The relationship between human resource management practices, business strategy and firm performance: evidence from steel industry in Taiwan

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The relationship between human resource management practices, business strategy and firm performance: evidence from steel industry in Taiwan

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The primary objective of this study is to investigate the relationship between human resource management (HRM) practices, business strategy and firm performance. We examined the following HRM practices: training and development; teamwork; compensation/incentives; HR planning; performance appraisal; and employment security. We surveyed 236 managers working at steel firms in Taiwan to explore their perceptions on the impact of HRM practices and business strategy on firm performance. The results of this study are summarized as follows: (1) HRM practices will be positively related to firm performance; (2) there is a close linkage between HRM practices and business strategy; (3) business strategies will be positively related to firm performance; (4) integrating HRM practices with business strategies will be positively related to firm performance.

Keywords: business strategy; firm performance; HRM practice

Introduction

Today’s market environment is dynamic and market stability today may become uncertainty tomorrow. In an uncertain market, the intensity of competition increases from time to time. Firms have been trying to defeat one another in order to be the last survivor and are able to enjoy total benefits as the market leader. Facing this situation, managers must keep their fingers on the pulse and be ready to respond to any sudden changes. Moreover, they need to be sure that the resources and capabilities are available for next steps and fights. Traditionally, product technology and process, accessible capital sources, and so on, were essential to win the game; however, at present, these kinds of resources, suggested by Pfeffer (1994), fail to fulfil their roles to defeat competitors. The decreased vitality of those primitive resources has drawn practitioners and academics’ attentions to explore other types of assets which can capture and retain competitive advantage and at the same time, are not easily imitated and copied by competitors (Barney 1991). The question of the kind of asset that can provide sustainability, competitive advantage, and superior performance has been asked and discussed among managers and scholars over the past decades. As a result, the finding of human resources as a valuable intangible asset of an organization was the unequivocal answer to clarify all doubts on how organizations could compete in the market, achieve superior performance, realize competitive advantage, and improve organizational performance over a very long time, or possibly forever.

Nowadays, the whole world recognizes that human resources are vital to achieve success in the most effective and efficient ways. Only a small number of firms are able...
to elicit the hidden power of human resources and bring them into use to become leaders in
the markets (Sang 2005). The first formal human resource function and department were
initiated since the 1920s (Ferris, Hochwater, Buckley, Cook and Frink 1999). Traditionally, HRM
function was considered by managers as a tool to deal with staff function, record keeping and file
maintaining for organizations. However, the HRM function has evolved into being strategic
partner, sharing ideas, perspective, and resources with marketing, finance, and accounting
departments (Schuler and MacMillan 1984; Ulrich 1987; Dulebohn, Ferris and Stodd 1995;
Barney and Wright 1998).

A number of researchers found a link to HRM practices with some influential variables
seeming to increase firm performance. For example, Youndt, Snell and Lepak (1996) found
that business strategy and HRM practices interaction is an important factor in organizational
effectiveness. Richard and Johnson (2001) conducted a study to understand the impact of
human resource diversity practices on firm performance. They employed business strategy
as a contingent factor and found that business strategy moderates the relationship between
strategies paired up with appropriate HRM practices will have a positive effect on firm
performance. Therefore, the primary objective of this study is to investigate the impact of
integrating HRM practices with business strategy on firm performance.

The reason why we selected the steel industry to conduct our research is that the steel
industry has long been regarded as a symbol of national strength in many countries (ITIS
Program Office 2007). Moreover, both developed and developing countries have been
trying to boost this industry. Since the steel industry is closely related to economic stability
and national development, it can be considered as a national strategic industry (ITIS
Program Office 2007). Furthermore, the production value of the Taiwanese steel industry
was over US$29 in 2007 and will exceed US$34 billion within three years (ITIS Program
Office 2007). Within three years the Taiwanese steel industry will be the third largest
industry in production value in Taiwan (ITIS Program Office 2007). However, due to
serious oversupply of global steel production capacity and rapid growth of mainland
China’s steel industry, the Taiwanese steel industry has become more and more
uncertain and competitive. Thus, this study concentrates on the Taiwanese steel industry to
identify how to improve and enhance the performance and competitiveness of this industry
by integrating and implementing HRM practices and business strategies.

Literature review and hypothesis development

HRM practices

The influence of HRM on organizational outcomes has become an important topic of
research starting in the 1990s. Laka-Mathebula (2004) has mentioned that HRM attaches
importance to the motivational aspect of organizational practices in the development and
best utilization of human potential. Thus, she defines HRM as an integrated strategy
and planned development process for effective utilization of human resources for the
achievement of organizational objectives. Mondy, Noe and Premeaux (2002) defined
HRM as the utilization of individuals to achieve organizational objectives. HRM involves
the development of an individual’s abilities and attitudes in such a way that the individual
is able to grow personally and contribute towards organizational interests. Noe,
Hollenbeck, Gerhart and Wright (2006) defined HRM as referring to the policies,
practices, and systems that influence employees’ behaviour, attitudes and performance.

However, the important thing is to define the boundary of HRM practices. Hornsby
and Kuratko (2003) defined HRM practices in five major areas: job analysis and
description, recruiting and selection, training, performance appraisal and compensation. Huselid (1995) defined HRM practices as employee recruitment and selection procedures, compensation and performance management systems, employee involvement and employee training. Jeffrey and Donald (2003) viewed HRM practices as job analysis, recruitment, selection, compensation, benefits, incentive, performance appraisal and training. Mondy et al. (2002) thought the practices of HRM include five basic functions, including staffing, human resource development, compensation and benefits, safety and health, employee and labour relations and so on. Pawan (2000) identified HRM practices as pay and reward, recruitment and selection, training and development, health and safety, and work expansion or reduction.

From the above discussion, this study suggests six key HRM practices that are likely to be positively associated with firm performance, product quality, production cost, product delivery, and production flexibility. The six HRM practices are: training and development, teamwork, compensation/incentives, HR planning, performance appraisal, and employment security.

Training and development refers to the amount of formal training given to employees. Organizations can provide extensive formal training or rely on acquiring skills through selection and socialization. Training is targeted on skill development, whether technical, clinical or soft skills such as team working, leadership and interviewing (Delery and Doty 1996). According to Harel and Tzafrir (1999), training can influence performance in two ways: first, training improves relevant skills and abilities; and second, training increases employees’ satisfaction with their current job and workplace. Training can consist of on-job training, off-job training, formal training, skill training, cross-functional training, team training, literacy training and so on (Gomer-Mejia, Balkin and Cardy 2004).

Teamwork refers to a group of employees created on purpose to carry out a particular job or to solve problems. The idea of teamwork is people share knowledge, skill, judgement, and ideas among one another to get better results (Sang 2005). According to Pfeffer (1998), teamwork provides many advantages: (1) teamwork depends on peer-based work rather than hierarchical, which leads to more effective achievement; (2) teamwork facilitates flows of ideas from team members and finally, an innovative solution; and (3) teamwork helps save the administrative costs arising from paying specialists to watch people.

Compensation or incentive is contingent on performance (e.g., individual or group incentive pay). One of the primary means organizations use to enhance employee motivation is providing performance-contingent incentive compensation to align employee and shareholder interests (Delaney and Huselid 1996). According to Gomer-Mejia et al. (2004), there are three kinds of compensation plan: first is base-compensation (fixed pay to employees). Second is pay incentives (bonuses and profit sharing). Third is indirect compensation (health insurance, vacation, unemployment compensation). Normally, compensation is based on two categories: financial incentives and non-financial incentives.

HR planning includes the forecasts of personnel requirements, the budget on selection staff, the numbers of people involved in selection, and structured and standardized interviews (Chang and Chen 2002). Firms need to predict the supply of labour required to meet future demand. According to Sang (2005) and Schuler and MacMillan (1984), firms have to take the following things into consideration: (1) What is the rate of availability of a future workforce? (2) Are there enough potential young workers in the labour market, in the next two years or five years? (3) What is the level of education of those potential workers? (4) Do firms need to help invest in the educational system to help upgrade education of the potential workers or not?
Performance appraisal is used to evaluate employee performance. The purpose of performance appraisal is to improve goal setting and feedback processes in order that employees can direct, correct and improve their performance. It can be based on results or behavior. Considerable evidence shows that the extent and sophistication of appraisal are linked to changes in individual performance (Fletcher and Williams 1985). According to Sang (2005), performance appraisal helps the top level of management to clarify and communicate organizational objectives and expectations to internal employees and helps them understand the capability of its own workforce. Gomer-Mejia et al. (2004) have mentioned that performance appraisal system can be used for administrative purposes which are related to employee’s work conditions, including promotion, termination and rewards. However, some scholars and managers argued that performance appraisal brings demoralization to a workplace and low productive rate, and should be eliminated from practices (Williams 1997). Thus, some firms adopt performance appraisal in a careful way.

Employment security means job security via workforce stabilization and employment continuity policies (Browne 2000). Employment security is important to determine the work productivity of employees and the higher degree of job security offered to employees, the more commitment an organization receives from them (Sang 2005).

Business strategy

Business strategy can be defined as a set of decisions about the direction of a firm. A strategy is an integrated and coordinated set of commitments and actions designed to exploit core competencies and gain a competitive advantage (Liao 2005). Strategies are purposeful and precede the taking of actions to which they apply (Slevin and Covin 1997). Business-level strategy is designed to provide value to customers and gain a competitive advantage by exploiting core competencies in specific, individual product markets (Dess, Gupta, Hannart and Hill 1995). Thus, Liao (2005) has mentioned that a business-level strategy reflects a firm’s belief about where and how it has an advantage over its rivals.

The essence of strategy is to understand why organizations perform differently, and how performance can be directed and controlled (Ketchen, Thomas and McDaniel 1996). The literature on strategy is ‘vast and growing at an astonishing rate’ (Mintzberg, Ahlstrand and Lampel 1998). However, there is no consensus on what strategy is and there are many definitions. Strategy is frequently described as a deliberate set of actions to achieve competitive advantage, and giving coherence and direction to the organization (O’Regan, Ghobian and Sims 2005).

Business strategy implies a series of systematic and related decisions that give a business a competitive advantage relative to other business (Schuler and Jackson 1987). The concept of business strategy derives primarily from Porter’s (1985) classifications of generic strategies: cost leadership, differentiation, and focus. Miles and Snow (1984) have classified business strategies into three types: defender, prospector and analyser. Referring to Porter’s strategy types, Schuler and Jackson (1987) have classified business strategies slightly differently from those of Porter into three types: cost reduction, innovation and quality enhancement. Many scholars (e.g., Beaumont 1993; Huang 2001) have employed Schuler and Jackson’s approach, and this study also adopts this method of classification.

Cost-reduction strategy involves enhancing competitiveness by lowering the cost of products or services. This strategy enhances production efficiency and reduces expenditures by adopting new technology, enlarging the scale of production, or re-engineering production processes, so that a business can sell its products or services
at a lower price in the market. Innovation strategy implies an emphasis on the development of products or services that are unique or different from those of competitors. The essence of quality enhancement strategy is to achieve success by offering a standard of quality superior to that of other products or services (Huang 2001).

Firms adopting a cost-reduction strategy must strictly control and minimize expenses, and struggle for greater economies of scale. Firms adopting an innovation strategy must adapt to rapid market change and technological development. Firms adopting a quality-enhancement strategy must make frequent changes or continuous improvement in the production process in order to continuously upgrade their product quality.

Firm performance
A number of previous studies examined the impacts of HRM practices on different kinds of firm performance, such as on productivity (Chen, Liaw and Lee, 2003), on efficiency and employee turnover (Huselid 1995), on financial performance (Huselid, Jackson and Schuler 1997), on customer satisfaction (Koys 2003), on turnover, absenteeism, productivity and quality (Richard and Johnson 2001).

There are different ways to define firm performance according to different purposes of studies. This study defines firm performance as operational performance. In recent years, scholars argued a number of criteria of operational performance measures. Among them, Skinner (1974) mentioned short and dependable delivery, superior quality, fast new product development, volume flexibility and low cost. Wheelwright (1978) emphasized efficiency, dependability, quality and flexibility. After the previous research, Wheelwright in collaboration with Hayes agreed upon changing efficiency factor into cost (Hayes and Wheelwright 1984). Schmenner (1982) and Hill (1989) have also contributed various dimensions of operational performance measures such as cost, quality, delivery and flexibility. Later, Leong, Snyder and Ward (1990) identified five main aspects: cost, quality, delivery, flexibility and responsiveness. Vickery, Droge and Markland (1997) introduced the rate of new product launching, so called ‘speed’, as another dimension of the measures.

Besides those scholars described above, there are more contributors to the operational performance measures (Krajewski and Ritzman 1987; Ferdows and DeMeyer 1990; Droge, Vickery and Markland, 1994; Youndt et al. 1996; Vokurka, O’Leary-Kelly and Flores 1998). Youndt et al. (1996) suggested four dimensions: cost, quality, delivery, delivery flexibility and scope flexibility. Delivery flexibility is the timing of the introduction of new products and on-time delivery. Scope flexibility is about the variety of things: adjusting product mix, handling non-standard orders and producing products in small quantities (Jayaram, Droge and Vickery 1999).

Based on those previous researches, this study identifies four dimensions of operational performance, which are commonly agreed upon in the academic field. The four dimensions are: product quality, production cost, product delivery and production flexibility. Product quality includes several dimensions such as product specifications (standard product), product performance (product functions), product reliability, product serviceability (reparability of service), product durability (product life) and so on (Kotler 2003; Hill and Jones 2004). Low-cost production is the ability to reduce costs through efficient operations, process technology and/or scale economies (Vickery et al. 1997). As for product delivery, service organizations can differentiate from others by designing a fast delivery network (Kotler 2003). Production flexibility is about the reduction of production lead times and set-up times, the development of new processes for new products, and offering workers a variety of tasks (Meyer, Nakane, Miller and Ferdows 1989).
**HRM practices and firm performance**

A number of theoretical and empirical studies have linked HRM practices to firm performance. This study concentrates on operational performance and there is a number of researches conducted on the relationship between HRM practices and operational performance as follows.

Ahmad and Schroeder’s (2003) study attempted to generalize the efficacy of seven HRM practices proposed by Pfeffer (1998) in the context of country and industry, focusing primarily on the effects of these practices on operations. The seven HRM practices include employment security, selective hiring, use of teams and decentralization, compensation/incentive contingent on performance, extensive training, status differences, and sharing information. The operational performance includes cost, quality, delivery, flexibility and organizational commitment. Their findings provided overall support for the relationship between the seven HRM practices and operational performance.

Chang and Chen (2002) conducted a comprehensive study to evaluate the links between human resource management practices and firm performance of Taiwanese high-tech firms in the Hsinchu science-based industrial park. They found that HRM practices such as training and development, teamwork, benefits, human resource planning and performance appraisal have significant effect on employee productivity. In addition, benefits and human resource planning are negatively related to employee turnover.

Corbett and Harrison (1992) conducted a study on employee involvement and manufacturing performance in New Zealand and Australia, and indicated that workforce-related programmes that promoted great improvement in quality and communication throughout an organization could help maintain this achievement. Additionally a well-trained work force would help firms to gain the market share because such firms would produce high quality of products, meeting customers’ expectation.

Huselid et al. (1997) studied the effect of HRM on corporate firm performance of 293 US firms. They divided HRM effectiveness into two types: the first type is HRM effectiveness including compensation, recruitment and training, employee/industrial relations, selection tests, appraisal and employee attitudes. The second type is strategic HRM effectiveness including team work, employee participation and empowerment, employee and manager communications, management and executive development. Their study showed that there is positive link between strategic HRM effectiveness and firm performance, but technical HRM effectiveness is not related to firm performance. They concluded that there is a relationship between HRM effectiveness and productivity of firms.

Ichniowski and Shaw (1999) conducted a research on international human resource management issue by comparing performance between steel making firms in the US and Japan implementing HRM practices. Their study showed that Japanese plants implemented a greater number of HRM practices for example, problem-solving teams, extensive orientation, career-long training, extensive information sharing, job rotation, employment security and profit sharing, than the US counterparts. They noted that Japanese steel firms were remarkably more productive than those in the US.

Jayaram et al. (1999) used top management commitment, communication of goals, employee training, cross-function teams and other HRM practices to test the relationships with quality, cost, flexibility and time. They pointed out that there are positive linkages between individual HRM practices and operational performance.

Kuo (2004) conducted a study on the relationship between HRM practices, employee commitment and operational performance in the healthcare institutions in Taiwan. Kuo
adopted 11 HRM practices including staffing selectivity, internal career opportunities, HR planning, training, employment security, job descriptions, team working, incentive compensation, performance appraisal, employee participation and employee communication. Kuo concluded that each HRM practice has a different degree of influence on operational performance. Among these 11 HRM practices, Kuo concluded that employment security, team working and incentive compensation are regarded as three of the main practices for impacting operational performance.

MacDuffie (1995) conducted a research of 62 automotive assembly plants to identify the effect of HRM bundles on operational performance and suggested that innovative HRM bundles affected operational performance.

Sang (2005) conducted a study trying to find out the effects of HRM practices on business performance (operational performance and overall firm performance) in Cambodia and Taiwan. Sang (2005) selected nine HRM practices (HR planning, staffing, incentives, appraisal, training, teamwork, employee participation, status differences and employment security) to explore the relationships with the perception of firm performance (non-financial and financial performance). Meanwhile, Sang also tested the nine HRM practices to observe impacts on four operational performance contents: product quality, product cost, product delivery and production flexibility. The results of Sang’s study showed that HR planning, staffing, incentives, appraisal, training, teamwork and employee participation positively influence employee productivity. Moreover, a positive relationship between HRM practices and operational performance was also confirmed.

According to the researches outlined above we can see that operational performance can be improved by HRM practices. Since this study concentrates on the steel industry, it is necessary to narrow the focus towards HRM practices that are adopted in this particular manufacturing industry. From the above literature review, this study adopts six key HRM practices that are likely to be positively associated with operational performance which includes product quality, production cost, product delivery and production flexibility. The six HRM practices are training and development, teamwork, compensation/incentives, HR planning, performance appraisal and employment security.

Based on the above discussions, this study constructs the first hypothesis to test the relationship between HRM practices and firm performance:

**Hypothesis 1:** HRM practices will be positively related to perceived firm performance.

**HRM practices and business strategy**

The strategic perspective of HRM examines the fit between various HRM practices and the company’s business strategies (Delery 1998). Baird and Meshoulam (1988) indicated that when adopting their HRM practices, firms must take into account the desirability of fit between these practices and firm strategy. Furthermore, Wright and Sherman (1999) noted that one of the main goals of strategic human resource management is to ensure that HRM is integrated with the strategic needs of firms in order to gain competitive advantage. Liao (2005) pointed out that strategic human resource management (SHRM) researchers have established a broader perspective that is oriented toward managing the workforce since SHRM was introduced. Since then, the behaviorist perspective has emerged as the predominate paradigm for research (e.g. Fisher 1989; Schuler 1989; Snell 1992). According to behaviorist perspective, HRM practices should be linked to business strategy. Nowadays, there is a growing number of empirical studies that support this perspective (Schuler and Jackson 1989).
On the other hand, according to contingency theory, a close link exists between business strategy and HRM practices. This theory also holds that HRM practices are determined by the type of business strategy that a firm follows. Moreover, it assumes that the companies that closely coordinate their business strategy and HRM practices achieve better performance than the companies that do not (Huang 2001). At the present time, there is an extensive research exploring the links between business strategy and HRM practices (Bird and Beechler 1995; Huselid 1995; MacDuffie 1995; Delery and Doty 1996; Huang 2001).

Based on the above statement, this study therefore proposes a second hypothesis:

**Hypothesis 2:** There is a close linkage between business strategies and HRM practices.

**Business strategy and firm performance**

The relationship between business strategy and firm performance has concerned researchers for a number of years (Brews and Hunt 1999). O’Regan et al. (2005) argued that strategy is frequently described as a deliberate set of actions to achieve competitive advantage that gives coherence and direction to an organization.

Cheng (2003) conducted a research on nine recreation resorts in the Kenting Area in Taiwan. Cheng found that there is a close relationship between business strategy and firm performance. According to Cheng’s analysis outcome, business strategy and firm performance have a positive interaction. Different business strategies will influence the results of firm performance. Chiang (2004) conducted a study to examine the impacts of business strategies (including differentiation strategy, cost leadership strategy and focus strategy) and compensation strategy on organizational performance using data for 108 Taiwanese companies listed on the Taiwan Stock Exchange and over-the-counter market. The study addressed certain business strategies that have significantly positive impacts on organizational performance. Lee (2000) conducted an empirical study of the relationship between business type, strategy and performance of Chinese medicine industry in Taiwan. Lee found that business strategy will impact the internal structure of organization and organizational performance.

However, there are few empirical researches investigating the relationship between business strategy and firm performance in manufacturing industry and even less addressing the steel industry.

Based on the above discussion, in order to have an in-depth understanding of the correlation between business strategy and firm performance in the steel industry, this study proposes the third hypothesis.

**Hypothesis 3:** Business strategies will be positively related to perceived firm performance

**HRM practices, business strategy and firm performance**

Scholars, such as Delery and Doty (1996), have suggested that a good fit between HRM strategies and the business strategy of the firm tends to lead to superior outcomes. In other words, when the company’s HRM practices support firm strategy, superior performance is expected. Other examples such as Bird and Beechler (1995) examined linkages between business strategy and human resource management strategy of Japanese subsidiaries in the US. They investigated whether or not fit between a subsidiary’s business strategy and its HRM strategy is associated with higher performance. The result showed that subsidiaries
with matched strategies perform better than unmatched ones in terms of HRM-related performance measures. Japanese subsidiaries with a business strategy/HRM strategy match are also more likely to experience better firm performance versus competitor than unmatched ones. Chow (2006) mentioned that business strategies paired up with appropriate HRM practices will have a positive effect on firm performance. Martell, Gupta and Carroll (1996) have mentioned that considerable emphasis has been put on the importance of integrating HRM practices and business strategy for firm performance. Richard and Johnson (2001) conducted a study to understand the impact of human resource diversity practices on firm performance. They employed business strategy as a contingent factor and found that business strategy moderates the relationship between human resource practices and firm performance. Youndt et al. (1996) indicated that business strategy and HRM practices interaction is an important factor in organizational effectiveness.

Based on the above statement, this study therefore proposes a fourth hypothesis:

**Hypothesis 4:** Integrating HRM practices with business strategies will be positively related to perceived firm performance.

**Methodology**

**Research model**

See Figure 1 for the research model.

**Questionnaire design, sampling plan and procedure**

**Questionnaire design**

The questionnaire of this study is consisted of three constructs: ‘HRM practices’ (total 25 items) from Delery and Doty (1996), Ahmad and Schroeder (2003), Chang and Chen (2002) and Martell et al. (1996), ‘business strategy’ (total 10 items) from Huang (2001) and Shih and Chiang (2005), and ‘firm performance’ (total six items): product quality from...
Dean and Snell (1996); production cost from Butler and Leong (2000) and Meyer et al. (1989); product delivery from Christiansen, Berry, Bruun and Ward (2003) and Butler and Leong (2000); and production flexibility from Dean and Snell (1996). Thus, a 41-item survey questionnaire was developed to obtain the responses from managers in the Taiwanese steel industry about their opinions on various research variables. Respondents were asked to rate their opinions on a 5-point Likert-type scale questionnaire. The items ranged from 1 (strongly disagree) to 5 (strongly agree) for HRM practices and business strategy or 1 (very low) to 5 (very high) for firm performance. The entire questionnaire is shown in Box 1 in the Appendix.

**Sampling plan and procedure**

A sampling plan was developed to ensure that appropriate respondents were included in this study. This study selected managers working at Taiwanese steel industry as samples. This study applied the following formula suggested by Bowerman, O’Connell and Orris (2004) to calculate the sample size:

\[
N = p(1 - p)(Z_{\alpha/2}^2 + B)^2
\]

Where, \(N\) equals to the sample size which this study needs, \(Z_{\alpha/2}\) equals to the confidence level, and \(B\) equals to the error tolerance. This study used \(p = 0.5\) as Bowerman et al. suggested to acquire a normal distribution, \(Z_{\alpha/2}\) equals to 1.96 by setting confidence interval to be 0.05, and error bond or error tolerance to be 0.07. Therefore, the sample size which this study needs is 196. With regard to the population firms, this study selected 196 public and private steel firms from the Top 1000 Manufacturing Firms List provided by *Common Wealth Magazine* in Taiwan (2007). In this study, the estimated response rate was 40% and three questionnaires were distributed to each steel firm. Therefore, a total 588 questionnaires were distributed.

The questionnaires were gathered between February 2008 and June 2008 with 252 being collected. Of the total, 16 were unusable due to incomplete data. This resulted in 236 usable questionnaires and a response rate of 40.1%.

**Characteristics of sample firms and respondents**

The characteristics of the research population are shown in Tables 1 and 2.

**Table 1. Characteristics of sample firms (196 firms).**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm age</td>
<td>&lt;5 years</td>
<td>13</td>
<td>6.6</td>
</tr>
<tr>
<td></td>
<td>6–10 years</td>
<td>40</td>
<td>20.4</td>
</tr>
<tr>
<td></td>
<td>11–15 years</td>
<td>66</td>
<td>33.7</td>
</tr>
<tr>
<td></td>
<td>16–20 years</td>
<td>62</td>
<td>31.6</td>
</tr>
<tr>
<td></td>
<td>&gt;21 years</td>
<td>15</td>
<td>7.7</td>
</tr>
<tr>
<td>Employee number</td>
<td>&lt;300</td>
<td>118</td>
<td>60.2</td>
</tr>
<tr>
<td></td>
<td>301–500</td>
<td>31</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td>501–700</td>
<td>21</td>
<td>10.7</td>
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<tr>
<td></td>
<td>701–900</td>
<td>15</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>&gt;901</td>
<td>11</td>
<td>5.6</td>
</tr>
</tbody>
</table>
Measurement method

Purification and reliability of the measurement variables

To purify the measurement scales and identify their dimensionality, principal component factor analysis with varimax rotation was applied to condense the collected data into certain factors. After factor analysis has been done, item-to-total correlation and internal consistency analysis (Cronbach’s alpha) were testified to confirm the reliability of each research factor. In this study, measurement items with a factor loading greater than 0.6 were selected as the member of a specific factor. Furthermore, items with a low correlation (e.g., lower than 0.5) will be deleted from further analysis. Moreover, according to Robinson and Shaver (1973), if the $\alpha$ is greater than 0.7, it means that it has high reliability and if $\alpha$ is smaller than 0.3, then it implies that it has low reliability. In this study, measurement items with $\alpha$ smaller than 0.7 were deleted from further analysis.

Firm characteristics’ impact on various dimensions

MANOVA was employed to identify the impact of firm characteristics on various dimensions. The SPSS 16.0 package software was used to analyse the data. The operated firm characteristic variables include employee number and firm age. The dependent variables include the constructs of HRM practices, business strategy and firm performance.

The hypotheses testing

Hypothesis 1, 2, 3 and 4 were tested by Structure Equation Model (SEM). SEM encompasses an entire family of models known by names, among them covariance structure analysis, latent variable analysis, confirmatory factor analysis and often simply LISREL analysis. SEM can also be used as a means of estimating other multivariate models, including regression, principal components, canonical correlation and MANOVA. The Amos 7.0 package software was used to analyse the relationships in the entire research

Table 2. Characteristics of respondents (236 respondents).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt;30 years old</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>31–40 years old</td>
<td>123</td>
<td>52.1</td>
</tr>
<tr>
<td></td>
<td>41–50 years old</td>
<td>80</td>
<td>33.9</td>
</tr>
<tr>
<td></td>
<td>51–60 years old</td>
<td>28</td>
<td>11.9</td>
</tr>
<tr>
<td>Seniority</td>
<td>&lt;5 years</td>
<td>9</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>6–10 years</td>
<td>54</td>
<td>22.9</td>
</tr>
<tr>
<td></td>
<td>11–15 years</td>
<td>74</td>
<td>31.4</td>
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<td></td>
<td>16–20 years</td>
<td>64</td>
<td>27.1</td>
</tr>
<tr>
<td></td>
<td>&gt;21 years</td>
<td>35</td>
<td>14.8</td>
</tr>
<tr>
<td>Department</td>
<td>Production</td>
<td>74</td>
<td>31.4</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>36</td>
<td>15.3</td>
</tr>
<tr>
<td></td>
<td>Management &amp; Marketing</td>
<td>82</td>
<td>34.6</td>
</tr>
<tr>
<td></td>
<td>Technology</td>
<td>32</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>12</td>
<td>5.1</td>
</tr>
<tr>
<td>Education level</td>
<td>High school or below</td>
<td>37</td>
<td>15.7</td>
</tr>
<tr>
<td></td>
<td>Junior college</td>
<td>86</td>
<td>36.4</td>
</tr>
<tr>
<td></td>
<td>University/college</td>
<td>94</td>
<td>39.8</td>
</tr>
<tr>
<td></td>
<td>Graduate school</td>
<td>19</td>
<td>8.1</td>
</tr>
</tbody>
</table>
model to find out the relationships among variables in this model. The criteria of chi-square divided by degree of freedom, GFI, AGFI, NFI, CFI, RMR and RMSEA were used to evaluate the overall goodness of fit of the model. Five criteria in this study were used to test the fit of this model and they are from Wu (2005) and Hair, Black, Babin, Anderson and Tatham (2006). The first one is the ratio of chi-square/degree of freedom. If chi-square/d.f. is less than 3, it is considered as a good fit to the data. The second, third and fourth criteria are the GFI (goodness-of-fit index), AGFI (adjusted goodness-of-fit index) and NFI (normed fit index). The values of those three indices should be greater than 0.9. The fifth one is the CFI (comparative fit index), which should be greater than 0.95. The sixth is the RMR (root-mean-square residual). The smaller the RMR is, the better the fit of the model. A value of less than 0.05 indicates a close fit. And the last index is the RMSEA (root mean square error of approximation). The RMSEA is acceptable when the value is less than 0.08.

Results

Factor analysis and reliability testing results

To verify the dimensionality and reliability of the research constructs in this study, several purification processes, including factor analysis, correlation analysis and internal consistency analysis (Cronbach’s alpha) were conducted. Factor analysis was first employed to identify the dimensionality of each research construct, to select questionnaire items with high factor loadings, and to compare these selected items with items suggested theoretically. Item-to-total correlation and coefficient alpha were assessed to identify the internal consistency and reliability of the construct. Latent roots (eigen values), scree test and other criteria were used to determine the number of dimensions to be extracted from the principal component factor analysis. The selected criteria are: factor loading > 0.6, eigen value > 1, accumulatively explained variance > 0.6, item-to-total correlation > 0.5, and coefficient alpha (α) > 0.7 (Wu 2005).

Tables 3 to 5 present the results of factor loadings for measurements of human resource management practices, business strategy and firm performance. The three tables show that a total of 38 variables (except for PA2, PA4 and ES4 which have low loading scores) have significantly high loading scores (higher than 0.6). The internal consistencies of all three constructs are also presented. It is shown that those variables within a factor tend to have a high coefficient of item-to-total correlation (higher than 0.5) that suggests a high degree of internal consistency for each dimension. In addition, Cronbach’s alpha for the factors exceeds the generally accepted guideline of 0.7 (Wu 2005), which further confirms the reliability of the measurement items.

Firm characteristics’ impact on various dimensions results

Table 6 is the summary of the firm characteristics’ impact on various dimensions by using MANOVA. The table shows that firm age affects the level of HRM practices (F = 6.095, p = 0.001), business strategy (F = 5.166, p = 0.002), and firm performance (F = 4.714, p = 0.003). Among the groups of firm age under 6–10 years old, those firms acquire the highest level of HRM practices (Mean = 3.622), business strategy (Mean = 4.015), and firm performance (Mean = 3.793). The employee numbers also affect the level of HRM practices (F = 4.783, p = 0.001), business strategy (F = 6.057, p = 0.000), and firm performance (F = 6.001, p = 0.000). Among the groups of employee, those firms with more than 901 employee acquire the highest level of HRM practices (Mean = 3.486), business strategy (Mean = 3.950), and firm performance (Mean = 3.689).
### The hypotheses testing results

Table 7 shows the criteria of the proposed model and the results of variables in this study. From Table 7, all the indices are supported in this study and they represent a good fit.

Table 8 and Figure 2 exhibit the structural coefficients for the model. All coefficients of the path are significant (C.R. is greater than 1.96). The result is shown that: HRM practices are positively related to firm performance ($\gamma = 0.198$); there is a close linkage between HRM practices and business strategies ($\beta = 0.841$); and business strategies are positively related to business performance ($\beta = 0.636$).

Regarding the relationships between factors and dimensions, the coefficients are all at significant level. For the dimension of HRM practices, the coefficients...
Table 5. Results of reliability tests on firm performance.

<table>
<thead>
<tr>
<th>Factor (FPF)</th>
<th>Research items</th>
<th>Factor loading</th>
<th>Eigen value</th>
<th>Acc. expl. variance (%)</th>
<th>Item-to-total correlation</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm performance</td>
<td>FP2</td>
<td>0.881</td>
<td>4.069</td>
<td>67.819</td>
<td>0.815</td>
<td>0.904</td>
</tr>
<tr>
<td></td>
<td>FP3</td>
<td>0.852</td>
<td></td>
<td></td>
<td>0.778</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FP4</td>
<td>0.849</td>
<td></td>
<td></td>
<td>0.773</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FP5</td>
<td>0.816</td>
<td></td>
<td></td>
<td>0.729</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FP6</td>
<td>0.786</td>
<td></td>
<td></td>
<td>0.689</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FP7</td>
<td>0.750</td>
<td></td>
<td></td>
<td>0.649</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Summary of the firm characteristics’ impact on various dimensions.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Duncan</th>
<th>Dependent variables</th>
<th>F-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm age</td>
<td>6–10 years old</td>
<td>3.622</td>
<td>(435,2)</td>
<td>HRM practices</td>
<td>6.095</td>
</tr>
<tr>
<td></td>
<td>11–15 years old</td>
<td>3.290</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16–20 years old</td>
<td>3.086</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 21 years old</td>
<td>3.330</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm age</td>
<td>6–10 years old</td>
<td>4.015</td>
<td>(453,2)</td>
<td>Business strategy</td>
<td>5.166</td>
</tr>
<tr>
<td></td>
<td>11–15 years old</td>
<td>3.687</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16–20 years old</td>
<td>3.498</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 21 years old</td>
<td>3.509</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm age</td>
<td>6–10 years old</td>
<td>3.793</td>
<td>(354,2)</td>
<td>Firm performance</td>
<td>4.714</td>
</tr>
<tr>
<td></td>
<td>11–15 years old</td>
<td>3.377</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16–20 years old</td>
<td>3.387</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 21 years old</td>
<td>3.384</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee numbers</td>
<td>&lt; 300</td>
<td>2.953</td>
<td>(1,342)</td>
<td>HRM practices</td>
<td>4.783</td>
</tr>
<tr>
<td></td>
<td>301–500</td>
<td>3.372</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>501–700</td>
<td>3.322</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>701–900</td>
<td>3.372</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 901</td>
<td>3.486</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee numbers</td>
<td>&lt; 300</td>
<td>3.279</td>
<td>(134,324,25)</td>
<td>Business strategy</td>
<td>6.057</td>
</tr>
<tr>
<td></td>
<td>301–500</td>
<td>3.785</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>501–700</td>
<td>3.595</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>701–900</td>
<td>3.600</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 901</td>
<td>3.950</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

of compensation/incentives (λ = 0.871), training and development (λ = 0.774), teamwork (λ = 0.826), HR planning (λ = 0.829), performance appraisal (λ = 0.703) and employee security (λ = 0.585) are all significant. For the dimension of business strategy, the coefficients of innovation (λ = 0.932), cost reduction (λ = 0.784) and quality enhancement (λ = 0.833) are all significant. From the above results, we further conclude that integrating HRM practices with business strategies is positively related to firm performance.

Discussion and conclusions

From the above results, we have the following conclusions:
Table 7. The standard coefficients and model fit statistics.

<table>
<thead>
<tr>
<th>Fit statistics</th>
<th>Conceptual model</th>
<th>Criterion</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square/d.f.</td>
<td>2.132</td>
<td>&lt;= 3</td>
<td>Wu (2005) &amp; Hair et al. (2006)</td>
</tr>
<tr>
<td>GFI</td>
<td>0.948</td>
<td>&gt; 0.9</td>
<td></td>
</tr>
<tr>
<td>AGFI</td>
<td>0.907</td>
<td>&gt; 0.9</td>
<td></td>
</tr>
<tr>
<td>NFI</td>
<td>0.961</td>
<td>&gt; 0.9</td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>0.979</td>
<td>&gt; 0.95</td>
<td></td>
</tr>
<tr>
<td>RMR</td>
<td>0.021</td>
<td>&lt; 0.05</td>
<td></td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.069</td>
<td>&lt; 0.08</td>
<td></td>
</tr>
</tbody>
</table>

Table 8. Path analysis for the constructs of this study.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>C.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRM practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensation/incentives</td>
<td>0.871*</td>
<td>A</td>
</tr>
<tr>
<td>Training and development</td>
<td>0.774*</td>
<td>14.538</td>
</tr>
<tr>
<td>Teamwork</td>
<td>0.826*</td>
<td>16.156</td>
</tr>
<tr>
<td>HR planning</td>
<td>0.829*</td>
<td>16.233</td>
</tr>
<tr>
<td>Performance appraisal</td>
<td>0.703*</td>
<td>12.452</td>
</tr>
<tr>
<td>Employment security</td>
<td>0.585*</td>
<td>8.765</td>
</tr>
<tr>
<td>Business strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>0.932*</td>
<td>A</td>
</tr>
<tr>
<td>Cost reduction</td>
<td>0.784*</td>
<td>16.145</td>
</tr>
<tr>
<td>Quality enhancement</td>
<td>0.833*</td>
<td>18.247</td>
</tr>
<tr>
<td>Path</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRM practices →</td>
<td>0.198*</td>
<td>2.064</td>
</tr>
<tr>
<td>Business strategy ←</td>
<td>0.841*</td>
<td>8.823</td>
</tr>
<tr>
<td>Business strategy →</td>
<td>0.636*</td>
<td>6.470</td>
</tr>
</tbody>
</table>

Notes: 1. *: C.R. (critical ratio) > 1.96; using a significant level of 0.05, critical ratios that exceed 1.96 would be considered significant. 2. A: the parameter compared by others is set as 1; therefore, there is no C.R. It is determined as significant. 3. The coefficients are standardized value.

Figure 2. Structure equation model of this study.

Notes: * C.R. (critical ratio) > 1.96; using a significant level of 0.05, critical ratios that exceed 1.96 would be considered significant.
All six HRM practices help improve firm performance. Thus, Hypothesis 1 is supported. The results found in this analysis are consistent with the previous studies, such as Ahmad and Schroeder (2003) who concluded that all seven HRM practices influence operational performance. Corbett and Harrison (1992) found that workforce related programmes promoted great improvement in quality. Huselid et al. (1997) concluded that there is positive link between strategic HRM effectiveness and firm performance. Ichniowski and Shaw (1999) found that firms implementing HRM practices were more productive than those that did not implement them. Jayaram et al. (1999) found that there are positive linkages between individual HRM practices and operational performance. Kuo (2004) noted that employment security, team working, and incentive compensation impact operational and quality performance. MacDuffie (1995) indicated that innovative HRM bundles affect operational performance. Sang (2005) identified that HR planning, incentives, appraisal, training and teamwork influence operational performance.

All six HRM practices have a close relationship with three business strategies including cost reduction, innovation and quality enhancement. Therefore, Hypothesis 2 is supported and this result is congruent with other previous studies such as Baird and Meshoulam (1988) who indicated that when adopting their HRM practices, firms must take into account the desirability of fit between these practices and firm strategy. Delery (1998) also mentioned that the strategic perspective of HRM examines the fit between various HRM practices and the company’s business strategies. Schuler and Jackson (1987) described that there is a close relationship between HR and business strategy.

Business strategies do substantially and positively relate to firm performance. Therefore, Hypothesis 3 is supported. The result is consistent with previous studies, such as Cheng (2003) who concluded that there is a significant relationship between business strategy and firm performance. According to Cheng’s analysis outcome, business strategy and firm performance have a positive interaction. Cheng suggested that different business strategies will influence the results of firm performance. Chiang (2004) mentioned that business strategies have significantly positive impacts on organizational performance. Lee (2000) found that business strategy will impact the internal structure of an organization and organizational performance.

All six HRM practices integrated with three business strategies will be positively related to firm performance. Therefore, Hypothesis 4 is supported. The results found in this analysis are consistent with the previous studies, such as Bird and Beechler (1995) who explored linkages between business strategy and human resource management strategy and found that matching business strategy and HRM strategy results in higher firm performance. Chow (2006) mentioned that business strategies paired up with appropriate HRM practices will have a positive effect on firm performance. Huselid (1995) found that the organization’s strategy moderated the effect of HRM practices on firm performance. Martell et al. (1996) emphasized the importance of integrating HRM practices and business strategy for firm performance. Richard and Johnson (2001) conducted a study to understand the impact of human resource diversity practices on firm performance. They employed the business strategies as a contingent factor and concluded that business strategy moderates the relationship between human resource practices and business performance. Wright and Sherman (1999) noted that one of the main goals of strategic human resource management is to ensure that HRM is integrated with the strategy and the strategic needs of firms in order to gain competitive advantage. Youndt et al. (1996) suggested that business strategy and HRM practices interaction is an important factor in organizational effectiveness.
Limitations

This research has several limitations. First, the survey questionnaire did not consist of sufficient items to explore the relationships between HRM practices, business strategy and firm performance. The questionnaire only included some items extracted from previous studies. Therefore, the results of this study may be biased. Second, this study merely focused on the viewpoint of the managers working at steel firms. It means that investigating the relationships between HRM practices, business strategy and firm performance are only based on the perception of respondents. Third, this study only selected six out of a wide range of possible HRM practices. Finally, this study only focused on the Taiwanese steel industry the results may differ from other industries in Taiwan or other countries.

References


ITIS Program Office (2007), 2007 Taiwan Industrial Outlook, Department of Industrial Technology, Ministry of Economic Affairs, Taiwan.


Appendix

Box 1. The questionnaire

**Human Resource Management Practices (HRMPF)**

**I. Training and development (TDF)**

1. Extensive training programs are provided for individuals in their jobs at your firm. TD1
2. Employees in their jobs will normally go through training programs every few years at your firm. TD2
3. There are formal training programs to teach new hires the skills they need to perform their job at your firm. TD3
4. Formal training programs are offered to employees in order to increase their promotability at your firm. TD4

**II. Teamwork (TWF)**

1. During problem solving sessions, your firm makes an effort to get all team members’ opinions and ideas before making a decision. TW1
2. Your firm forms teams to solve problems and in the past 3 years many problems have been solved through small group sessions. TW2
3. Problem solving teams have helped improve manufacturing processes at your firm. TW3
4. Employee teams are encouraged to try to solve their problems as much as possible at your firm. TW4

**III. Compensation/Incentives (CIF)**

1. Incentive system at your firm encourages employees to pursue company objective. CI1
2. Incentive system at your firm is fair at rewarding people who accomplish a company objective. CI2
3. Incentive system at your firm encourages people to reach company goals. CI3
4. Incentive system at your firm really recognizes people who contribute the most to the company. CI4

**IV. HR planning (HRPF)**

1. Your firm forecasts personnel requirements. HRP1
2. Your firm spends amount of money on selecting staff. HRP2
3. There are number of people involved in selection at your firm. HRP3
4. Your firm conducts structured and standardized interviews. HRP4

**V. Performance appraisal (PAF)**

1. Your firm frequently does formal appraisals. PA1
2. Your firm frequently does informal appraisals. PA2
3. Your firm uses objective data for appraisals. PA3
4. Your firm uses subjective data for appraisals. PA4
5. Your firm utilizes the appraisal results. PA5

**VI. Employment security (ESF)**

1. Employees in their jobs can expect to stay at your firm for as long as they wish. ES1
2. It is very difficult to dismiss an employee from his/her job at your firm. ES2
3. Job security is almost guaranteed to employees in their jobs at your firm. ES3
4. If your firm were facing economic problems, employees in their jobs would be the last to get cut. ES4
### Appendix – continued

#### Business Strategy (BSF)

**I. Cost Reduction Strategy (CRF)**
1. Your firm aims at lowering cost and promoting efficiency. CR1
2. Your firm implements strict control of cost. CR2
3. Your firm emphasizes efficient way of operation. CR3
4. Your firm simplifies and standardizes operating process. CR4

**II. Innovation Strategy (IVF)**
1. Your firm aims at innovation and responsiveness. IV1
2. Your firm emphasizes marketing ability as well as product development and design. IV2
3. Your firm highlights responsiveness to customers’ demands. IV3
4. Your firm is constantly seeking new business opportunities. IV4

**III. Quality Enhancement Strategy (QEF)**
1. Your firm emphasizes product quality via the use of quality circles or work improvement teams. QE1
2. Your firm emphasizes continuous improvement of products to secure a long-term competitive edge. QE2

#### Firm Performance (FPF)
1. Your firm’s ability to increase its non-defective rate for its products. (product quality) FP1
2. Your firm’s ability to keep consistency of its product quality. (product quality) FP2
3. Your firm’s ability to reduce its costs of product inspection, inventory, products, and overhead. (production cost) FP3
4. Your firm’s ability to reduce delivery time, lead time, and cycle time for its products. (product delivery) FP4
5. Your firm’s ability to adjust its changes in product mix quickly. (production flexibility) FP5
6. Your firm’s ability to change its capacity quickly. (production flexibility) FP6