The impact of human resource management practices on the implementation of total quality management

An empirical study on high-tech firms

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Abstract

Purpose – The perceived advantages of the implementation of TQM are generating improved quality and efficiency, increasing customer satisfaction, thus improving competitiveness. However, there is a high failure rate in the implementation of TQM. The key issue in this regard is that companies have devoted relatively little attention to human resources management (HRM). Several academics and practitioners have asserted that synergy and congruence among HRM practices are critical to the implementation of TQM. However, there is relatively little empirical evidence to support this contention. The purpose of this research is to conduct an empirical study on high-tech firms, in order to analyse the impacts of HRM practices on the implementation of TQM.

Design/methodology/approach – In this study, a research framework related to HRM practices, TQM practices, and quality performances was developed. Based on the framework, a questionnaire was designed and sent to the HR managers or chief executive officers (CEOs) of high-tech companies in Taiwan to investigate the effect of HRM practices on the implementation and practice of TQM.

Findings – The study confirms that HRM significantly affects TQM practices. The study concluded that HRM practices have a significantly positive effect on the implementation of TQM. Implementing HRM practices can also have a significant effect on employee and customer satisfaction. It also positively affected "employees' quality awareness" and "corporate image". The quality performances were also significantly affected by the implementation of TQM.

Research limitations/implications – The research limitation is that the empirical study was on high-tech firms in Taiwan only. However, the framework can be easily extended to other industries if survey results are available.

Practical implications – Overall, successful implementation of TQM can lead to an increase in customer satisfaction, and then benefit corporate image. It can also improve the satisfaction and quality awareness of employees. Enterprises that devote themselves to the implementation of TQM also need to perform HRM aggressively, if they are to increase the firm's performance significantly.

Originality/value – In this research, a conceptual framework related to HRM practices and TQM practices was developed, which is a valuable reference for future research. This study confirms the impacts of HRM practices on the implementation of TQM, and several key practices can be investigated.

Keywords Total quality management, Human resource management, Organizational performance, Taiwan

Paper type Research paper

The TQM Magazine
Vol. 18 No. 2, 2006
pp. 162-173

0954-478X
DOI 10.1108/09544780610647874

Introduction

Since the 1980s, total quality management (TQM) has become a globally implemented management technique (Trappey, 1995). Most enterprises in manufacturing and services have devoted considerable attention to the implementation of TQM. The incentives are that TQM generates improved quality of products and services, raises production performance, and reduces costs, thus improving business competitiveness (Rajagopal *et al.*, 1995; Youssef *et al.*, 1996). In addition, the quality award (for examples, Malcolm Buldrige National Quality Award, European Quality Award, and Swedish Quality Award) recipients have shown better financial results than the comparable average companies (Hendricks and Singhal, 1996; Eriksson and Hansson, 2003).

However, experience shows a high failure rate in the implementation of TQM (Gaucher and Coffey, 1993; Hubiak and O'Donnell, 1996). One of the main issues is that companies devote relatively little attention to human resource management (HRM) and considerations of personal relations. Total quality is a holistic concept, and requires the motivation of all members of an organisation to seek customer satisfaction. HRM can reinforce human relationships and group consciousness, raise employee competence, and achieve culture change; therefore, it acts as the catalyst for the implementation of TQM (Lammermeyr, 1991; Wilkinson, 1992; Oakland and Oakland, 1998; Palo and Padhi, 2005). As Morrison and Rahim (1993) and Hoogervorst *et al.* (2005) note:

> TQM hinges on the effective management of human resources.

Several academics and practitioners have asserted that synergy and congruence among HRM practices have significant effects on the implementation of TQM. For example, Wilkinson (1992) asserts that TQM has both a "hard" side and a "soft" side, and that the "soft" side emphasises the management of human resources. Evans and Lindsay (1996) agree that a total quality system is comprised of two distinct systems: the management system and the technical system. The management system is concerned with issues of HRM. Gunasekaran (1999) develops a conceptual model for the implementation of TQM. The model presents seven major strategies in the successful implementation of TQM. Of these, six are related to HRM. However, there is little empirical evidence to support the effect of HRM on TQM implementation. The main difficulty is that it is difficult to measure, in statistical terms, the level of implementation of HRM practice and TQM practice, and the relationship between the two practices.

The present study overcomes the difficulty in measurement by using a questionnaire survey of HR managers and other senior managers of high-tech companies in Taiwan to quantify the effect of HRM practices on TQM practices and the implementation of TQM. The reasons for choosing senior management of high-tech companies as the survey target are:

- HR managers and upper management have more objective perceptions of the implementation levels of HRM and TQM, and the impact of HRM practices on TQM (Harel and Tzafrir, 1999); and
- high-tech companies have higher levels of implementation of HRM practices and TQM practices than do other companies (Luker and Lyons, 1997).

Conceptual framework and objectives

There are many definitions of TQM; interestingly, no single definition can express the whole picture (Eriksson and Hansson, 2003). For example, Short and Rahim (1995) and Boon *et al.* (2005) view TQM as a programme or a system, but as a set of philosophies and methods used by an organisation to guide it in continual improvement in all aspects of its business. Ross (1993) and Yang (2005) assert that TQM is an integrated management philosophy and a set of practices that emphasises, among other things, continuous improvement, meeting customers' requirements, reducing rework, long-range thinking, increased employee involvement and team-work, process redesign, competitive benchmarking, team-based problem-solving, constant measurement of results, and closer relationships with suppliers. Boaden (1997) views TQM as one element of cultural change, along with human business process re-engineering. Hellsten and Klefsjö (2002) and Hansson and Klefsjö (2003) define TQM as "a management system in continuous change, which is constituted of values, methodologies and tools, the aim of which is to increase external and internal customer satisfaction with a reduced amount of resources". All the views above indicate that although various researchers approach the issues of TQM from different perspectives, there is still a general consensus regarding the essential principles, practices, and values of TQM (Ahire and Golhar, 1996; Hellsten and Klefsjö, 2002; Yang, 2003).

The levels of implementation of HRM and TQM depend on what practices are adopted and the implementation of these practices. A review of the literature (Ulrich, 1997; Harel and Tzafrir, 1999), and interviews with HR managers of high-tech companies, reveals that the main practices of HRM are as illustrated in Figure 1. On a similar basis, a literature review (Powell, 1995; Hermel, 1997; Quazi *et al.*, 1998), and interviews with senior management, reveals 16 main practices in TQM, also illustrated in Figure 1. In the present study, discussion of the "practices of HRM" or the "practices of TQM" will emphasise the process of implementation (while recognising that the process of implementation influences the results of implementation). For example, in addition to business results, the assessment criteria for the European Quality Award (EQA) also focus on people satisfaction, customer satisfaction, and the impact on society (Rajagopal *et al.*, 1995). These results are also influenced by the process of implementation of HRM (Yeung and Berman, 1997). Because the business results are affected by many factors – such as research and development (R&D), production, and the status of the market – these factors result in a synergistic effect on business results.

It is difficult to evaluate the effect of HRM on business results accurately. The present study therefore restricts itself to four criteria. The first three are the EQA criteria of:

(1) People satisfaction.

(2) Customer satisfaction.

(3) The impact on society (although it should be noted that the present study uses the item "corporate image", rather than "impact on society", because it is difficult to assess the impact on society of a company).

In addition to the three EQA-derived criteria, the present study also adds the fourth criteria – "employees' quality awareness". The conceptual framework of the research is illustrated in Figure 1.

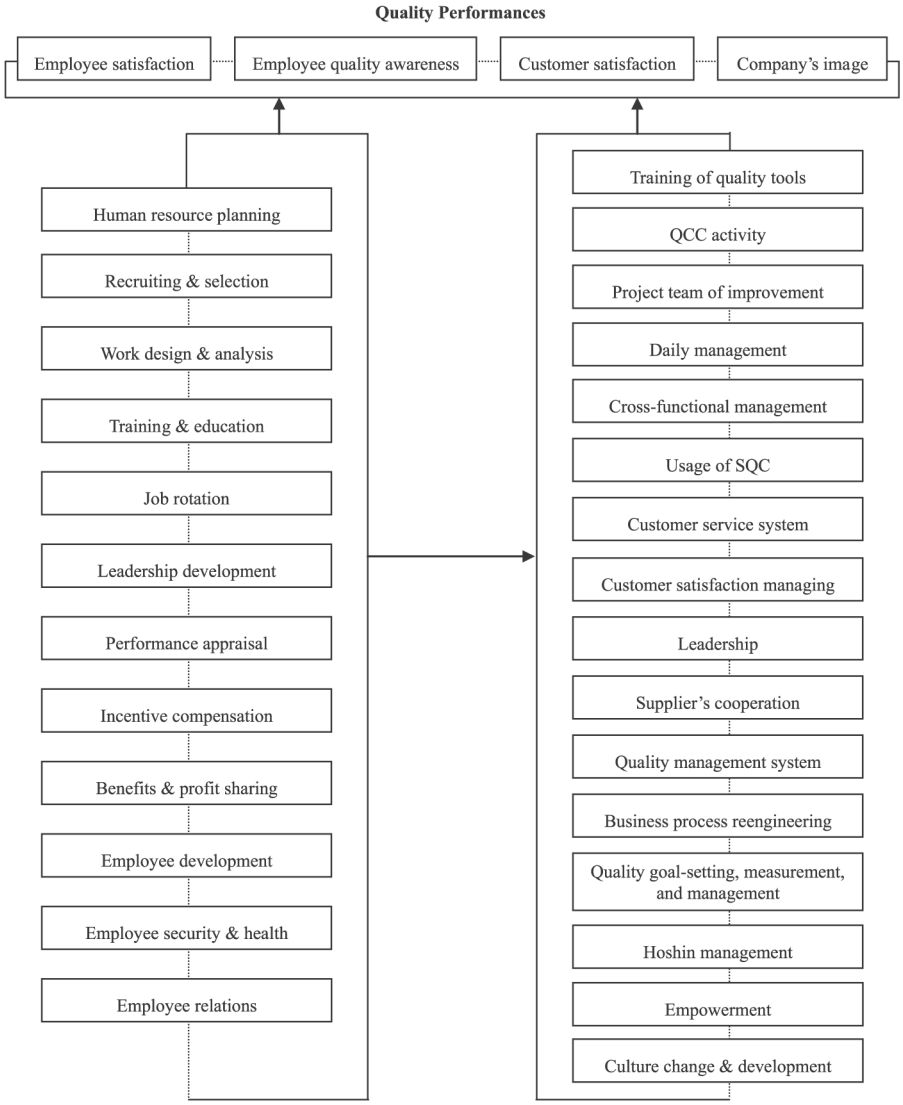

Figure 1.
The framework of this research

The objectives of this study are therefore:

- to investigate the relationships between HRM practices and TQM practices, and the relationships between HRM practices and quality performance;
- to investigate the effect of HRM practices on the implementation of TQM, and on quality performance; and
- to investigate the effect of the implementation of TQM on quality performance.

Methodology

The questionnaire included questions on:

- the basic data of the respondent and the company;
- the implementation maturity of each HRM practice;
- the implementation maturity of each TQM practice;
- the impact of HRM practices on the implementation of TQM practices and quality performance; and
- the resulting influences of TQM practices on quality performance.

The questionnaire employed a five-point scale – from 1 ("is not implemented at all") to 5 ("is implemented completely") to evaluate the implementation maturity of each HRM practice and TQM practice. Another five-point scale – from 1 ("no effect at all") to 5 ("very significant effect") evaluated the effect of HRM practices on the implementation of TQM and quality performances, and the effect of TQM practices on quality performances.

The study focused on high-tech companies because, in general, high-tech companies have devoted relatively more attention to the implementation of HRM practices and TQM practices than have other enterprises (Luker and Lyons, 1997). Although there is no precise definition of high-tech industries (Luker and Lyons, 1997), companies located in the Science-Based Industrial Park in Hsinchu – the so-called "Silicone Valley" of Taiwan – were selected as the research sample. At the initial stage of research, the author interviewed HR and quality managers, as well as the CEOs of several high-tech companies, in order to understand the practices used in human resource management and total quality management, and their implementation status. Their insights also helped to confirm the effectiveness of the questionnaire design. Then, questionnaires were sent to all 300 companies located in the park. There were 62 valid questionnaires in the 64 responses, representing a response rate of 20.66 per cent, which is moderate given a relatively lengthy questionnaire.

Cronbach's alpha-values in this study were all greater than 0.80 (with a maximum value of 0.9499). The statistical result confirms the significantly high consistency of the questionnaire. In addition, a pilot test examined the reliability and validity for the factor loading analysis of the perspectives of HRM and TQM. The test results were between 0.50 and 0.90; and the explained variances were from 50.296 to 92.495 per cent. Therefore the content validity and construct validity are trustworthy.

Results and analysis

The effect of various HRM practices on TQM practices

The study first examined the effect of various HRM practices on individual TQM practices, and then investigated the effect on quality performance by using the correlation analysis. The results listed in Table I show that the implementation of HRM has a positive and significant effect on the performance of TQM – thus confirming the assertions of several academics and practitioners.

The exception is the effect from the practice of "employee relations", which has a tiny influence on all TQM practices. The possible reasoning for the insignificant effect is that most Taiwanese high-tech companies offer employees relatively higher wages and benefits, including the bonus of stock options. Given the conventional working

TQM practices and performance	HRM practices											
	Human resource planning	Recruiting and selection	Work design and analysis	Training and education	Job rotation	Leadership development	Performance appraisal	Incentive compensation	Benefits and profit sharing	Employee development	Employee security and health	Employee relations
Training of quality tools	0.322*	0.416**	0.337*	0.522**	0.172	0.412**	0.538**	0.534**	0.586**	0.533**	0.404**	0.170
QCC activity	0.581**	0.522**	0.564**	0.685**	0.378*	0.597**	0.449**	0.451**	0.294	0.513**	0.114	0.255
Project team of improvement	0.481**	0.449**	0.518**	0.518**	0.245	0.281	0.263	0.513**	0.373*	0.385*	0.157	0.058
Daily management	0.448**	0.422**	0.391*	0.513**	0.104	0.404*	0.418**	0.564**	0.451**	0.521**	0.386*	0.194
Cross-functional management	0.438**	0.474**	0.451**	0.632**	0.363*	0.461**	0.468**	0.566**	0.437**	0.460**	0.318	0.050
Usage of SQC	0.511**	0.595**	0.502**	0.594**	0.118	0.499**	0.497**	0.616**	0.545**	0.533**	0.371*	0.302
Customer service system	0.422**	0.462**	0.455**	0.470**	0.362*	0.396*	0.428**	0.545**	0.284	0.403*	0.537**	0.148
Customer satisfaction managing	0.533**	0.576**	0.558**	0.612**	0.506**	0.499**	0.483**	0.531**	0.317	0.509**	0.476**	0.166
Leadership	0.407*	0.603**	0.526**	0.609**	0.431*	0.452**	0.432**	0.515**	0.452**	0.515**	0.409*	0.267
Supplier's cooperation	0.396*	0.532**	0.433**	0.408*	0.226	0.393*	0.497**	0.499**	0.498**	0.460**	0.425**	0.109
Quality management system	0.408**	0.376*	0.374*	0.385*	0.143	0.213	0.382*	0.327*	0.445**	0.337*	0.285	0.220
Business process reengineering	0.550**	0.414*	0.396*	0.520**	0.171	0.516**	0.412*	0.456**	0.338*	0.551**	0.105	0.144
Quality goal-setting, measurement, and management	0.250	0.126	0.213	0.234	0.031	0.164	0.119	0.209	0.144	0.251	0.069	0.235
Hoshin management	0.297	0.255	0.287	0.370*	0.154	0.287	0.303	0.357*	0.172	0.340*	0.178	0.211
Empowerment	0.455**	0.502**	0.361*	0.539**	0.283	0.601**	0.527**	0.418*	0.554**	0.526**	0.239	0.096
Culture change and development	0.532**	0.539*	0.375*	0.593**	0.367*	0.629**	0.665**	0.630**	0.641**	0.658**	0.412*	0.221
Employee satisfaction	0.571**	0.548**	0.588**	0.586**	0.596**	0.589**	0.725**	0.637**	0.700**	0.710**	0.354	0.372*
Employee quality awareness	0.454**	0.440**	0.537**	0.431**	0.352**	0.415**	0.560**	0.564**	0.549**	0.439**	0.516**	0.259
Customer satisfaction	0.719**	0.655**	0.679**	0.569**	0.303	0.551**	0.648**	0.659**	0.660**	0.651**	0.450**	0.431*
Company's image	0.455**	0.480**	0.487**	0.494**	0.342	0.399*	0.527**	0.511**	0.472**	0.478**	0.397*	0.248

Notes: The numbers in the Table denote the correlation coefficients of the related TQM practices and HRM practices; asterisks denote the level of significance; *p-value < 0.05, **p-value < 0.01

Table I.
The effects of each HRM practice on individual TQM practice and individual quality performance

culture in Taiwan, as a result, a higher level of loyalty exists among employees. Only few companies have a unionised workforce, and high-tech firms usually pay less attention to the question of employee relations. They consider quality to be their primary competitive strategy, and are aggressively devoted to the implementation of TQM. The practices of "job rotation" and "employee security and health" thus have more influence on TQM practices than does the practice of "employee relations". The moderate influence of the practice of "employee security and health" on TQM practices is understandable. The practice of "job rotation" has a weaker effect on TQM practices because most jobs in a high-tech company require consistent technical skills. A job rotation system is therefore difficult to implement. Apart from these practices, the rest of the HRM practices have significant effects on most of the TQM practices.

The effect of various HRM practices on implementation of TQM

With respect to the effect of HRM practices on the implementation of TQM in Table I, the greatest influence on the implementation of TQM was the practice of "training and education", followed by such practices as "incentive compensation", "employee development", and "recruiting and selection". In the implementation of many TQM programs – such as the adoption of new quality concepts, the set-up and practice of customer satisfaction systems, the use of statistical quality control (SQC), a change in culture, and quality control circle (QCC) – employee training and education was fundamental. TQM emphasises employee involvement and teamwork, and this was encouraged by a good incentive system. Therefore, many companies promoted employees who had made good contributions to the implementation of ISO 9000 and TQM, or other important programmes. The practice of "employee career growth and development" attempted to ensure that each employee had a fair opportunity to reach his or her highest potential personally and professionally, and encouraged a sense of pride of association with a company that was devoted to the implementation of TQM in pursuit of long-term business success. With respect to the practice of "recruiting and selection", if this function performed well, the company would recruit employees with good qualifications and requisite skills – and hence facilitate the implementation of TQM. In order to check the influence extent of each HRM practice on the implementation of TQM, the cumulative value of the numbers in each column were calculated in Table I, and then the weighted value of each HRM practice was calculated by using the cumulative values. The results are listed in Table II.

The effect of implementation of HRM on various TQM practices

With respect to the effect of HRM on individual practices of TQM, the TQM practice of "culture change and development" is mostly significantly affected by HRM implementation, followed by such factors as "customer satisfaction managing", "statistical quality control", and "leadership" (see Table III). Same to the calculation in Table II, the "cultural change and development" in Table III is necessary if TQM is successfully implemented (Wilkinson, 1992). A good performance of HRM through the education, leadership, and the incentives available to employees will change the thinking and behaviour of those employees, resulting in a change of culture. Total quality is a holistic concept, requiring the motivation of all members of an organisation towards the common goal of satisfying the customers (Lammermeyr, 1991). The implementation of HRM can motivate the employees and change the culture of an

HRM practices	Degree of impacts
Human resource planning	0.0919
Recruiting and selection	0.0949
Work design and analysis	0.0881
Training and education	0.1073
Job rotation	0.053
Leadership development	0.0889
Performance appraisal	0.0899
Incentive compensation	0.1011
Benefits and profit sharing	0.0854
Employee development	0.098
Employee security and health	0.0638
Employee relations	0.0372
Total	1.0000

Table II.
The effects of various HRM practices on the implementation of TQM

TQM practices	Degree of effect by HRM
Training of quality tools	0.061
QCC activity	0.071
Project team of improvement	0.056
Daily management	0.063
Cross-functional management	0.067
Usage of SQC	0.075
Customer service system	0.064
Customer satisfaction managing	0.076
Leadership	0.074
Supplier's cooperation	0.064
Quality management system	0.051
Business process reengineering	0.060
Quality goal-setting, measurement, and management	0.027
Hoshin management	0.042
Empowerment	0.067
Culture change and development	0.082
Total	1.000

Table III.
The effect of implementation of HRM on various TQM practices

organisation committed to managing customer satisfaction through employees' involvement and continuous improvement.

TQM in manufacturing industry focuses on increasing the quality and quantity of goods in response to customer needs (Clark, 1991). SQC is an important tool for quality control, but the concept of the usage of SQC must be changed, using SQC, to prevent defects – not merely to control or inspect work defects. The implementation of HRM can help employees to change the traditional concept and conduct of SQC. It is significant that performing HRM leads managers to improve leadership and to exert a better influence on their subordinates. In this study, the implementation of HRM has some minor effects on the TQM practices of "quality goal-setting, measurement, and management" and "Hoshin management". According to the "quality goal-setting, measurement, and management" or Hoshin management strategies, employees are

asked to propose annual goals, and management then applies pressure to reach those goals. This management style contradicts the philosophy of empowerment, which is the prevalent practice of HRM. The "quality guru" W. Edwards Deming emphasises that a company must eliminate numerical quotas for the workforce and numerical goals for management (Deming's point 11) (Walton, 1986). Deming's concept is very similar to the philosophy of empowerment.

The effect of implementation of HRM and TQM on quality performance

The effect of implementation of HRM on quality performance. The effect of implementation of HRM on quality performance is depicted in Table IV (using the same method as used in Tables II and III to obtain the weighted value in Table IV). Performing HRM practices can have significant effects on "employee satisfaction" and "customer satisfaction". Most researchers and practitioners agree that customer satisfaction is a vital business goal (Oakland and Oakland, 1998) because customer satisfaction can, in turn, lead to increased revenue and profit (Gorst *et al.*, 1998). Therefore, a company must design and implement systems of managing customer satisfaction, and that company depends entirely on employees to implement and maintain such systems (Lammermeyr, 1991). Enterprises must therefore devote themselves to the implementation of HRM for long-term development. HRM also positively affects "employees' quality awareness" and "company image" – which were also key factors in performing TQM and attracting customers.

The combined effect of TQM practices on quality performance. Table IV also shows the combined effects of TQM practices on quality performance. The implementation of TQM resulted in greatest effect on "customer satisfaction". Examining the impact of individual TQM practices on this aspect of quality performance, it was obvious that all TQM practices significantly influence "customer satisfaction" (there are 13 items that have a p-value < 0.01, and three items which had a p-value < 0.05). In addition, the implementation of TQM also positively affected the other three aspects of quality performance. Pursuing customer satisfaction was the primary intention of the enterprises. Performing TQM became a necessary and critical strategy. The successful implementation of TQM not only raised the customer satisfaction level, but also enhanced the company's image and improved employee satisfaction and quality awareness.

Based upon the analysis in above, the implementations of HRM and TQM enhanced the performances of organisations, and HRM practices had positive effects on the performance of TQM. Therefore, implementing HRM was an important strategy for increasing a firm's competitiveness.

Table IV.
The effect of implementation of HRM and TQM on quality performance

Quality performances	Degree of impact by HRM	Degree of impact by TQM
Employee satisfaction	0.2818	0.216
Employee quality awareness	0.2228	0.211
Customer satisfaction	0.2817	0.319
Company's image	0.2137	0.254

Conclusion

Customer satisfaction is a basic goal of enterprises. If a firm cannot satisfy its customers, its competitiveness will be decreased. It has been found that TQM practices have positive effects on customer satisfaction, and that the adoption of TQM is therefore an effective means by which enterprises can increase competitiveness. The implementation of TQM also benefited the company's image, and improved the satisfaction and quality awareness of employees. However, several empirical studies have asserted that there is a high failure rate in the implementation of TQM. One of the main factors is that companies cannot perform HRM practices effectively. Therefore, this study focused on the effects of HRM practices on the implementation of TQM and quality performance.

The study investigated the effect of individual HRM practices on the implementation of TQM and concluded that the practices of "training and education", "incentive compensation", and "employee development" produced the greatest influences on TQM. The HRM implementation significantly affected the TQM practices of "culture change and development", "customer satisfaction management", and "statistical quality control" to a greater extent than the other TQM practices. The study also analysed the effects of HRM and TQM on quality performance. Both HRM and TQM significantly affected these quality performances, especially with regard to "customer satisfaction" and "employee satisfaction".

Overall, the empirical results proved that HRM played a key role in the implementation process of TQM; and HRM and TQM combined to give total quality and organisation performance. However, the effects of different HRM practices on the implementation of TQM are differentiated. Enterprises must determine which HRM practices are critical to their business, and should prioritise these practices before they devote their efforts to the implementation of HRM. The analytic results of this research provide a useful reference for industry in this respect.

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