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Key success factors for implementing Taiwan TrainQuali System (TTQS) in Taiwanese enterprises

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Facing the change of economic environment and the need of enhancing competitive advantages, small and medium-sized enterprises in Taiwan utilize 'Taiwan TrainQuali System (TTQS)' on training talents. In order to maximize the benefits of TTQS implementation and increase the training efficiency, this paper aims to use 'grey relational analysis (GRA)' to extract key success factors (KSFs) from 46 factors, which influence the implementation of TTQS. Moreover, this study also verifies the KSFs with nine case companies which have won gold medals in TTQS evaluation and sum up 12 concrete practices as references for other enterprises in order to show how to implement the TTQS training quality system better in the future, and in turn enhance the quality and performance of human resource training.

Keywords: ISO 10015; Investors in People (IIP); Taiwan TrainQuali System (TTQS); key success factors (KSFs); grey relational analysis (GRA)

1. Introduction

Taiwan TrainQuali System (TTQS) is originated based on 'Guidelines and Action Plans for Service Industry Development (2004–2008)' of the Taiwanese Government (Taiwan TrainQuali System, 2012). The objective is to construct an integrated certification system of training quality focused on the development of talent training industry, by importing and combining ISO 10015, European vocational training policies, British Investors in People (IIP) and Australian active vocational training policies, by taking into account of the challenges for Taiwan to face globalized knowledge economy.

Due to the lack of human and capital resources in small and medium-sized enterprises (SMEs), there is less willingness to do vocational training, and there seldom exists professional training organizations (Small and Medium Enterprise Administration, Ministry of Economic Affairs, 2007). Although the Taiwanese Government provides free counselling, with limited resource they can't set it into real action. If the enterprises can effectively introduce TTQS system covering five aspects (including Plan, Design, Do, Review and Outcome), we can evaluate the training quality performance and find the key success factors (KSFs) to pass the evaluation, which can greatly improve the training performance and lead to a higher competitiveness. If we can extract the KSFs of TTQS, we believe that it would help a lot for those SMEs to implement training system better. This paper aims to study from the committee members and consultants of

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TTQS, and the enterprises that passed the assessment, in order to: (1) use grey relational analysis (GRA) to find out the key factors and their weight of TTQS, and by sorting their weights to find the most important key factors; (2) provide the practical methods for enterprises to implement the key factors of TTQS.

This paper is organized as follows. Section 2 reviews the related studies. Section 3 introduces the data collection. Section 4 analyses the results. Section 5 draws the conclusions.

2. Literature review

2.1. Criteria for international training quality and ISO 10015

International Organization for Standardization (ISO) was founded in Geneva – Switzerland, 1947, and its primary job is to establish various international standards on behalf of its member countries (IIP, 2013). Nowadays, ISO 9001:2008 is implemented by over one million companies and organizations in over 170 countries (ISO, 2013). Quality management principle in ISO 10015 is based on ISO 9000 system, and also the only international criteria for human resource training in the ISO 9000 system (Hockman, Grenville, & Jackson, 1994; Huang, Chang, & Lin, 2006). It is used to enhance the quality of human resource and improve the outcome of education and training in an organization (Cheng, 2005). ISO 10015 is constructed on Plan–Do–Check–Act (PDCA) system, the so-called 'Deming Cycle' or 'Deming Wheel'. Developed by Walter Shewhart in 1920, PDCA was later introduced by Edwards Deming (Fan, 2008). It is now widely used in training quality management (Wu, 2008). There are two core ideas in ISO 10015. One is the strategic connection between investment training and organizational performance. It contributes to precise analysis of performance gaps and the real need for training. The other is setting up the training procedures, which leads organizations to 'learning organizations' by continuous improvements.

2.2. Investors in People UK (IIP UK)

To enhance the competence of enterprises, since 1991 the British Government has set 'IIP' into action. The policy is set by government to provide a standard for enterprises to invest their human resource. It aims to enhance the enterprises' ability to manage and develop human resource and to promote the responsibility of enterprises. It is not only good for workers, but also helps to improve the structure and the performance of the organization (Fan, 2008).

The main purpose of IIP is 'to improve the performance of an organization'. Therefore, IIP follows the three Principles: Plan, Action and Review, which form 10 Indicators (IIP, 2013). To be qualified, each applicant must fit 39 basic requirements from these 10 indicators set by IIP. In addition, to be eligible for bronze honour, based on its own features and development, the applicant needs to qualify at least 65 requirements in which 26 out of 157 can be chosen from advanced requirements to be evaluated. Silver honour requires qualifying at least 115 requirements and 165 for gold honour. Besides, if the applicant who gets the gold honour is willing to promote IIP, give consulting, and accept enterprise visiting, it will be given the certificate of 'leading enterprise' (Yeh & Tsai, 2010) (Table 1).

Table 1. IIP's principles, indicators and requirements.

Divisions		10 Indicators	Requirements	
			Basic	Advanced
Three Principles	Plan	1. Business strategy	6	19
		2. Learning and development strategy	4	13
		3. People management strategy	5	24
		4. Leadership and management strategy	3	10
	Action	5. Management effectiveness	4	21
		6. Recognition and reward	3	16
		7. Involvement and empowerment	3	16
		8. Learning and development	3	17
	Review	9. Performance measurement	5	9
		10. Continuous improvement	3	12
Subtotal			39	157
Total			196	

Note: Adapted from IIP (2013).

2.3. Taiwan TrainQuali System

2.3.1. The origin and structure of TTQS

In 'Guidelines and Action Plans for Service Industry Development (2004–2008)', the Administrative Council focuses on 'Measurements of Cultivating Talents in Service Industry' to list a certification of the quality of the training. It is mapped by the Labour Committee in order to introduce international standards of training quality. Therefore TTQS, planned by the Labour Committee in 2005, is composed of ISO 10015, vocational training policy in Europe, IIP in UK and active vocational training policy in Australia. The Labour Committee sets up Taiwan's own 'Taiwan TrainQuali Scorecard,' which is a cyclical system to enhance the training quality (Bureau of Employment and Vocational Training Enterprise Network, 2009), shown in Table 2.

2.3.2. Measurement and evaluation standard of TTQS

The structure of TTQS mainly follows PDDRO, which means: 'Plan, Design, Do, Review and Outcome', using five aspects with 18 items in total for evaluation. With weighted calculations and circulating training quality modification system, it scores and grades with different counselling. We modify the evaluation items into relative factors in the research questionnaire based on our experience (as shown in Table 3).

Based on 'Bureau of Employment and Vocational Training: TTQS guidelines manual (2010),' items on the score chart are depending on each enterprise. In other words, score of TTQS is judged by whether there is a record or documentation, represented by a value between 1 and 5 and fine scaling by .5. Evaluation of enterprises is based on five aspects with 18 items. Except for No. 19 ('others'), there are 21 scales. The highest score of each square is 5, and the original total score is 105. Under 53 (including) fails; 53.5–63 passes the examination; 63.5–74 is honoured with the bronze medal; 74.5–85 is honoured with the silver medal; over 96.5 is honoured with the gold medal and achieve TTQS standards.

Table 2. Comparison between IIP, ISO 10015 and TTQS.

Items	ISO 10015	IIP	TTQS
Applying country	Switzerland	UK	Taiwan
Starting year	1999	1991	2006
Principles	Plan, Do, Check and Action	Plan, Do and Review	Plan, Design, Do, Review and Outcome
Purpose	1. Make sure the investment in training corresponds with enterprise's target 2. Make sure the application of the training can make a positive return on investment	Through investing in employees' professional development, it can increase employees' devotion towards the organization, and help the organization to reform and improve results	Use strategic training system to improve the training quality and human resource capital, and thus, increase the competitiveness of the organization
Number of indicators	Five main indicators	10	18
Number of detailed catalogues	Nine secondary indicators	39	None
Examining standards	ISO 9001: 2000 training relative standards + ISO 10015 standard requirements + results agree to the business plan	10 requirements	Fundamental standards are based on five aspects of 'PDDRO,' which is the score sheet consisting of 18 standards
Examining mechanism	Qualified for examination (value the process and results)	Qualified for examination and subjective judgment (result-oriented; sampling interview with employees)	Qualified for examination (value the process and results)
Goal	Learning organization with exceptional performance	Team with high commitment and exceptional performance	Learning organization with exceptional performance
Documentary requirement	High (TMIS required)	Low	High
Evaluation type	Qualified for examination (value the process and results)	Qualified for examination and subjective judgment (result-oriented)	Qualified for examination (value the process and results)
Subject	Medium/large-sized training facilities or training centres in groups	Service industry, knowledge industry, high changing industry (technology industry, for example), especially suitable for SMEs	Training departments in organizations and independent training facility
Characteristics	1. Support ISO 9000 system and enforce its training ability 2. Become an independent and complete training system	Condense employees' common consensus and help organization transform. Strong subjectivity, so the quality and the training of verification staffs are very important	1. Verification institute will make sure applicants' quality agrees to the standard of training (1) 2. Assist applicants to conduct counselling and

(*Continued*)

Table 2. (*Continued*).

Items	ISO 10015	IIP	TTQS
	Can be used in enhancing cooperation's competitiveness		view the result of counselling
Sections for Notation	It is the only standard in ISO 9000 international system to regulate human resource training	The first and the only standard of human resource quality in the world	Unique training verification system of Taiwan, based on IIP, ISO 10015 et al.

Note: Adapted from Lin, Kung, and Lin (2009).

2.3.3. Recent studies of TTQS

Several recent studies have dealt with the performance, challenges and opportunities of TTQS (Chang & Chen, 2013; Chuang, 2013). Related studies have introduced evaluation models and filled the gaps of Plan and Design structures that TTQS incorporates through data mining in order to help in the future (Lin, Wang, Wu, & Ye, 2011; Lin, Wu, Tung, Huang, & Qin, 2010). Thus, the existing literature notes that introducing TTQS effectively enhances the organization's human capital and this strengthens human capital to be competitive internationally (Hsieh, Lin, & Lee, 2012; Lo, Tsai, Lan, & Lin, 2011). However, most of the studies have focused on the positive implementation of TTQS, reviewing assessment standards and advantages, evaluation models that uplift human capital for the performance of TTQS. Very few have focused on challenges of looking after those assessment items in the limited operational resources to develop competitive advantage (Liu & Liang, 2015), and some even state that is not beneficial at all (Kao et al., 2013; Yeh, 2012). Therefore, very few studies have proposed combinations from a generic algorithm (GA) (Chen, Lin, Chen, Huang, & Chang, 2012a; Huang et al., 2010) and support vector machine (SVM) (Aggarwal, Rani, & Dhir, 2010; Ichihashi, Honda, & Notsu, 2011; Kao et al., 2013; Martens, Baesens, & Van Gestel, 2009) to be GA–SVM algorithm, so they can select the combination of assessment items and identified the most important items to influence the enterprises and be their first priority of execution and to better training target (Kao et al., 2013).

This unique research aims to use 'GRA' to conclude key factors which influence the implementation of TTQS. Empirically, this study introduces nine cases which have passed the TTQS evaluation and honoured with gold medals in Taiwan. It sums up the 12 concrete methods influencing TTQS as references in order to show how to implement the TTQS training quality system for the enterprises in the future, and in turn enhance the quality and performance of human resource training.

2.4. Key success factors

The idea of KSFs is originated in Daniel's article 'Management Information Crisis' (1961) and suggests that 'To succeed, you have to do your job very well.' Later, KSFs were elaborated by Rockart (1979) and Bullen and Rockart (1981) in the perspective of the design management information system. There are three to six KSFs in most industries. For a successful enterprise, these KSFs must be well functioned. Therefore, the concept of KSFs is crucial to the design of information system. Boynton and Zmud (1984) point out the definition of KSFs. It represents that a manager or an enterprise has to offer special and constant notion of success or gain better achievements. It includes

Table 3. Five aspects and evaluation standards in TTQS.

Aspects	Emphatic facets	Evaluation items		Relative factors in this research
Plan	Focus on relativity and the practice of training plan and enterprise's goal	1. Explicitness	1a. Organization's vision	1. Enterprise with visions, missions and strategies.
			1b. Setting of goals and needs	2. Setting clear training goals and needs of the plan
			1c. Clear training policies	3. Enterprises with clear training policies
			1d. Clear core training categories or fields	4. Annual training programs with clear core training categories or fields
		2. Systematic	2a. Management system and documental manual of training quality	5. Enterprises with complete training management system
			2b. Career analysis and applications of training process	6. Clear requirement that the relative staffs should have ability to analyse careers and explain the jobs
		3. Connections	Connections between training plan and business goals	7. Connections between training goals and results of organizations
		4. Ability	4a. Administrative management of training unit	8. Enterprise with professional human resource department or training unit
			4b. Relative ability of training	9. Training staff has relative ability of analysing and also provides career instructions
Design	Focus on the design of training system (including the involvement of beneficial party, standard of course selections, purchase standard)	5. Selection standard of training products and services		10. Products which help training (teachers, teaching materials and training outsourcing)
		6. The involvement of beneficial party		11. Include training party's suggestions in the plan
		7. Combination of training and targets		12. Use training targets as the plans
		8. Systematic design of training		13. Complete training action plan
		10. Purchase process and standardization of training products and services		14. Construct a standardized procedure to cultivate purchase staff or outsourced training
Do	Emphasize the process of training, records	11. Whether the training	10a. Selection of trainees	15. Set up the complete selection

(*Continued*)

Table 3. (*Continued*).

Aspects	Emphatic facets	Evaluation items		Relative factors in this research
	and the standardization of management	follows the plan	corresponds to the plan	system of trainees and teachers
			10b. Selection of teaching materials corresponds to the plan	16. Draft the learning and action plan before training
			10d. Teaching methods correspond to the plan	17. Provide job opportunity and sharing after training
			Results transfer to the working environment	
		12. Records and information system	11a. Classification and establishing files of training	18. Training unit with the ability to manage files
			11b. Procedure of managing information	19. Educational training system
Review	Focus on periodical analysis, monitoring and reaction to accidents	13. Evaluation reports and periodical analysis		20. Periodical evaluation meeting and reports, which will be the adjustment standard next time
		14. Monitoring and reactions		21. Record accidents to be the training review next time
Outcome	Focus on layers, completeness, and sustained improvement of training evaluation	15. Diversity and completeness of training evaluation		22. Full records of diversity and completeness of training evaluation
		16. Results of trainees		23. Training courses can improve the working behaviour effectively
				24. Positive rewards after training, and also on their work
		17. Extension Effects of training		25. Combination of training results with salary, evaluation or promotion
				26. Training results can enhance competitiveness of enterprises and performance
		18. Results of special training		27. Devote the training results into corporate social responsibility
		19. Others		

Note: Adapted from Bureau of Employment and Vocational Training 'TTQS operating standard of training quality (2011).'

factors about recent and future operating activities of the enterprise. As a result, the enterprises are becoming more promising and also benefit from the 'strategic planning.'

KSFs are thus defined as variables and they are in correspondence with some characteristics such as, for instance the market, which mandates that some skill is a KSF in one but not in another occasion. If an analysis of KSFs is conducted it should not only be a description, but rather contribute to a more general theory about the study area and then it is linked to those particular characteristics.

Thus, KSFs lead into four main research tasks for an empirical analysis in an environment: measuring the perceived KSFs, finding additional hypotheses about the actual causes of superior perceived value and lower relative costs, measuring how businesses score on the potential KSFs, measuring perceived value and relative costs. These four research tasks clearly call for a combination of research methods (Bullen & Rockart, 1981). As this study is different in its nature due to its methodology using GRA to find out the current most vital KSFs of TTQS and future enterprise patterns for implementing TTQS (Chen, 2008), the existing studies have focused on implementation to some case companies and reviewing the general theory of the TTQS. Therefore, it is important to mention that this research shows the most important KSFs that can be utilized when TTQS is implemented.

2.5. Grey relational analysis

GRA is mainly focused on looking for a quantitative method to measure the relevance of factors. It's easier to find out key factors affecting developing trend of the system and then grasp the main features of things. GRA is a measure to analyse the relevance among discrete sequence data without strict demand for numbers of samples. If samples are small, it still accurately analyses the relationship between quantified data and ordering data (Feng & Chiou, 2004; Kung & Yang, 2006). Different from previous methods like regression analysis, related analysis or factor analysis which pose specific demand for numbers and styles of sampling, the method proposed in this paper works beyond the limitation of reliability and normal distribution among huge amount as well as small amount of data and variables. Moreover, it helps to process with uncertainty, multi-variable input, discrete data and non-integrity, compensating for the weaknesses of regression analysis (Chang, Wen, & Chang, 2000). Deng (1987) suggests that the GRA does not strictly require a certain number of samples, and does not require a typical distribution or assumptions for analysis. Therefore, GRA has four main features: (1) the models created are non-function type of series; (2) the calculation is simple and easy to use; (3) it can be calculated based on a small amount of data and (4) the data are not subject to comply with any typical distribution. Grey theory can effectively deal with the 'uncertainty', 'multivariate input', 'discrete data' and 'data incompleteness', and compensate the drawbacks in statistics regression (Wen, Zhao, Zhang, Chen, & Wen, 2009). In conclusion, GRA can overcome the shortage that a quantitative indicator cannot reflect the differences between factors, and make the research more accurate. As a result, GRA fits the purpose to select KSFs after enterprises adopt TTQS evaluation.

Firstly, the procedure of the GRA has to identify possible factors affecting the research target firstly. Then, it collects relevant effecting factors and select major factors as a research target. Next, GRA is processed. In other words, with applications of GRA to determine two sequences of information, the first step is to determine 'sequence

analysis' and 'reference analysis.' Next is to calculate grey relational coefficient and figure out grey relation based on the average. After putting grey relation in order, it is possible to get the standard of balancing the importance and select KSFs affecting evaluation. The procedure is explained as follows:

Step 1: Calculate the grey relational coefficient

According to Deng (1989), the calculation of the grey relational coefficient is shown in the following equation:

$$r(x_0(k), x_i(k)) = \frac{\Delta\min + \xi\Delta\max}{\Delta_{0i}(k) + \xi\Delta\max} \tag{1}$$

ξ represents the identified coefficient. Its value lies between 0 and 1. The main function of it is to show a comparison between these two. The value of the identified coefficient can be determined by the reference to different targets. Generally speaking, its average is .5 as its identified value.

Step 2: Calculate grey relation

According to Deng (1989), after grey relational coefficient is derived, grey relation (Equation (2)) is calculated by averaging grey relational coefficient, which also stands for the relationship between two sequences. If two variables are uniform, their simultaneous changes are higher, meaning that their relationship is higher, otherwise is lower. Deng (1989) calculates the values of grey relation based on the following equation:

$$\gamma\big(x_i(k), x_j(k)\big) = \frac{1}{n}\sum \gamma\big(x_i(k), x_j(k)\big) \tag{2}$$

Step 3: Calculate grey relational sequence

In GRA, grey relation means the relationship between two sequences. The value is not the key, but how to sort each relationship matters the most. It represents values between two sequences. With sorting, the relationship is called 'grey relational sequence'.

Grey relation is a relative concept. Take an *example* of college students fighting with kids in kindergarten and high school students to explain grey relation. When they fight, college students are relatively likely to win. As a result, the college students' value of grey relation is 0.9, while it is .1 for kids in kindergarten. But if college students fight with high school students, the former has to pay much effort. Thus, the college students' value of grey relation is .8 while it is .7 for high school students. The relative concept about grey relation is derived from this example. The closer the value is, the less distance they are. The higher value stands for higher level of importance. The study also calculates the value of grey relation and figure out key factors which values are higher.

3. Questionnaire and sampling

Choices in the questionnaire are based on relevant documents and the authors' adjustments through participating in TTQS evaluation and assisting enterprises. Answers are chosen from one (least important) to five (very important) using five-point Likert scale.

Table 4. Grading scale of ISO system, IIP system and TTQS.

System		Questionnaire
ISO	1.	Executive manager's support and determination
	2.	The staff's participation and recognition
	3.	Educational training and staff quality
	4.	Selection of tutoring units
	5.	Customers' demand orientation and communication
	6.	Usage of information system
	7.	Planning carefully and implement thoroughly
	8.	Current system (ex: ISO) and previous successful experiences
	9.	Implement of document management and document system
	10.	Confirmation of examination and correction
IIP	1.	Service measures to enterprises are market demand
	2.	Connection with enterprises' organizational performance
	3.	Professional reliance on consultants and committees
	4.	Professional personnel in human resource as key members
	5.	Interior strategic communication is clear and deep
	6.	Property and a sense of belongings to the organization. Turnover rate is lowered
	7.	An important management tool for transformation in an organization
	8.	Integration with organizational culture
	9.	Continuous improvements in the enterprises
TTQS	1.	Envision, mission and strategy
	2.	Identified training goals and plans needed
	3.	Clear training policies in an enterprise
	4.	Fields of clear core training in yearly training sessions
	5.	Complete system of educational training management
	6.	Ability to analyse and explain the job is required
	7.	Connections between training plans and organizational performance
	8.	Professional human resource department or training division
	9.	Ability to value the proficiency and offer embodied brochure
	10.	Clear standards of valuation on training products (tutors, materials and outsource training companies)
	11.	Ideas from trainees are taken into training programs
	12.	Planning training demand based on company's training goals
	13.	Detail plans for training programs
	14.	Build up a systematic SOP for training purchasing or expatriates
	15.	Complete selection systems of trainees and tutors are set
	16.	Plans for learning and action-taking on employees are conducted before training
	17.	Practical opportunities and knowledge sharing are provided after training
	18.	Training department has the ability to manage training files
	19.	Information system for educating and training
	20.	Hold meetings of training outcome review and evaluate reports regularly, and adjust the courses according to the results for next time
	21.	Record all the unusual process as the review for the training in the future
	22.	Make sure the evaluations of diverse training results are completely recorded
	23.	Training courses can effectively improve the work behaviour
	24.	After the employees participating the training, they can effectively promote the organizational performance
	25.	Link the employees' training results with salary, evaluation and promotion
	26.	Training can effectively enhance the competitive advantage and business performance
	27.	Companies can put the training results into corporate social responsibility

The questionnaire is divided into two parts. The first part is demographic variables, including gender, age, education, profession and seniority of committee or consultants. Second part is grading scale of TTQS. In order to make the questionnaire and content

more clearly, the fourth choice is 'selection of tutoring unit' and the fifth is 'customer demand orientation and communication' in ISO system. In IIP system, the third is 'professional reliance on consultants and committees'. The fifth is 'interior strategic communication is clear and deep' and the seventh is 'an important management tool for transformation in an organization'. The eighth is 'integration with organizational culture' and the ninth is 'continuous improvements in the enterprises' (Table 4).

The survey method has three interrelated advantages. The first advantage is that through this method we aimed to come up with conclusions referring to the main KSFs for implementing TTQS. The most important KSFs are another point that from methodological perspective enterprises answered the survey and that were reliable respondents from different position managers. Therefore, the survey obtained a variety of responses that include different views on KSFs for implementing TTQS. It was important and feasible for such KSFs issues to be accessible to these middle and high-level managers. However, this also related with the theoretical implications and importance of middle and high-level managers in TTQS. The importance of these respondents has been underlined to be crucial. Hence, a survey of a wide range of enterprises offers evidence towards the KSFs to implement TTQS.

The second advantage of the quantitative or surveying approach aimed to provide a wide range of data of KSFs to implement TTQS in different cases and it can obtain two things. One is the comparative analysis of the gathered data and the other is the comparison of KSFs to implement successfully TTQS.

Finally, the third advantage of such approach is that a survey can explore not only firm responses, attitudes and the most important KSFs, but also new conditions introduced by the TTQS approach that enterprises in this country can implement. Through the survey, a variety of information has been collected referring to issues that are directly or indirectly related to TTQS.

The target readers for this research are TTQS committee and consultants. A total of 97 questionnaires were sent. Seventy-five of them were returned. The rate of return was 77.3%. Seventy-three valid questionnaires were analysed while of them were invalid. The rate of validity was 97.3%.

4. Analysis

The analysis is done as follows. First, interpret according to basic information about the interviewees. Next, discuss key factors with analysis of GRA. Third, explain KSFs after enterprises adopt TTQS.

4.1. Interpretation of collected samples

The basic profiles of respondents include gender, age, educational level, professional qualification and experience, as shown in Table 5.

The questionnaire has been sent to a total of 97 people and 73 valid answers have been received, which yields 75.3% of the total sample size. A brief analysis is summarized as follows.

Firstly, the respondents were majority male with a total of 61 people, accounting for 83.56% of all the respondents. There were only 12 female respondents, accounting for 16.44%, showing that in the studied region, TTQS assessment members or counsellors are still male dominant.

Table 5. The basic profiles of respondents.

Basic info	Item	Number	Percentage (%)
1. Gender	Male	61	83.56
	Female	12	16.44
2. Age	Below 30	0	0
	31–40	13	17.81
	41–50	31	42.46
	Over 51	29	39.73
3.Educational background	Upper secondary	0	0
	Bachelor	5	6.85
	Master	47	64.38
	Doctor	21	28.77
4.Professional qualification	Assessment committee member	54	73.97
	Counsellor	19	26.03
5. Experiences	1 year	15	20.55
	2–3 years	22	30.14
	4–5 years	21	28.76
	Over 5 years	15	20.55

Secondly, in terms of age, no respondents were under 30 years old. Respondents between 41 and 50 years old were the majority with a total of 31 people, accounting for 42.46%. While there were 29 people over 51 years old, accounting for 39.73%. There were only 13 respondents between 31 and 40 years old, accounting for 17.81%. In overall view, respondents over 41 years old accounted for as much as 82.19%.

Thirdly, the education level of most respondents is master's degree with a total of 47 people, accounting for 64.38%, followed by doctorate with a total of 21 people, accounting for 28.77%. There were only five people with bachelor's degree, representing 6.85%. No respondent has education level of upper secondary or below.

Fourthly, in terms of professional titles, the main categories are assessment committee member and counsellor. In this case study, majority respondents were assessment committee members with a total of 54 people, accounting for 73.97% of all respondents. The other 19 people were counsellors, accounting for 26.03%.

Finally, in terms of experience, the largest group of 22 respondents has two until three years, accounting for 30.14% of all respondents. Second largest group of 21 people has for until five years, accounting for 28.76%. The smallest group has both experience of one year and over five years, each counts 15 people accounting for 20.55%. It can be seen that majority respondents have experience between two and five years with a total of 43 people, accounting for over half.

4.2. Outcomes of GRA

Values of grey relation are plotted on the X axis. Similar values are grouped. Fourty-six key factors are divided into six groups. Figure 1 shows the distribution of relation.

Daniel (1961) points out that, 'An enterprise has to achieve 3 to 6 KSFs to survive and succeed in the industry. If it lacks these key factors, it is likely to fail'. As a result, there are three to six factors chosen in all questions based on this principle.

In the first group, there is only one factor, which cannot satisfy the requirement of three to six KSFs. So, we move on to select factors from the next group. In the second group, there are three factors. Including the one factor in the first group, together there are four factors which can satisfy the requirement in total. If we continue to select

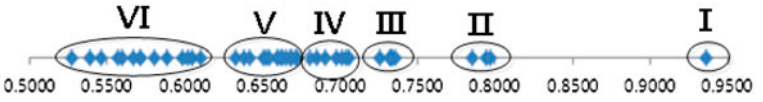

Figure 1. Distribution chart of grey relation among 46 key factors.

factors in the third group, it exceeds the standard of six factors. According to No. 1, 14, 5 and 3 sorted by grey relation in Appendix 1, Table 6 shows ISO System, IIP System and TTQS based on these four key factors.

4.3. Practical analysis of KSFs after TTQS adopted

Nine enterprises that passed the evaluation and won gold medals after adopting TTQS in 2011 are presented as case examples to compare the results analysed with the GRA

Table 6. Lists of KSFs and practical measures.

No.	KSFs	12 Practical ways	Grey relation	Grey relational sequence	System
1	Executive manager's support and determination	1. Show executive managers' support for training 2. Clear training policies and promises 3. Organize professional training personnel and implement training outcomes evaluation. Executive managers take in charge of tracking outcomes	.9361	1	ISO
14	Identified training goals and plans needed	4. Clear KPI and analysis of competency 5. Implement training demand and survey on yearly educational training sessions 6. Quantify training goals and rewards	.7968	2	TTQS
5	Connection with enterprises' organizational performance	7. Build up a complete system of competency qualification 8. Build up diverse training evaluation system 9. Connect training outcomes with salary, checking or promotion	.7945	3	IIP
3	Continuous improvements in the enterprises	10. Implement review sessions which record feedbacks and suggestions from trainees 11. Build up constant checking system, track training outcomes and improve constantly 12. Wind up training programs as the reference for future improvements	.7854	4	IIP

and the four selected key factors. It shows these enterprises which have been awarded gold medals from TTQS have the consistent ideas and relevant actions with the four key factors selected. The KSFs are found through the questionnaire results from the nine firms, and then the results are verified by revisit the nine firms to study the suggested actions, and totally 12 feasible practices have been summarized to achieved the KSFs, which are shown in Table 6.

The highest relative weight is executive manager's support and determination. It is also one of the key factors to reach gold medal after enterprises successfully pass TTQS evaluation. There are four companies whose executive managers greatly support the training and consider that promoting quality of personnel is beneficial to the enterprises. Some of the enterprises even set up personnel in charge of training and inspecting its performance. Secondly, enterprises need to build up identified training goals and plans and have a face-to-face interview with individuals according to the goals. What is more, the yearly individual training plan is needed to form a further yearly educational training plan.

Next, connection with enterprises' organizational performance and continuous improvements in the enterprises are also key factors, for example, to evaluate each index on training programmes based on yearly key performance indicators (KPIs) and call for follow-up meetings to examine the outcomes, or hold routine training conferences to discuss relevant issues as references for future improvements. Especially, the concluding reports after training can be integrated into checking and analysis report. Thus, enterprises can monitor the actual situations of trainees.

The logic connection of these four factors being the KSFs of implementing TTQS is similar to the process of making a strategic plan. Firstly, only if the company is willing to continuously improve the enterprises, they would set the training goals and plans that will lead the way where the company is going. Secondly, management people need to have determination and to support the implementation of all the tactics. Finally, the results should be connected with enterprises' organizational performance evaluation to ensure all the employees will work hard to achieve the goals.

A more elaborated explanation is as follows.

(1) Executive manager's support and determination

For training without the full support of executives, companies will not be able to maintain the continuity of operations and evolution. Therefore, the support of executives is the driving force of training activities. In Section 2 literature review, it can be also found that for any project or action to be successful in a company, the support and determination of top executives is a KSF. This also applies to the successful adaptation and evaluation of TTQS. This finding is in accordance with Chen (2008), Hockman, Grenville, & Jackson, (1994) and Michael (2001).

(2) Identified training goals and plans needed

To ensure the results of training, prior to performing training courses, the training survey needs to be implemented, which includes gap analysis of the organizational performance and current functional status. The curriculum planning is based on discussion with the trainees to clarify the training objectives, assess training effectiveness, set after-training studies or action plans to ensure the effectiveness of the training. From the assessment of nine companies which have received gold medals, the study shows these

enterprises or organizations have all set training goals and plans which need improvement to meet their business objectives.

(3) Connection with enterprises' organizational performance

Organizational performance analysis is very important. Only through the analysis it is possible to find out whether the problem is the inadequate capability and understand the gaps in the functions of the staff. The 'plan' indicators of TTQS are connected with 'design' indicators, which expand curriculum design, transfer the training implementation to the training outcome assessments, and connect closely the training and organizational performance.

(4) Continuous improvements in the enterprises

Facing technological change and highly competitive environment, enterprises cannot sustain their operations and will face elimination without continuous improvements (Liu, 2013). Therefore, it is very important to pursue continuous improvement and deeply root such concept and attitude into every member's heart. Most enterprises or organizations which have awarded TTQS gold medals utilize the training to improve the function gaps, and let them understand the development of employees is important. This is because the investment in staff development will result in improving themselves for learning more skills and enhancing expertise, and thus create more reward for the enterprises, which, in turn are willing to spend more time to focus on staff development, forming a virtuous circle. Such action makes the needs of enterprises and employees become more consistent, thus forming common visions and goals.

4.4. Generalization of the results

The research has found that it is possible to generalize through the web platform to guide practitioners to implement the four KSFs by the following three practices:

(1) It provides successful experiences and practices as references to more people. Those who want to use TTQS system can refer themselves and compare their own practices with the references to understand the gaps and make up for deficiencies.
(2) It offers an interactive discussion area for those who are using TTQS system can introduce their current practices and invite other professionals to provide comments or suggestions for improvement.
(3) It offers an automated scoring system, so that people who are using TTQS system can report the practices currently in use which will be scored by the system, allowing the users to understand the performance of the current practices.

When the practitioners find their TTQS performances are not good, they will likely share their own experience on the web platform and discuss with other professionals, who will in turn provide suggestions and guidance, thus lead to a better performance. On the other hand, they can also obtain self-evaluation through the automated scoring system, and once they find their current practices have lower scores they can immediately start improving from the suggested areas, i.e. the four KSFs found in this study. Through these methods, the success rate of implementing TTQS can be improved, and the results of this study can be verified. In summary, the results of this study can be generalized.

5. Conclusions

The contribution of this study is to find out four KSFs with 12 concrete practices verified by nine enterprises which passed the TTQS evaluation and won gold medals as guidelines for other enterprises. In order to strengthen the training quality and enhance labour quality, enterprises are proposed to implement these 12 practices as shown in Table 6. Apart from achieving improved evaluation, decreasing competence gaps of employees, and raising organizational performance and promoting competitiveness can be also achieved. Besides, with the spirit of TTQS, two advices are presented. One is that the four selected KSFs should be focused and emphasized on their relative weights to push the evaluated units to pay more attention to these indexes. If these KSFs can be promoted, it is more efficient to implement TTQS. The other one is that continuous feedbacks and corrections are needed to ensure the successful adoption of TTQS, which will help to strengthen the training quality in enterprises. However, there are still some limitations in this research. The features of SMEs in Taiwan have not been taken into consideration. The sample size is relatively small and only focuses on Taiwanese companies, and this study only covers TTQS, but not IIP or ISO 10015. Therefore, the results may not be directly transferred to other countries. In the future research, analysis of variance may be conducted to analyse the significance of respondent categories as well as the case data, larger samples can be used, and the KSFs in other countries can be compared.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix 1. List of grey relation analysed by GRA

No.	Key factors	Rank of grey relational sequence	Grey relation
1	Executive manager's support and determination	1	.9361*
14	Identified training goals and plans needed	2	.7968*
5	Connection with enterprises' organizational performance	3	.7945*
3	Continuous improvements in the enterprises	4	.7854*
38	Staff with training to enhance organizational performance	5	.7352
12	The staff's participation and recognition	6	.7333
16	Fields of clear core training in yearly training sessions	7	.7326
37	Training sessions efficiently promote jobs	8	.7318
13	Envision, mission and strategy	9	.7260
19	Connections between training plans and organizational performance	10	.7055
33	Call for checking meetings on training outcomes and evaluation as references for future sessions	11	.7044
40	Training outcomes enhance competitive strengths and managerial performance	12	.7009
8	Interior strategic communication is clear and deep	13	.6973
46	Implement of document management and document system	14	.6903
26	Clear programs of training programs	15	.6848
39	Connection with training outcomes with salaries, checking or promotion	16	.6804
6	Professional reliance on consultants and committees	17	.6723
29	Plans for learning and action-taking on employees are conducted before training	18	.6715
2	Confirmation of examination and correction	19	.6689
36	Complete records of diverse training outcomes	20	.6676
11	Integration with organizational culture	21	.6652
25	Planning training demand based on company's training goals	22	.6621
7	Professional personnel in human resource as key members	23	.6621
15	Clear training policies in an enterprise	23	.6621
17	Complete system of educational training management	25	.6598
10	An important management tool to transformation in an organization	26	.6594
41	Leading to corporate social responsibility	27	.6539
23	Educational training and staff quality	28	.6525
44	Planning carefully and implement thoroughly	29	.6507

(*Continued*)

Appendix 1. (*Continued*)

No.	Key factors	Rank of grey relational sequence	Grey relation
20	Professional human resource department or training division	30	.6417
42	Customers' demand orientation and communication	31	.6378
30	Practical opportunities and knowledge sharing are provided after training	32	.6324
22	Clear standards of valuation on training products (tutors, materials and outsource training companies)	33	.6097
18	Ability to analyse and explain the job is required	34	.6050
31	Training units have the ability to manage files	35	.6018
35	Record unusual process as references for future checking	36	.5982
32	Information system of education training	37	.5888
24	Ideas from trainees are taken into training programs	38	.5799
9	Property and a sense of belongings to the organization. Turnover rate is lowered	39	.5716
21	Ability to value the proficiency and offer embodied brochure	40	.5708
34	Selection of tutoring units	41	.5666
45	Current system (ex: ISO) and previous successful experiences	42	.5594
43	Usage of information system	43	.5572
27	Build up a systematic SOP for training purchasing or expatriates	44	.5457
28	Complete selection systems of trainees and tutors are set	45	.5388
4	Service measures to enterprises are market-demand	46	.5274