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Does matching pay policy with innovation strategy really improve firm performance?

An examination of technology-based service firms

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Abstract

Purpose – The purpose of this paper is to examine whether matching pay policy with innovation strategy really improves firm performance.

Design/methodology/approach – Three technology-based service sectors (software, information system integration, and IC design) comprise the analytical samples. A hierarchical multiple regression method is adopted to examine the research hypotheses.

Findings – Examinations reveal that the positive effect which pay policy combined with innovation strategy has on firm performance is only found in IC design service firms.

Research limitations/implications – Industry serves as a moderator in the relationship between the match and firm performance. However, this examination concentrates on the technology-based service sectors only.

Practical implications – Matching pay policy and innovation strategy cannot be regarded as a panacea for improving firm performance.

Originality/value – This study makes an interesting contribution to understanding the strategic perspective of compensation.

Keywords Pay policies, Innovation, Organizational performance, Service industries, Human resource strategies, Compensation

Paper type Research paper

Introduction

In a fast-moving and globalized world, a firm must maintain its competitive advantage to constantly improve its performance and compete with its competitors. The competitive advantage concept includes the capabilities, resources, relationships, and decisions that permit a firm to capitalize on opportunities and avoid threats within its industry (Hofer and Schendel, 1978). Porter (1985) argued that human resource management (HRM) helps a firm obtain a competitive advantage by lowering costs,

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increasing product sourcing and service differentiation, or both. However, achieving a competitive advantage through human resources requires a strategic management perspective (Jackson and Schuler, 1995). This is the basic rationale of strategic human resource management (SHRM). Recent studies have examined SHRM as a means of enhancing organizational competitive advantage, which improves overall firm performance (Arthur, 1994; Huselid, 1995; MacDuffie, 1995).

Previous authors have described SHRM as the process of linking HR practices to business strategy (Ulrich and Lake, 1991). Human resource managers have long regarded compensation as a crucial lever to move employees toward the desired goals of an organization (McLagan and Nel, 1995). Examining the effects of pay policy on an enterprise has become a very important issue in the HRM field as managers increasingly emphasize SHRM. Prior research has contributed, at the individual level, to the nexus between pay policy and several important constructs by examining issues such as satisfaction (Dyer and Theriault, 1976; Rice *et al.*, 1990), retention (Holzer, 1990; Barber and Bretz, 2000), and performance (Neal, 1993; Levine, 1993; Trevor *et al.*, 1997). At the firm level, several studies argue that matching pay policy with business strategy may increase organizational performance (Miles and Snow, 1984; Carroll, 1987). In addition, a few recent studies discuss the impact of business strategy on compensation (Singh and Agarwal, 1999; Yanadori and Marler, 2006).

Although previous studies address the strategic perspective of pay policy, only a few empirical investigations were conducted (e.g. Balkin and Gomez-Mejia, 1990; Montemayor, 1996). These studies provide a solid foundation for subsequent research, but challenges must still be addressed in terms of their methodology and interpretation of results. For example, previous analyses were grounded in small sample sizes and scarcely controlled for extraneous factor effects such as firm size and industry characteristics. Therefore, the effect which pay policy combined with business strategy has on firm performance remains to be fully examined. Even though pay policy is regarded as a crucial HR lever to influence employee behavior and enhance firm performance (McLagan and Nel, 1995; Song *et al.*, 2005), some HR scholars argue that pay may be valuable in recruiting and retaining employees but is typically unrelated to productivity (Rosenbloom and Hallman, 1981; Hills, 1987). Other authors note that individual incentive pay may undermine teamwork and encourage a short-term focus, which often decreases organizational performance (Pfeffer, 2001). A pay increase may also lead to rising firm costs (Becker and Gerhart, 1996). Disputes regarding the role of pay which the strategic compensation viewpoint emphasizes necessitate a further examination of this perspective.

This study draws on a large data-set to support a developed conceptual framework, and examines the notion of whether matching a pay policy with a business strategy conclusively supports better firm performance. This paper concentrates on Taiwan's three technology-based service sectors – the integrated circuit (IC) design service industry, the system integrated service industry, and the software service industry. Several factors influenced the selection of these three industries. First, acquiring a skilled workforce is an important part of a service firm's efforts to enhance its competitive advantage. Since technology-based service firms profit from services delivered within an advanced technology context, they should emphasize an appropriate pay policy to recruit and motivate highly qualified people. Second, in terms of issues related to strategic pay policy perspectives, existing studies do not focus on

service sectors. Third, Taiwan was once one of the significant emerging markets in the world, but is now facing great challenges due to the emergence of China and intense competition in international markets. The technology-based service sector plays the important role of innovation initiator and knowledge mediator, leading to productivity growth for the entire industry. Building a competitive advantage through HRM practices in this sector is of vital interest to Taiwan's economic development, and is thus an important issue for Taiwan's HR professionals and researchers. Finally, the empirical aspect of this research exploits a technology-based service firm dataset constructed by the Directorate-General of Budget, Accounting and Statistics (DGBAS), a cabinet-level office in Taiwan. This large sample dataset provides a more complete and appropriate picture of the variables analyzed in this study. Consequently, the results of this investigation are an interesting examination of this field.

In view of the importance of innovation in technology-based service firms, this study focuses on one specific but important aspect of business strategy: innovation strategy. This area is worthy of study because no researchers have investigated the effect which pay policy combined with innovation strategy has on firm performance. This study uses secondary data rather than the primary data derived from questionnaires in previous studies. This approach limits the effect caused by the qualitative or attitudinal propensities of respondents. Hence, this study examines the strategic compensation perspective more objectively. Previous studies do not regard industry-type as a variable in their frameworks even though different industries may have different labor conditions related to market situations and competition. This study provides a more comprehensive investigation framework by incorporating the influence of different industries. The results of this study will interest HR professionals in general and Taiwan's HR researchers and managers in particular.

The remainder of this paper is organized as follows. The following section reviews the literature, followed by a presentation of the conceptual framework and research hypotheses. The research methods adopted in this study and the descriptive statistics of the variables used in this analysis are presented next. The following section provides results of the analysis and explanatory discussion. The closing section summarizes the findings and presents the implications of the study.

Literature review

The HRM field contains two competing approaches to the issue of how HR practices encourage firm performance. Some researchers claim that all organizations, regardless of size, industry, or business strategy, should adopt so-called HRM "best practices" to achieve better performance. Their argument implies that superior management practices are readily identifiable and can be transferred across organizations (Arthur, 1994; Delery and Doty, 1996). However, as Cappelli and Crocker-Hefter (1996) state, "many firms – some very successful – stubbornly refuse to adopt those (best) practices." The other approach, called the "best fit," has become prominent in SHRM literature. This "best fit" approach emphasizes the notion that HR practices need to "fit" with the organization's environment, business strategy, and pay plan; The better the fit, the greater the competitive advantage (Cappelli and Crocker-Hefter, 1996; Boxall and Purcell, 2000).

The basis of the "best fit" approach is that HR strategy is most effective only when appropriately integrated within a specific organizational and environmental context.

Further, this approach implies interactions rather than the simple linear relationships involved in the "best practices" perspective (Venkatraman, 1989). This echoes the resource-based view of competitive advantage, which states that the link between a firm's strategy and resources is a major issue (Barney, 1991). HR practices are perhaps the most important of all firm resources because they provide an invisible asset that enhances the firm's ability to deal with a turbulent environment (Chang and Huang, 2005).

The strategic role of pay policy features prominently in business strategy related literature because managers regard compensation as a crucial HR lever to move employees toward the desired goals of an organization (McLagan and Nel, 1995). Miles and Snow (1984) observed four large companies and argued that a compensation strategy can restore the competitive position of companies. In other words, adopting a strategic pay policy could help a firm achieve better performance. Using Porter's (1985) competitive strategy framework, Schuler and Jackson (1987) pointed out that firms adopting innovation strategy would have a compensation system emphasizing internal equity rather than external or market-based equity. Firms pursuing a cost-reduction strategy would closely monitor market pay levels to make compensation decisions. Systematically combining compensation practices with selected competitive strategies could improve a firm's effectiveness and performance. In addition, Holzer (1990) pointed out that paying above-market levels might improve employee motivation enough to offset any increases in labor costs, and thus improve the firm's overall performance.

Several studies include empirical investigations on the pay policy and business strategy relationship. Balkin and Gomez-Mejia (1990) surveyed 192 HRM executives in manufacturing companies. Their results suggest that business strategy (growth and maintenance) affects firms' pay strategies. Using a sample of 243 manufacturing firms, Gomez-Mejia (1992) concluded that firm performance is positively related to the degree to which compensation strategies reinforce or match corporate strategies. Montemayor (1996) surveyed 282 firm executives from various industries, and the statistical results of that study do not support the generic hypothesis with regard to pay and performance. This lack of support indicates that innovators have a more aggressive pay policy than cost leaders. Montemayor (1996) further suggested that the effect of matching pay policy with business strategy requires closer examination in different contexts. Yanadori and Marler (2006) sampled 237 high-tech firms, finding that a firm's strategic intention to pursue innovation has a significant influence on its relative pay levels.

In summary, previous research emphasizes the effect which pay policy combined with business strategy has on firm performance, but empirical study of this issue is limited. This study contributes to the literature on this issue from a theoretical viewpoint. In contrast to past empirical research, this study also examines whether matching pay policy and innovation strategy really does improve a firm's performance.

Framework and hypotheses

Figure 1 displays the conceptual framework investigated in this study. The framework indicates that pay policy and innovation strategy combined affect the performance achieved in a technology-based service firm. The conceptual framework further proposes that the industry type moderates this relationship. Specific hypotheses

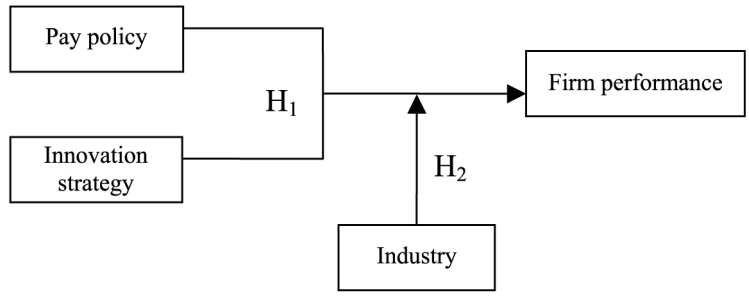

Figure 1.
Conceptual framework

concerning these relationships are detailed below, together with their underlying rationale.

The effect of matching pay policy with innovation strategy

The contingency perspective in strategic compensation theory emphasizes that a match between an organization's strategy and all its systems will result in superior performance (Milkovich, 1988; Gomez-Mejia and Balkin, 1992). Innovation has been identified in many organizations, especially high tech companies, as an important business strategy for achieving a competitive advantage. Through successful innovation, a firm may achieve uniqueness that its rivals lack. This uniqueness may allow the firm to charge a premium price, which increases the firm's performance (Porter, 1985). Miles and Snow (1984) argued that a firm pursuing an innovation strategy should adopt high pay levels to achieve better organizational performance. Prior research indicates the importance of hiring skilled employees for technology innovation (Schuler and Jackson, 1987; Almeida and Kogut, 1999).

According to the efficiency wage theory, high wages may increase efficiency and actually lower costs because they attract higher-quality applicants, decrease turnover, increase worker effort, and reduce "shirking" (Milkovich and Newman, 2004). In other words, hiring better employees or motivating present employees to work smarter or harder increases efficiency. Cappelli and Chauvin (1991) examined shirking behavior in several auto plants using employee wages, and found that higher wages were associated with lower shirking. Furthermore, Rynes and Boudreau (1986) pointed out that higher wages actually attract more qualified applicants. The longitudinal study of Tsai and Wang (2005) suggests that firms with higher wages achieve higher productivity by improving labor. From the knowledge-based perspective, Van der Bij *et al.* (2003) and Song *et al.* (2005) showed that high wage rewards can influence employee behaviors which lead to high levels of knowledge application, thereby increasing firm performance.

In practice, organizations paying higher wages believe that they will be able to attract high-quality and productive employees and thus achieve lower unit-labor costs. Higher-paying firms usually attract more and better-qualified applicants than lower-paying companies in the same market. The basic premise of this viewpoint is that pay competitiveness affects the organization's ability to achieve its compensation objectives, and this in turn affects the organization's performance (Levine, 1993). Since the technological skills and knowledge required for technology services are primarily embedded in people, innovation-oriented technology-based firms must retain a highly

qualified workforce or recruit people to pursue technology services innovation. Accordingly, technology-based service firms pursuing innovation and paying higher wages should be more likely to retain and recruit employees with greater competencies and subsequently achieve better performance within their industry. Grounded on these rationales, the first research hypothesis is as follows:

H1. Matching pay policy with innovation strategy is positively related to firm performance.

The moderating role of industry

Although not yet widely incorporated into research paradigms, industry usually serves as a substantive moderator in the relationship between business strategy and firm performance (Rumelt, 1991). From the contingency perspective, the industry environment in which a firm operates may affect its strategic intentions. These intentions, in turn, affect their HRM practices (Van de Ven and Drazin, 1985). Researchers view a technological environment as a major dimension positively associated with adopting an innovation strategy for technology-based firms. This is because technological changes can make established products and services obsolete overnight. At the same time, these changes can create a host of new products and services (Gort and Klepper, 1982). In other words, technological change enhances the importance of innovation for a firm operating in a technology-based service sector.

The pace of technological change varies between industries. Adopting an innovation strategy is more necessary for a firm in an industry with rapid technology changes to achieve competitive advantage (Tushman and Anderson, 1986; Balkin and Gomez-Mejia, 1987; Brown and Eisenhardt, 1997; Koberg *et al.*, 2003). According to the rationale of the above research hypothesis, the positive effect which a pay policy combined with innovation strategy has on firm performance will be stronger in an industry with high technological turbulence than an industry with stable technology conditions. In other words, industry may play a moderating role in the relationship between the match of compensation policy and innovation strategy with firm performance. The integrated circuit (IC) industry is an industry with highly fragmented technology. Consequently, innovation is vital to firm performance in this industry sector (Vanhaverbeke *et al.*, 2002; Ziedonis, 2004). Taiwan's IC design service industry has been typified as a technology innovator among high tech sectors in both practice and in academic research (ITIS, 2004; Chang and Tsai, 2002; Hsieh *et al.*, 2006). Accordingly, the second research hypothesis in this study is proposed as follows:

H2. The effect which pay level combined with innovation strategy has on firm performance is stronger in the IC design service industry than in software and system integration service industries.

Research methods

Variable definitions and measures

Firm performance. Firms pursue different objectives, and there is probably no single measure that fully captures firm performance (Venkatraman and Ramanujam, 1986). The ultimate success of a firm is not solely measured by its capacity to increase its sales, produce profits, or generate cash from its operations, but whether the firm's activities are creating value for its owners (Fletcher and Smith, 2004). In addition, R&D

investments usually allow a firm to benefit from efficiency improvement or differentiation, which can then lead to enhanced value added (Griliches, 1979, 1986). Prior empirical studies have invariably used value added rather than sales to measure firm performance resulting from innovation (e.g. Goto and Suzuki, 1989; Lichtenberg and Siegel, 1991; Wakelin, 2001; Tsai and Wang, 2004). Thus, in line with these past studies, this research uses value added to measure firm performance. Here value added is a dollar based measure (in NT millions dollar) constructed by the difference between the revenues of a firm and the cost of its material inputs.

Pay policy. An organization often formally or informally establishes a pay policy that determines whether it will be a pay leader, a pay follower, or merely hold an average position in the labor market (Klaas and McClendon, 1996). This study measures the pay policy of a firm by its pay levels, comparing a firm's pay with that of other firms in the same labor market. The firm's pay level is operationalized by the ratio of each employee's pay to the average pay of each employee in the same industry.

Innovation strategy. In the knowledge-creating view, innovation refers to a firm's efforts to explore or exploit technological knowledge for new product or process developments (Cohen and Levinthal, 1990). A firm's R&D expenditures can enhance its level of knowledge application, thereby increasing its competitive advantage (Song *et al.*, 2005). Previous studies have deemed R&D efforts as the most important aspect of innovation (Griliches, 1979, 1986; Cohen and Levinthal, 1990; Henderson and Cockburn, 1996). This study uses R&D expenditures as a proxy measurement of the extent to which a firm pursues an innovation strategy.

Controls. This analysis includes several important controls to provide more convincing evidence for the research hypotheses. Milkovich and Newman (2004) argued that above-market pay is more prevalent among larger companies and firms paying below-market wages tend to be small. Thus, larger firms are more successful in attracting and retaining good employees. Tsai and Wang (2005) indicated that firm size has a positive impact on firm productivity. In addition, prior research revealed that firm size is positively but weakly correlated with innovation performance (Damanpour, 1991; Van de Ven and Poole, 1995; Boeker and Huo, 1998). Counter arguments are also found in prior research. One suggestion is that as firms grow in size, efficiency is undermined either through loss of marginal control or through excessive bureaucratic control. Lichtenberg and Siegel (1991) found no higher innovation performance for large firms over their smaller counterparts. Acs and Audretsch (1990) demonstrated that innovation performance tends to decline with firm size. All these findings, whether positive or negative, suggest that there is a relationship between firm size and firm performance. This study therefore controls effects arising from firm size in the models. In line with prior research (e.g. Lichtenberg and Siegel, 1991; Tsai and Wang, 2005), this study uses fixed capital and labor to measure firm size. Labor is measured by total employees and fixed capital is measured by total fixed gross assets. This study also controls for firm age influences. Over time, a firm may adapt to environmental change with different strategies which lead to different organizational outcomes. Hannan and Freeman (1984) argued that organizational structural inertia increases with firm age, thus decreasing its liability of responding to environmental changes. Several studies have indicated that firm age is negatively correlated with innovation output (Kelly and Amburgey, 1991; Stacey, 1995). Counter claims indicate that new firms have a higher risk of failure because of insufficient resources (e.g. Fichman and Levinthal, 1991;

Mitchell, 1991). These arguments and findings, whether positive or negative, suggest that firm age may be related to firm performance. The analyses in the next section include this variable in the empirical models.

The data and preliminary analysis

This study utilized a dataset constructed by DGBAS, a cabinet-level office handling most of Taiwan's industry surveys. The serial surveys conducted by DGBAS have long been regarded as a more complete and appropriate source than any other privately conducted surveys. The data used in this study were obtained by personal interviews in 2001. A total of 3,446 firms were used for this investigation. These firms can be assigned to three service industries: information software, 3,053 firms; information system integration, 334 firms; IC design, 59 firms.

Table I provides the basic statistics of major variables for the total sample and for each industry. Table I shows two interesting findings. First, in terms of the total sample, the correlation between the value-added variable and other variables is significant at the 1 percent significance level; however, the structure of correlation in the IND3 sample differs from that in the other two service industries. For example, the relationship between R&D and value added in the IND3 sector is stronger than in the other two samples. This finding suggests that this industry may serve as a moderator. Second, three service sectors have different levels of pay for each employee and R&D investment. A Scheffe's test indicates that the average pay for each employee in IND3 is significantly higher than in IND1 and IND2 ($F = 9.18$, $p < 0.01$). The same test shows that average R&D investment in IND3 is significantly greater than in the other two sectors ($F = 20.50$, $p < 0.01$).

Results

The hypotheses in this study are tested using a three-step hierarchical regression procedure suggested by Cohen *et al.* (2003). Model 1 includes control variables including firm age, labor, and physical capital. Model 2 contains the main effects of pay level and R&D variables. The interaction term between pay level and R&D is added to Model 3. Because the interaction term is usually highly correlated with its individual variable, this study follows the straightforward procedure suggested by Friedrich (1982) to reduce or eliminate bias resulting from multi-collinearity. The approach provided by Friedrich (1982) is the standardized solution of the mean centered method, suggested by Aiken and West (1991). The criterion and the regressors must first be standardized and the cross-product term can then be formed. Table II lists results for the total sample. In terms of the adjusted coefficient of determination, Table II suggests that the models fit the data reasonably well. In addition, the variance inflation factors (VIFs) for all coefficient estimates in Model 3 are below the cut-off of 10 (Mason and Perreault, 1991), indicating that multi-collinearity does not contaminate the results. Table II shows that the addition of the main effects of pay level and R&D variables (Model 2) to Model 1 (including only the control variables) increases the R-square value by about 6 percent. The F-value for the incremental R-squared value achieves a statistical significance at the 1 percent level. Although the addition of the interaction term (Model 3) to Model 2 increases the R-square value by only 0.01 percent, the F-value for this incremental R-square value still attains a statistical significance at the 5 percent level due to large sample sizes. A one-tailed test is used for the first

Variables	1	2	3	4	5	6
1. Value added	1.000					
2. Pay (all)	0.207*	1.000				
(IND1)	0.194*					
(IND2)	0.407*					
(IND3)	0.153					
3. R&D (all)	0.415*	0.089*	1.000			
(IND1)	0.391*	0.062*				
(IND2)	0.679*	0.337*				
(IND3)	0.789*	0.049				
4. Fixed capital (all)	0.594*	0.091*	0.132*	1.000		
(IND1)	0.595*	0.087*	0.116*			
(IND2)	0.838*	0.328*	0.641*			
(IND3)	0.390*	−0.139	0.280**			
5. Labor (all)	0.803*	0.123*	0.483*	0.402*	1.000	
(IND1)	0.834*	0.119*	0.491*	0.407*		
(IND2)	0.704*	0.203*	0.563*	0.769*		
(IND3)	0.821*	−0.024	0.676*	0.621*		
6. Firm age (all)	0.182*	0.082*	0.054*	0.103*	0.210*	1.000
(IND1)	0.167*	0.090*	0.041**	0.097*	0.186*	
(IND2)	0.376*	0.128**	0.232*	0.354*	0.379*	
(IND3)	−0.047	−0.322**	−0.063	0.062	0.003	
Mean (all)	13,803	450.377	0.971	6,850.41	12.609	4.911
(IND1)	13,407	449.973	0.775	6,964.43	11.923	4.875
(IND2)	15,222	417.580	1.612	6,233.00	17.129	5.161
(IND3)	26,252	656.927	7.503	9,620.25	22.542	5.373
SD (all)	66,828	196.253	9.652	50,329	52.536	4.628
(IND1)	67,967	198.044	9.302	52,992	49.845	4.578
(IND2)	58,596	145.906	8.782	18,997	75.123	4.756
(IND3)	46,762	228.018	22.136	24,527	23.562	5.782

Table I.
Means, standard deviations, and correlation coefficients

Notes. *, $p < 0.01$; ** $p < 0.05$; three service sectors (software, information system integration, and IC design) are denoted by IND1-IND3, respectively; the unit of value added, fixed capital, and R&D is millions (NT dollar); pay, thousands (NT dollar); labor, persons; firm age, years

hypothesis because directional prediction is offered. Model 3 indicates that the estimated coefficient of the interaction between pay and R&D is positive and significant ($t = 1.75$, $p < 0.05$), supporting *H1*.

H2 states that the impact of the match between pay level and innovation strategy is contingent on the difference of industry. To test for the moderating effect of the industry, a subgroup (split group) analysis is performed with three different industries separately[1]. The Chow (1960) test is performed to assess the statistical significance of the difference in the interaction term regression coefficients across any two of the three industries. These tests indicate that the regression coefficient associated with the interaction between pay level and R&D in the IC design service industry is significantly greater than in the other two service industries ($F = 4.15$, $p < 0.05$; $F = 5.13$, $p < 0.05$).

Variables	Model 1	Model 2	Model 3	VIF
Firm age	−0.001 (−0.18)	−0.002 (−0.39)	−0.002 (−0.39)	1.065
Fixed capital	0.292 (30.80) *	0.226 (28.75) *	0.226 (28.72) *	1.782
Labor	0.690 (71.33) *	0.646 (77.34) *	0.645 (77.25) *	2.011
Pay level		0.269 (42.03) *	0.269 (42.01) *	1.177
R&D		−0.010 (−1.57)	−0.016 (−1.71)	1.570
Pay level × R&D			0.012 (1.75) **	1.389
R^2	0.8198	0.8812	0.8813	
Adj-R^2	0.8196	0.8810	0.8811	
F-value	5,193.95*	5,706.21*	4,233.23*	
ΔR^2		0.0614	0.0001	
F-value for ΔR^2		883.74*	3.06**	

Notes: *$p < 0.01$, **$p < 0.05$; figures in parentheses are t-values; $n = 3{,}446$

Table II.
Results from regression analysis

Tables III to V report the estimation results by industry using the procedure in the paragraph above. The Adj-R^2 values indicate that the models for each industry have a good data fit. Once again, the VIF values for all regression coefficient estimates in Model 3 for each industry are smaller than 10, indicating that multi-collinearity is not a problem in these analyses. Tables III and IV show that the regression coefficient estimates of pay level by R&D in IND1 (software) and IND2 (information system integration) are positive, but fail to achieve statistical significance ($\beta = 0.010, p > 0.05$; $\beta = 0.008, p > 0.05$). On the contrary, Table V suggests that a significant positive interaction effect is found between pay level and R&D in IND3 (IC design) ($\beta = 0.181$, $p < 0.05$).

Inspecting the signs and magnitudes of regression coefficient estimates is usually an insufficient analysis for interaction (contingency) hypotheses (Schoohoven, 1981). Previous studies contain two approaches on examining the nature of interaction. One is to present a graph by a partial derivative of the model; another is to assess the significance of the regression coefficient for the dependent variable at different contingency variable levels. This study adopts the second approach because it provides the significance test. The nature of interaction in each industry is examined

Variables	Model 1	Model 2	Model 3	VIF
Firm age	−0.001 (−0.18)	−0.004 (−0.70)	−0.004 (−0.68)	1.063
Fixed capital	0.309 (30.44) *	0.237 (28.11) *	0.236 (28.08) *	1.819
Labor	0.673 (65.01) *	0.633 (71.73) *	0.633 (71.65) *	2.002
Pay level		0.272 (40.09) *	0.272 (40.09) *	1.183
R&D		−0.010 (−1.18)	−0.013 (−1.67)	1.479
Pay level × R&D			0.010 (1.38)	1.326
R^2	0.8192	0.8819	0.8819	
Adj-R^2	0.8191	0.8817	0.8817	
F-value	4,586.28*	4,529.77*	3,776.26*	
ΔR^2		0.0627	0.0000	
F-value for ΔR^2		804.33*	1.91	

Notes: * $p < 0.01$; figures in parentheses are t-values; IND = 1, $n = 3{,}053$

Table III.
Results from regression analysis

Variables	Model 1	Model 2	Model 3	VIF
Firm age	0.013 (0.54)	0.032 (1.56)	0.032 (1.59)	1.148
Fixed capital	0.217 (7.83) *	0.186 (7.93) *	0.186 (7.93) *	1.502
Labor	0.766 (26.53) *	0.677 (24.45) *	0.677 (24.40) *	2.103
Pay level		0.273 (11.91) *	0.273 (11.89) *	1.445
R&D		− 0.058 (− 1.40)	− 0.053 (− 1.86)	2.026
Pay level × R&D			0.008 (0.34)	1.642
R^2	0.8297	0.8817	0.8818	
Adj-R^2	0.8282	0.8799	0.8796	
F-value	529.56*	483.09*	401.49*	
ΔR^2		0.0520	0.0001	
F-value for ΔR^2		71.21*	0.11	

Notes: * $p < 0.01$; figures in parentheses are t-values, IND = 2, $n = 334$

Table IV.
Results from regression analysis

Variables	Model 1	Model 2	Model 3	VIF
Firm age	− 0.089 (− 1.26)	0.003 (0.04)	− 0.008 (− 0.12)	1.155
Fixed capital	0.152 (1.54)	0.140 (1.54)	0.152 (1.73)	2.099
Labor	0.736 (7.46) *	0.744 (8.07) *	0.708 (7.84) *	2.217
Pay level		0.272 (4.05) *	0.238 (3.57) *	1.204
R&D		0.047 (0.59)	− 0.056 (− 0.63)	2.160
Pay level × R&D			0.181 (2.25) **	1.768
R^2	0.7251	0.7902	0.8088	
Adj-R^2	0.7101	0.7704	0.7867	
F-value	48.35*	39.92*	36.66*	
ΔR^2		0.0651	0.0186	
F-value for ΔR^2		8.22**	5.06**	

Notes: * $p < 0.01$, ** $p < 0.05$; figures in parentheses are t-values, IND = 3, $n = 59$

Table V.
Results from regression analysis

using the procedure suggested by Aiken and West (1991). This procedure tests for the significance of regression coefficient estimates for the pay level variable at one standard deviation below and above the mean R&D variable. A significantly positive relationship can be found between pay level and firm performance ($\beta = 0.281$, $p < 0.05$; $\beta = 0.265$, $p < 0.05$) in IND1, whether at a high or low level of R&D. Similarly, in IND2, a significant positive relationship is found between pay level and R&D regardless of the level of R&D ($\beta = 0.282$, $p < 0.05$; $\beta = 0.262$, $p < 0.05$). On the contrary, in IND3, a positive but insignificant relationship is found between pay level and firm performance ($\beta = 0.057$, $p > 0.05$) at a low level of R&D. At a high level of R&D, the relationship between pay level and firm performance is rather significant and positive ($\beta = 0.419$, $p < 0.01$). These statistical analyses suggest that the positive impact of the interaction between pay level and R&D on firm productivity is found only in the IC service industry. These results provide more detailed evidence for supporting *H2*.

Discussions and implications

Using secondary data, this study uses empirical evidence to determine whether or not matching pay policy and business strategy really improves firm performance. The examination focuses on business strategy and innovation strategy; and the analyses are based on a large sample of three technology-based service sectors. The results indicate that IC design services firms exhibit the positive effect of innovation strategy combined with high pay, but software services firms and information system integration services firms do not.

The industry characteristics of the three sectors considered in this study are quite similar. These industries are predominantly composed of SMEs (see the labor statistics in Table I) and are labor but knowledge-intensive (see the labor estimates in Tables III-V). In addition, the advantage of competition for a firm within these industries is based mainly on technologies, which are primarily embedded in qualified employees (Wang *et al.*, 2007). Furthermore, innovation is an important method of gaining a competitive advantage in these sectors. Since the three industries are alike, one issue worthy of further discussion arises: why are pay policy and innovation works linked in the IC service industry but not in the other two industries? Technological turbulence facing the three industries may explain this phenomenon. Technological turbulence refers to the rate of technological change. Innovation for an organization that works with nascent technological knowledge that is undergoing rapid change has been regarded as an important factor in achieving higher economic returns (Vanhaverbeke *et al.*, 2002; Ziedonis, 2004). By contrast, a more stable technological environment has alternative avenues, such as market orientation, to gaining a competitive advantage (Jaworski and Kohli, 1993). Thus, the advantage arising from innovation activities may no longer be guaranteed to the extent such alternative avenues exist. In other words, while technological change facing a firm is not rapid, the match between innovation strategy and pay level may not lead to higher economic returns. Previously mentioned reports and studies show that the IC design service industry in Taiwan has been typified as a technology innovator among high tech sectors. Thus, this may justify the inconsistent statistical findings of cross-industry interactions.

These findings have several implications for academic research and commercial practice. First, previous research argues for the effect which pay policy combined with business strategy has on firm performance, and suggests this perspective could be applied in all industries (Montemayor, 1996; Balkin and Gomez-Mejia, 1990; Milkovich and Newman, 2004). However, in terms of innovation strategy, the results of this study provide a less positive view. This study suggests that the hypothesized positive relationship between such a match and firm performance is conceptually supported in some specific industries but not in all sectors. Second, previous studies stress the benefits of multiple industry contexts while discussing the role of a human resource system. A multi-industry sample yields results with applicability for compensation professionals, regardless of industry (Arthur, 1994; Montemayor, 1996). However, their examination ignores the moderating effect of industry. The results of this study indicate that industry serves as a moderator; thus, future research should be cognizant of the contingency effect of industry when examining the validity of strategic compensation theory. Third, although many scholars argue for the effect of matching pay policy with business strategy, the findings of this study do not completely confirm

this perspective in terms of innovation strategy. Thus, for industrial managers, the results of this study suggest that matching pay policy and strategy cannot be viewed as a panacea for improving performance.

This study highlights the moderating role of industry characteristic in the relationship between the combination of pay and innovation strategy with firm performance. However, this finding is only generated from three technology-based service sectors. In the future, the validity of this result should be further examined in other contexts. Nevertheless, this study contributes to the field of human resources management in service sectors.

Note

1. This procedure is equal to the execution of a large, three-way interaction model. This study does not adopt such a model because for ease of interpretation and reading comprehension. Please refer to Aiken and West (1991) specifications of an interaction model with dummies. Indeed, using a split group analysis to examine the strength of moderation for each subgroup has been documented in prior research (e.g. Venkatraman, 1989; Jaworski and Kohli, 1993).

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