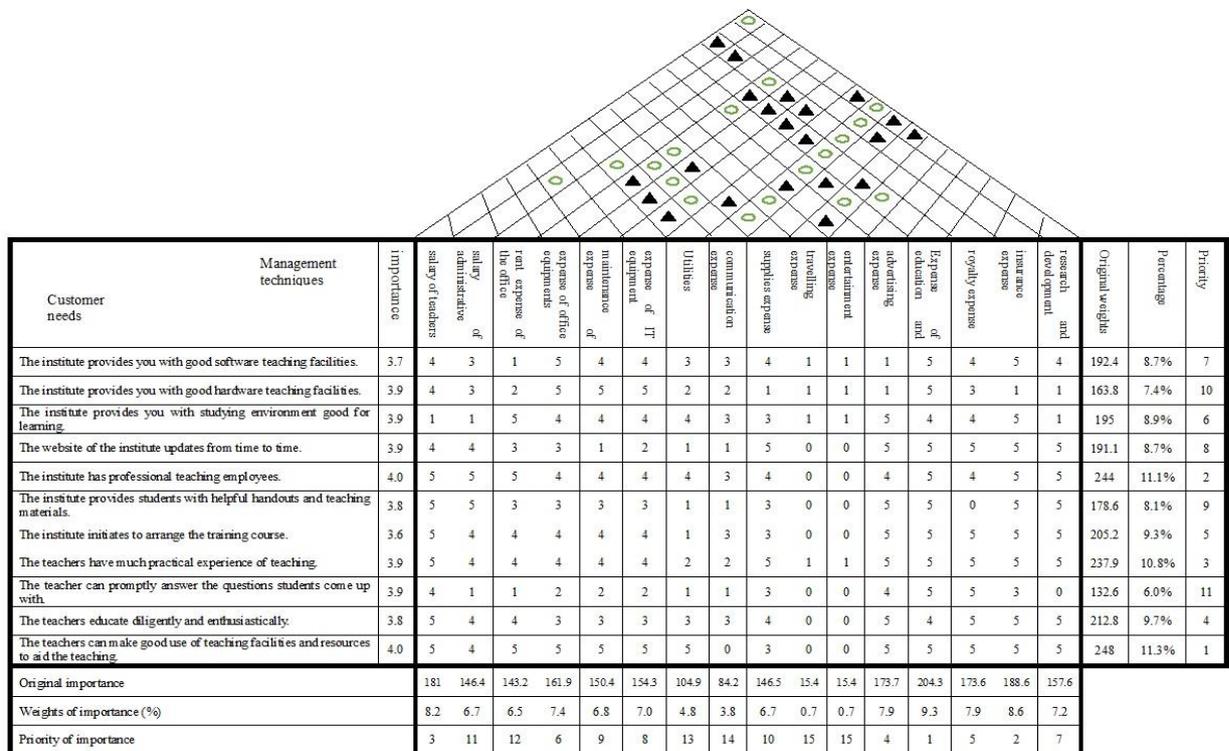


Fig. 3. Educational training institutions QFD

The previous studies focused on the presentation of management activities and quality performance, lacked the consideration of allocation of financial resources, and resulted in the weakness that the key factors of service and teaching quality cannot be prioritized according to the improvement items. Financial indicators as the management techniques were proved to improve the disadvantages of operation of the organization in a clear way. This study found that the expense of education and training are the most essential factor of competitiveness of organizational operation because the education and training courses can change the employees in responsiveness, learning drives, and working behaviors, thus enhancing the competitiveness of organizations. The result of this study was comparable to that of Kannan et al. (2013) and Saadon et al. (2015). The purpose of education and training was to advance the competence and capability of the teachers and administrative employees and to enhance the customer satisfaction and business competitiveness accordingly. Hence, the institutes should arrange the expense of education and training coupled with the key factors of service and teaching quality and apply the factors to the improvement of service quality, the preparation of teaching materials, and teaching methods through the cycle of plan-do-check-act. The financial indicators were verified to help the improvement of service and teaching quality. In other words, the inputs of educational training expenses, the procedures of total quality management, and the presentation of business competitiveness were confirmed in this study. Moreover, combined with the TQM process, the financial indicators reveal the roles played by the manager, teachers, and administrative employees in the institutes. As to their roles, the responsibility of manager was to implement the quality control and continuously monitor and verify whether each input

of financial resource of service and teaching quality can meet the customer needs. And the duty of the teaching and administrative employees was to provide the teaching and service quality that meet the needs of customers.

It is the worst fear of every business that the core employee are headhunted by the competitors with the reason of salary. Since salary can promote and reward the performance of the employees, the institutes should provide reasonable salary to enhance the satisfaction of employees to the institutes. Study by Owlia and Aspinwall (1997) also concluded that the reasonableness of the salary can enhance the coherence of the employees to the business. The outcome of this study clearly showed that the salary of employees in the institutes, the key factor of the operation of organization, can signify the nature of the industry. From the viewpoint of students and the factor of service quality, i.e., the institutes provide professional teachers, it is the key factor to attract potential students and compete with the peers.

In this study, the royalty was the third important factor. The royalty, that is, the copyright, is a kind of intellectual property. This right is an asset the same as other material properties or legal rights. The study of Asif et al. (2013) mentioned that the design of courses is the main product and the most important feature of the school. In the design of courses, the institutes should take both students and stakeholders into consideration and meet their requirements. The competitive advantages of the educational training institutes consist in innovative teaching methods and materials, which is an extremely important factor for the institutes. Based on experience, if the institutes own more royalties, they are more competitive and more differentiated from the peers, thus attracting potential customers and improving business performance. In researches related to the HOQ, this factor has never been employed as a management

technique while this study clearly specified the key factors of differentiation from the competitors.

Operating expenses include travelling expense, entertainment expense, communication expense, utilities, and rent of offices. The more the operating expenses, the more the operating costs. Therefore, due to the limitation of financial resources, operating expenses should be saved as much as possible to increase the operating revenue of the organization. Using the financial data as the management techniques, this study made a stronger connection between operating activities and all the expenditures, established a better coherence of customer needs and management techniques, and solved the inconsistency problem caused by the subjectivity of the relationship matrix (Bouchereau and Rowland, 2000; Andronikidis et al. 2009; Wu and Shieh, 2008; Kamrysi et al. 2014).

6. Conclusion

Firstly used in the manufacturing sector, TQM can be applied to the areas of operation strategy, education quality, and service quality. Business operation is continuous and the operation strategy and quality factors change all the time. Because the educational training institutes have the characteristics of operation strategy, education quality, and service quality, the study carefully allocated the financial indicators to the operation strategies with the management process of TQM together with the methodology of QFD. Since different industries require different key success factors, this study came to a conclusion and made a contribution different from the previous ones and provided a positive, integrated, and multi-faceted point of view. In terms of TQM, this study evidently pointed out the role played by and the management importance of the manager, administrative employees, and customers. Coupled financial indicators with the process of TQM, the working plans of management team and the capabilities of employees were demonstrated in this study and they could satisfy the customer needs and

improve the competitiveness of the organization.

As a methodology to incorporate the needs of customers and manager with the design of product and service, QFD can help the business find the key factors of management strategy and quality improvement activity. Among QFD-related studies, the study was the first one to use financial indicators as the management techniques to discuss operation strategies and proved that this methodology can fully combine the ideas of the management, teachers, and administrative employees. This study obviously confirmed that this methodology can be successfully applied to the needs of service and education quality, can reflect the practical needs of the operation of the educational training institutes, and can enable the management to provide efficient services. The resources should be optimized due to the limited resources in the organization. Therefore, instead of using management activities as the management techniques, this study employed financial indicators to be the management techniques. It concluded that the salary of teachers, royalty expense, and expense of education and training are the crucial factors in the operation of educational training institutes. Financial indicators helped the institutes to enhance competitiveness, attract potential customers, and differentiate themselves from the competitors. The management of the institutes should prepare enough funds before operation to gain the competitive advantages. This study integrated the financial indicators with the QFD methodology, applied them to the TQM to improve the operation strategy, and made plans for operation activities, quality management, and fund requirements in a more specific and accurate way. This can also be used in other industries in the aspects of operation management, organization performance, and TQM.

Finally, because the business strategy and quality improvement do change from time to time, it is recommended for the future studies to include the

time factor into this conceptual framework, observe the allocation of financial resources and quality improvements, and discuss the change of the factors of business strategy. Moreover, to increase the accuracy of business strategies, the weights allocated by the financial expenses can be discussed by different layers. Future researchers can focus on other aspects of motivation to improve computational environments like employee satisfaction, motivational incentives, investment in communications, software and infrastructure, and resource allocation, etc. Future exploratory research can focus on the relevance and difference of the financial expenses in different areas, business strategies to increase the correctness of the strategy management, and the attention and discussion of other researchers to the application of financial resources.

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