Integrating Quality Function Deployment with ISO 10015 to Discuss the Quality of Human Capital

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ABSTRACT

Human capital is the foundation for organizational improvement and innovation. Lots of organizations have been relentlessly focusing on education and trainings for employees to increase employees' capabilities and organization's performance. The objective of this study is to integrate QFD and ISO 10015 to set up a framework of human capital management by applying ISO 10015 as a planning tool to systemize the training processes such that an organization can be easily to track the benefits of trainings. Through the proposed framework, organizational needs and human capital can be linked to examine the effectiveness of education and trainings as well as the improvement of organization's performance.

Keywords: Quality Function Deployment, Human Capital, ISO 10015

1. Introduction

Globalization and rapid technological development have changed the competition environments for organizations. Human capital management becomes an important issue for gaining competitiveness. Lots of organizations have been relentlessly investing the resources in education and trainings for their employees. Major companies in North America and Europe have spent up to 2% to 3% of the total payroll on training amounting to millions of dollars. Besides, considerable amounts of money are spent on training worldwide. For example, US employers in the private sectors spent 55.3 billion US dollars on formal training in 1995, representing 569 US dollars per employee annually. In 2001, the investment on formal training has risen to 677 US dollars per employee [Saner and Yiu, 2003a, 2005]. From the above observations, the investment of training can be seen as an important strategy and is essential for organizations to examine the quality of human capital.

Examining the effectiveness of education and training is critically important for human capital management. Organizations can increase employees' capabilities and organization's performance by education and trainings. ISO 10015 provides a well-defined training process that helps an organization to plan and evaluate the effectiveness of training by better improving the employees' capabilities systematically. In addition, with better human capital management, a company is likely to generate more business values by satisfying customer requirements. Quality function deployment (QFD) is one of the very effective tools that can be used to meet customer requirements that make the product quality consist with customer requirement [Chan and Wu, 2002].

In the past, studies related to ISO 10015 only concentrate on introducing the concepts and contents without further discussing the implementation process [Yiu, 2005]. There is a lack of an implementation process for human capital management systematically. Thus, this study intends to integrate QFD and ISO 10015 to set up a framework of human capital management by utilizing ISO 10015 as a planning tool to systemize the training processes such that an organization can be easily to track the benefits of trainings. Through the proposed framework, organizational needs and human capital can be linked together to evaluate the effectiveness of education and trainings and the improvement of organization's performance.

2. Quality Function Deployment

QFD is an important tool for translating customer requirements into product features. It helps the product development team systematically to relate the customer needs that represent the overall customer

concerns to the design requirements. Akao [1990] defines QFD as "a method for developing design quality aimed at satisfying the customer and then translating the customer's demand into design targets and major quality assurance points to be used throughout the production phase." On the other hand, Hauser and Clausing [1988] defined QFD as follows: "quality function deployment focuses and coordinates skills within an organization, first to design, then to manufacture and market goods that customers want to purchase and will continue to purchase."

All of the customer needs and design requirements can be described in a house of quality (HOQ). The basic concept of HOQ, as shown in Fig. 1, has six major steps, i.e., (1) customer needs (WHATs), (2) planning matrix, (3) technical measures (HOWs), (4) relationship matrix between WHATs and HOWs, (5) technical correlation matrix, and (6) technical matrix. For further information about HOQ, please refer to Wu and Shieh [2006], Chan and Wu [2002-03], Gryna [2001], Wu *et al*. [2005], Chan *et al*. [1999].

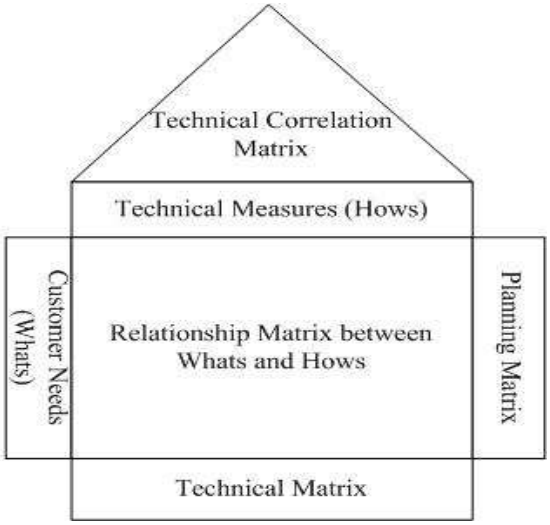

Figure 1: House of Quality

QFD has been successfully used to assist decision making in product design and development in various types of production and to link the customer requirements and product design information by a structured framework to satisfy customer needs. Moreover, QFD can be applied to analyze the relationship between employees' behaviors and customer satisfaction and then improve performance and customer satisfaction by modifying internal organization's behaviors [Hanna *et al*., 2004].

Very few studies have been found to use QFD as a planning tool to discuss the quality of human capital and human resources. Franceschini and Terzago [1998] have applied QFD for the design of a theoretic practical training course, with the purpose of giving a well-defined knowledge target to all the participants. This study, however, does not sufficiently provide a complete process of training from planning, implementing to evaluation. Wood [1993] believed that to better manage human resources, it is critically important to analyze the gap between employees' expectations and company resources. In addition, QFD can be a tool to fulfill a set of employees' expectations in the areas of career growth, compensation and recognition. This study only describes the company's needed capabilities to satisfy employees' expectations without further discussing the enhancement of the company's capabilities.

The applications of QFD in human resources mainly focused on the training courses planning from employees' viewpoints and employees' expectations. Obviously, there is a lack of an implementation process for human capital management by QFD. Therefore, this study intends to use QFD, a well-structured planning tool, to link with the decision information effectively to integrate QFD and ISO 10015 to set up a framework of human capital management.

3. ISO 10015

ISO 10015 was intended to identify and develop key quality elements in a well-planned, cost-effective education and training system. The ISO 10015 standard document can be an effective tool for setting up an education and training system of human resources [Basil, 2001].

An organization can enhance its competitive advantage by continually improving the quality of human capital to improve performance. Examining the effectiveness of education and training is

important for human capital management. An organization needs a comprehensive development process for education and training, while ISO 10015 offers an appropriate training design and effective learning processes to improve an organization's performance and productivity.

ISO 10015 defines training as a four-step process: (1) defining training needs, (2) designing and planning training, (3) providing the training, and (4) evaluating the training outcomes. Each step is connected to the next in an input-and-output relationship, depicted in Fig.2. ISO 10015 helps to specify the operational requirements for each step and establishes procedures to monitor the process [Saner and Yiu, 2003a].

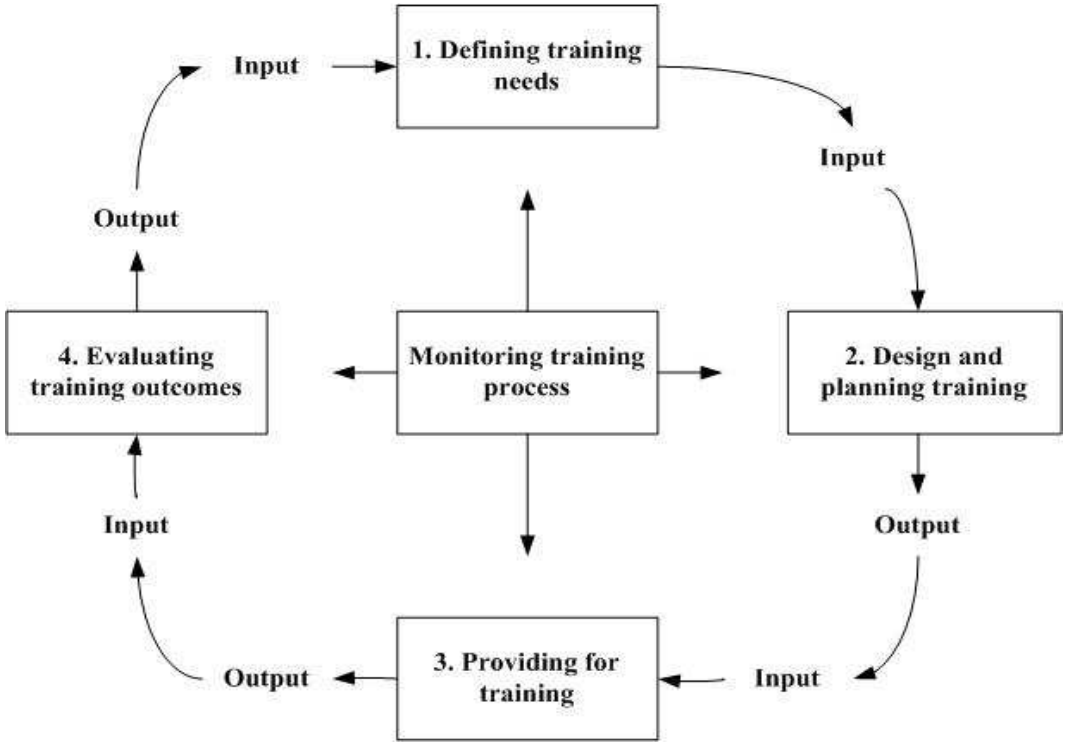

Figure 2: The process of training

4. A Framework of Integrating QFD with ISO 10015

Employees' knowledge and skills can be enhanced by education and training. Moreover, the effectiveness of training can be evaluated by the differences between before and after the education and training. The benefits for an organization can be determined if an organizations' knowledge can be accumulated to enhance the organization's synergy by employees' knowledge diffusion.

Different employees need different training requirements. QFD can be applied to translate training requirements into specific training items. The purpose of education and training is to improve employees' skills and work performance. Thus, continuous conducting the training courses and evaluating the effectiveness is an essential process for an organization. ISO 10015 provides a well-defined training process to improve the training quality by relentlessly monitoring the process to meet the training requirements. Therefore, a framework can be set up to integrate QFD and ISO 10015 for human capital management.

The proposed framework is first to construct HOQ for customer requirements (HOQCR) and HOQ for employees' execution (HOQEE). Later, these two HOQ constructs are integrated under the ISO 10015 process. The HOQCR is built up by extending the original QFD concept in the relationship matrix between WHATs and HOWs. By identifying and then analyzing the gap between employees' executions and customer requirements, the training requirements are defined. HOQCR, depicted in Table 1, is to meet customer needs by prioritizing the importance of employees' executions. The first step is to collect customer requirements (denoted as CR) from the company and then to translate these CR into employees'

executions (denoted as eE). The second step is to prioritize these customer requirements. Evaluating the relationship matrix between CR and eE is the third step. Each relationship is measured by strong, medium, weak, and none with the numerical values of 9, 3, 1, and zero, respectively.

		employees' Execution						Analysis of employees' Execution requirement		
Customer Requirements	Customer Weight	eE_1	eE_2	....	eE_j	....	eE_m	Importance of CRs	degree of Execution requirements	strength of employees' Execution
CR_1	CW_1	Relationship Matrix between Customer Requirements and employees' Execution (R_{ij})								
CR_2	CW_2									
⋮	⋮									
⋮	⋮									
CR_i	CW_i									
⋮	⋮									
CR_n	CW_n									
Sum of the Weight		EW_1	EW_2	....	EW_j	....	EW_m			

Table 1: The HOQ for Customer Requirements

The fourth step is to analyze the requirements of employees' executions by identifying how many eE inputs are required for each CR in order to satisfy customer requirements. The analysis of employees' execution requirements is composed of three columns, namely importance of CRs, degree of execution requirements, and strength of employees' execution. In the column of importance of CRs, customer requirements are determined by their respective weights. The CR with higher weight is considered to be more important. The column of degree of execution requirements is to count the number of eE items for each CR. If a particular CR is related to two eE items, the score is set to two. Finally, the column of strength of employees' execution is to sum up the numerical scores for each CR.

When the relationship matrix is determined, the importance score for each eE is calculated as execution weight (EW) by the following equation:

$$EW_j = \sum_{i=1}^{n} CW_i R_{ij} \quad (1)$$

By Equation (1), the gap of employees' execution can be determined by the execution weight. The organization can examine the most important employees' execution through execution weight to identify training requirements.

When HOQCR is completed, the next procedure is to perform HOQEE as shown in Table 2 by planning critical items to improve employees' executions. The procedure of constructing HOQEE is quite similar to that of constructing HOQCR. The first step is to use employees' execution items from HOQCR, translate these items into training items (denoted as T_i), and then check the relationship matrix (denoted as R_{ij}). Each cell in the relationship matrix represents how each eE relates to each T_i, where numerical values of 9, 3, and 1 depict the strong, medium, and weak relationships, respectively. The cell is left blank if no relationship at all.

Table 2: HOQ for Employees' Execution

		Training items						Analysis of training input		
employees' Execution	Executive Weight	Ti_1	Ti_2	....	Ti_l	....	Ti_k	Importance of employees' Execution	Degree of training item input	Strength of training input
eE_1	EW_1	Relationship Matrix between employees' Execution and Training items (R_{jl})								
eE_2	EW_2									
⋮	⋮									
⋮	⋮									
eE_j	EW_j									
⋮	⋮									
eE_m	EW_m									
Sum of the Weight		TW_1	TW_2	....	TW_l	....	TW_k			

When eE and Ti are organized and prioritized, the next step is to perform the analysis of training input to determine how many T_i inputs for each eE to improve employees' execution. The analysis of training inputs consists of three columns, i.e., importance of employees' execution, degree of training item input, and strength of training input. In the column of importance of employees' execution, each eE is prioritized by EW. The eE with higher weight sorted by EW is considered to be more important. The column of degree of training item input is to count the number of T_i items for each eE. If a particular eE is related to two T_i items, the score is set to two. Finally, the column of strength of training input is to sum up the numerical scores for each eE.

After the relationship matrix is determined, the importance score for each T_i is calculated as training weight (TW) by the following:

$$TW_k = \sum_{l=1}^{k} EW_j R_{jl} \tag{2}$$

By Equation (2), the priorities of the training items planning can be identified according to TW scores. The organization can examine the most important training item through TW to plan and design training items.

The framework of human capital management can be constructed by integrating HOQCR and HOQEE into ISO 10015 processes. To further evaluate the training outcomes, Kirkpatrick [1959] has proposed a four-level model of evaluating training outcomes, including reaction level, learning level, behavior level, and results level. To evaluate the short-term training outcomes, reaction level can be applied to measure if the training is successful. For the long-term training outcomes, four levels can be used to determine if the training is paid off. Fig. 3 depicts how QFD can be integrated with ISO 10015 processes by linking training investments to the organizational performance. The proposed framework possesses the advantage of identifying and defining training requirements clearly through integrating the HOQCR. Those training requirements can be easily planned through HOQEE. After the training is performed, a four-level model proposed by Kirkpatrick [1959] can be utilized to determine if the training outcome is satisfactory in both short- and long-term ranges.

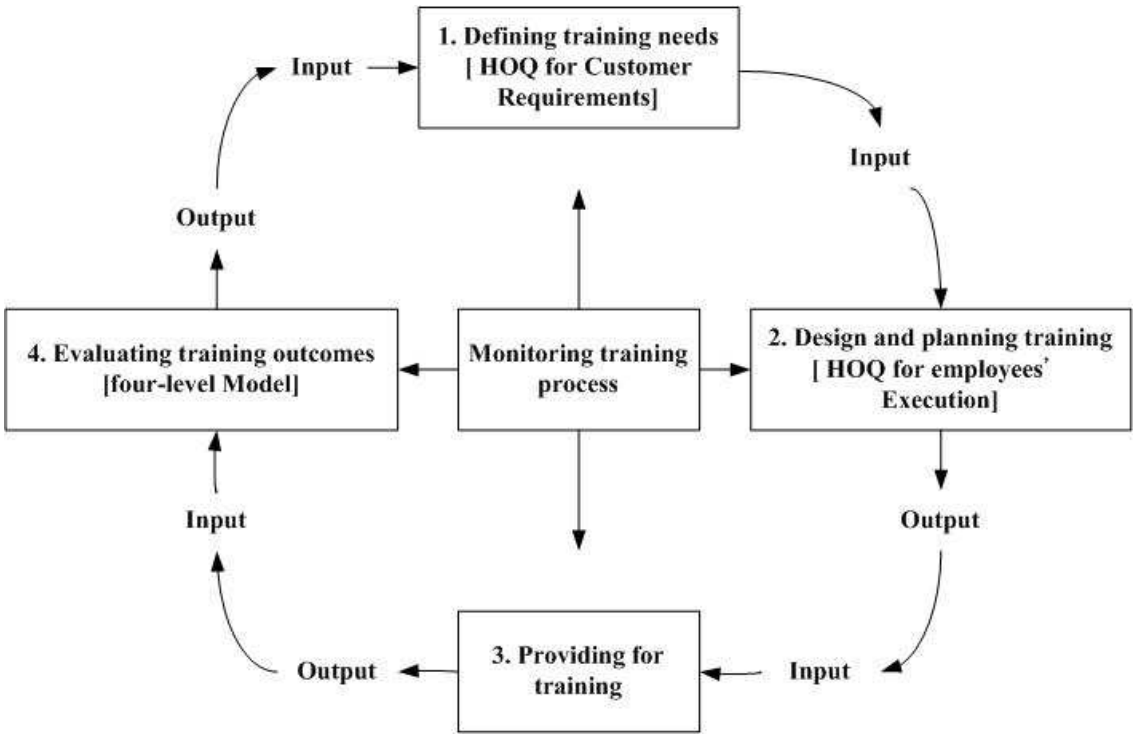

Figure 3: Integrating QFD and ISO 10015 Process

5. Conclusions

Organizations can use employees' knowledge, experiences and skills to produce the enterprises' values. Lots of organizations have been relentlessly focusing on education and trainings for employees to increase employees' capabilities and organizations' performance. Therefore, this study has proposed a framework to integrate QFD and ISO 10015 for human capital management by applying ISO 10015 as a planning tool to systemize the training processes such that an organization can be easily to monitor the benefits of trainings.

The proposed framework provides a means to improve the quality of human capital through planning, implementing, evaluating and controlling the entire processes. Besides, the framework enables the decision maker to identify the most important employee execution in order to satisfy customer requirement as well as to plans critical training items to improve employees' execution. In conclusions, integrating QFD and ISO 10015 processes provides an organization to examine the effectiveness of education and training.

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Authors' Backgrounds

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