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THE EFFECTIVENESS OF ORGANIZATION-WIDE
COMPENSATION STRATEGIES IN TECHNOLOGY
INTENSIVE FIRMS

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Abstract

This study examines compensation strategies formulated and implemented by high technology firms and their relative effectiveness. Based on a sample of 173 firms, empirical results indicate that the following pay strategies are most appropriate for high technology organizations: A greater emphasis on the individual rather than the job as the unit of analysis, sharing of risks between employees and the firm, an external market orientation, dispersed decision making authority for pay allocation purposes, reliance on aggregate incentives and a longer time orientation.

Key Words

Compensation strategies; High technology; sharing risk; incentives.

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ABSTRACT

This study examines compensation strategies formulated and implemented by high technology firms and their relative effectiveness. Based on a sample of 173 firms, empirical results indicate that the following pay strategies are most appropriate for high technology organizations: A greater emphasis on the individual rather than the job as the unit of analysis, sharing of risks between employees and the firm, an external market orientation, dispersed decision making authority for pay allocation purposes, reliance on aggregate incentives and a longer time orientation.

INTRODUCTION

Several earlier studies have shown that high technology firms tend to develop unique compensation strategies that are congruent with an organizational culture that emphasizes innovation (e.g., Balkin & Gomez-Mejia, 1984; Welbourne, Balkin, & Gomez-Mejia, 1990; Martell, Carroll, & Gupta, 1992). While this research has provided valuable information about compensation practices in high technology firms, it suffers from two major limitations. First, the compensation measures used are rather narrow, focusing primarily on pay mix and the various elements of the compensation package. Broader compensation strategy issues at a policy level, such as individual vs. job as unit of analysis, market positioning, time orientation and the like have not been examined. Second, earlier studies have tended to be descriptive, ignoring the relative effectiveness of various compensation strategies as a function of a firm's technological intensity.

The present study is designed to fill the research gap noted above. We first provide an overview of the characteristics of high technology firms derived from the literature. Next, we postulate a series of hypotheses as to which compensation strategies are most appropriate for the idiosyncratic nature of high technology firms. Third, we test the hypotheses postulated in the second part of the paper. To this end, we present survey data based on a sample of 173 firms to empirically examine which

compensation strategies tend to be associated with technology intensive firms and the relative effectiveness of those strategies.

CHARACTERISTICS OF HIGH TECHNOLOGY FIRMS

There is a relatively large literature documenting the unique features of high technology organizations. These features may be grouped into four categories: Individual traits, organizational factors, environment, and strategic orientation. These are briefly reviewed below.

Individual Traits

Several authors have argued that certain employee traits distinguish workers in high technology firms from their counterparts in other companies. While as a whole the evidence for these reported differences is perceptual or based on subjective assessments by researchers, there is general agreement that high technology firms share a prototypical profile of the kind of employee that is attracted to this sector and that is hired by these firms. The individual characteristics most frequently cited include:

- o A strong achievement orientation and a high drive to succeed (Galbraith, 1989; Galbraith & DeNoble, 1995)

- o Willingness to take risks and high tolerance for ambiguity (Balkin & Gomez-Mejia, 1989). Some have noted that high technology firms tend to hire younger workers which are more prone to exhibit these traits (Coombs & Rosse, 1992). Key employees, even if working as part of the team, tend to have a significant impact on organizational success. It is frequently noted that a disproportionate share of inventions may be attributed to a relatively small number of employees (Gomez-Mejia & Welbourne, 1990)

- o There tends to be weak allegiance or loyalty of employees to any given firm, creating higher rates of attrition (Anderson & Kleingartner, 1987; Drory, 1992).

- o There is a prevalence of "knowledge workers." High tech firms tend to have a high proportion of scientists and engineers who are more committed to the profession than to a particular firm because of occupational socialization (Allen, Lee, & Tushman, 1980).

- o There is a high rate of technical obsolescence. In some areas, such as biotechnology, a scientist's skills may become obsolete three years or less after graduation (Martell et al., 1992).

Organizational

A large number of studies, mostly using a case method, have documented the existence of unique organizational characteristics associated with high technology firms. Some of the most salient one include:

- o An eagerness to accept organizational changes, which are often abrupt, as a normal part of organizational routines (Hart & Quinn, 1992).
- o Tasks are highly uncertain and tend to have a long time horizon (Mohrman, Morhman, & Worley, 1990).
- o Fluid internal barriers creating a blending of people and ideas prompted by intensive interaction across disciplinary and functional lines (Uhl-Bien & Graen, 1992).
- o Short product life cycles, seldom exceeding three years (Brown & Eisenhardt, 1995).
- o Research projects, as well as business plans, may have to be altered overnight as a result of a new product release (Bommer & Barton, 1995).
- o Jobs are in a constant state of flux and can't be easily defined (Fryxell & Judge, 1995).

- o Lack of reliance on traditional personnel function and avoidance of mechanistic procedures to make human resource decisions (Mohrman, Mohrman, & Worley, 1990).
- o Need to channel resources to R&D, the core function of the firm, reducing expenditures in other areas (Gomez-Mejia, Balkin, & Milkovich, 1990).
- o A high degree of decentralization and autonomy of various segments of the organization to shift decision making to the lowest possible levels within the firm (Jelinek & Schonhoven, 1995).
- o Basic tension resulting from two opposite forces: need to provide for quick response due to fast pace of change, evolving complexity, and varying interdependence versus the pressure for business predictability and control (Mohrman, Mohrman, & Cohen, 1994).
- o Low levels of hierarchy with few bureaucratic trappings, requiring performance management practices that acknowledge uncertainty, volatility of measurement criteria, and reliance on professional standards/expertise to make ad hoc decisions (Maidique & Hayes, 1984).

- o Weak dependence on superiors. The performance of subordinates is often invisible to supervisors given low task programmability, high information asymmetries (because it is difficult to judge what people are doing), and lack of clarity in the performance clues (Mar, Newell, & Saxberg, 1985).
- o High outcome uncertainty given the difficulty of establishing unambiguous cause-effect linkages (Eisenhardt, 1985).
- o Long delays between time actions are taken and feedback received (Bentley, 1992).
- o Probability that technical success will lead to commercial success is uncertain at best, with most patented inventions failing to generate sufficient revenues to cover the development costs (Gomez-Mejia, Balkin, & Milkovich, 1990)
- o High tolerance of failure to promote entrepreneurial activities within the firm (Galbraith, 1989).

Environment

The organizational characteristics outlined above tend to reflect the environment facing high technology firms. In fact,

these are often posited as adaptations to the external environment or as coping mechanisms(Jelinek & Schoonhoven, 1994). The literature provides the following general depiction of this environment:

- o A high concentration of firms in "technology centers" to capitalize on a common knowledge base and accessibility to human input necessary to foster innovation (e.g., one or more major research universities)(Cheng & Bozeman, 1993).
- o The possibility of radical innovations being introduced by competitors creates a race to the market place (Ettlie & Penner-Hahn, 1994).
- o High environmental complexity at all levels because of many players jockeying for positions and precipitating sudden changes in the competitive landscape (e.g., strategic alliances, joint ventures, mergers and acquisitions)(Koberg, Sarason, & Rosse, 1996).
- o Short time frame to recapture R&D investments because imitation from competitors is often swift and/or standardization may cause prices to fall (Lapides & Ottensmeyer, 1994).

- o High velocity of change making it difficult to engage in long range planning because there is rapid and discontinuous movement in demand, competition, and technology, such that information is often inaccurate, unavailable or obsolete (Franko, 1989).

Strategic

While the body of literature on the business strategies followed by high technology firms is rather limited, two characteristics stand out:

- o There is a greater emphasis on "built" rather than "harvest" strategies because the competitive landscape changes too quickly to take advantage of a particular product/service for very long (Kaiser & Ross, 1994).
- o There is a deliberate strategy of innovation, what has sometimes been described as "creative destruction" in order to be first to market (McCutchen & Swamidas, 1994).

Summary of Characteristics

In summary, the literature suggests that high technology firms share a common set of features that distinguishes them from other types of organizations. Six overriding themes are recurrent in this literature which capture the essence of high technology firms from a management perspective. First, these firms are

exposed to a high degree of risk due to uncertainty and unpredictability in their organizational transformation processes, outcomes, and environment. Second, the ability to deal effectively with a high velocity of internal and external change is critical for the relative performance or the survival of these firms. Third, the success of high technology firms is heavily dependent on the creation of knowledge and innovation, which is often of a radical nature. Fourth, these firms tend to rely on organic organizational structures, avoiding bureaucratic procedures that prevent quick responses to internal or external jolts. Fifth, the quality of information available is generally poor and ambiguous, so that decisions must often be made by "the seat of the pants." Finally, high technology firms often face extreme complexity at all levels because of the many variables which must be simultaneously taken into account by decision makers. These individuals are forced to make choices on the edge or frontiers of knowledge, with results that may not be accurately assessed until it is perhaps too late.

COMPENSATION STRATEGIES THAT ARE MOST APPROPRIATE FOR HIGH TECHNOLOGY FIRMS

In this part of the paper, we argue that the characteristics of high technology firms reviewed above require a set of compensation strategies that facilitate the successful management of these firms in light of the constraints and challenges they face. While earlier research has shown that the compensation mix differs between high technology and traditional firms (Balkin &

Gomez-Mejia, 1984, 1987), little is known about other fundamental policy issues concerning compensation strategies that may have a direct impact on the extent to which the pay system contributes to the achievement of organizational objectives. Seven hypotheses are proposed here as to which compensation strategies are most likely to be utilized by high technology firms and the relative effectiveness of these strategies.

Individual vs. Job as Unit of Analysis

Job evaluation have been in use for at least 50 years to assess the value of different jobs to the firm and assign pay rates to incumbents who hold particular job titles (Milkovich & Newman, 1996).

Job evaluation procedures are most appropriate for firms with stable technologies and environment which allow for the classification of predefined jobs within an organizational structure. As turbulence in the environment increases, and internal change augments accordingly, job based evaluation becomes more difficulty because the tasks are in a constant state of flux. The ambiguity, unpredictability, and complexity of the tasks to be accomplished forces employees to be flexible in order to meet new and unforeseen challenges (Masters, Tokesky, Brown, Atkin, & Schoenfeld, 1992). The existence of a job evaluation scheme which defines the duties of each individual and that differentially rewards employees based on the tasks assigned to them by virtue of the job they hold would be counterproductive in

this type of setting because it confines rather than expands the range of activities that could potentially be accomplished.

In addition, job evaluation schemes would have a negative impact on the effectiveness of the pay system for high technology firms because knowledge workers should be rewarded for their contributions to innovation rather than for their position in the pecking order of the organizational hierarchy (Gomez-Mejia, Balkin, & Milkovich, 1990). Therefore, among technology intensive firms employees should be rewarded for their skills, knowledge, and ideas, with job titles and level in a predetermined organizational structure playing a lesser role. The following hypotheses are derived from the above logic:

Hypothesis 1.1: High technology firms tend to emphasize the individual rather than the job as the unit of analysis for pay allocation purposes.

Hypothesis 1.2: Individual based compensation strategies tend to be more effective than job based compensation strategies in high technology firms.

Risk Sharing

As noted earlier, a common thread in the literature on high technology firms is that risk is a key distinguishing feature of these companies. The compensation system may help reduce some of the firm risk to the extent that employees share part of the performance uncertainty (in the form of less secure income) with the organization, releasing committed resources away from labor

costs into research and development. Risk sharing is reflected in four compensation strategies that may be followed by the firm (Gomez-Mejia & Balkin, 1992). These four elements of compensation risk are briefly discussed below.

Performance versus seniority. The firm may reward employees primarily for their assessed contributions or length of time within the company. Obviously performance carries more risk as a criterion than seniority because the latter is perfectly predictable while the former is subject to various forms of uncertainty (measurement errors, biases, unforeseen events, etc.).

Risk Seeking Versus Risk Aversion. The firm may actively encourage employees to take greater risks (e.g., by funding projects with high potential but also a high probability of failure) or it may discourage risk by reducing the utility associated with assuming more risk (e.g., by being heavily penalized if outcomes are not as favorable as expected). The compensation system plays a major role in this since pay represents a major consequence associated with the attainment or lack of attainment of desired outcomes (Newman, 1988).

Fixed Versus Variable Pay. Most of the earlier empirical studies on the compensations strategies of high technology firms focus on this factor (e.g., Balkin & Gomez-Mejia, 1984, 1987).

This refers to the extent to which pay is received in a predictable fashion (normally in the form of a salary) or it is subject to changes overtime based on variations in some criterion (such as profitability). By definition fixed pay carries less risk to the employee than variable pay since the individual can "count on it" at defined intervals (e.g., monthly or biweekly). The other side of the coin is that fixed pay carries more risk to the firm because it commits resources ex-ante even though the flow of future resources to the firm is unknown.

Market Pay Policy. Firms can foster more risk sharing by recruiting employees at "below market" salaries (which represent a fixed cost), while simultaneously providing greater potential for gains in the future (such as awarding generous stock options). Of course, employees incur greater opportunity costs by accepting lower guaranteed pay than wages offered by competitors (which implies more income risk) yet this risk is compensated by higher promissory payments linked to uncertain criteria (Balkin & Bannister, 1993)

The above four dimensions of pay risk form different elements of a more general compensation strategy, which we will call risk sharing for short. We expect high technology firms to emphasize greater risk sharing with employees for three primary reasons. First, the unanticipated costs associated with uncertainty, change, lack of information, and complexity can be

reduced by "spreading" the burden to all members of the firm. Second, risk sharing offers the company greater flexibility to redirect scarce resources and make riskier investment decisions because the consequences of failure are more diffused (i.e., amongst employees and the firm). Third, risk sharing reinforces an organizational culture that is consistent with the features of high technology firms discussed earlier. The following hypotheses are derived from the above arguments.

Hypothesis 2.1: High technology firms are more likely to emphasize risk sharing in their compensation strategies.

Hypothesis 2.2: An emphasis on risk sharing leads to greater pay effectiveness among high technology firms.

Market Driven Pay Versus Internal Consistency

This compensation strategy refers to the extent to which the firm pays its employees based on external comparisons vis-a-vis assessments of the relative positioning of pay scales within the firm (Lawler, 1990). High technology firms must be very responsive to meet the market value of each individual because they are heavily dependent on the human capital of knowledge workers. The contributions of these employees is very uneven, and the market information on the quality of engineering and scientific personnel is widely shared within the industry (e.g., through patents and publications). Failure to make these distinctions in pay allocations may lead to the exodus of the

best performers who are likely to face more lucrative options offered by competitors.

A compensation strategy emphasizing internal consistency or internal equity also tends to slow down decision making because this typically requires multiple committees to examine job analysis data, make cross-comparisons among positions and reach political compromises (Milkovich & Newman, 1996). However, the market for high technology talent tends to evolve rapidly, and the firm needs to respond quickly to attract critical employees and retain key contributors. Emphasizing internal equity while at the same time being responsive to market changes may lead to a self-destructive dialectic cycle. This is because the variance in pay within jobs would tend to be rather high and the organization may be forced to pay above the preset limits for each job defeating the purpose of trying to achieve internal consistency. The following hypotheses are derived from the arguments made above:

Hypothesis 3.1: High technology firms are more likely to emphasize external equity in their compensation strategies.

Hypothesis 3.2: A compensation strategy emphasizing external equity is more likely to be effective among high technology firms.

Discretion Versus Uniformity

Firms can choose different levels of standardization in their compensation policies (Lawler, 1990). At one extreme, one

may find very rigid compensation systems that allow few exceptions to the rules or existing norms. At the other extreme, one may find compensation systems that provide much latitude in decision making, avoiding the uniform use of criteria and procedures to make pay allocations. There are two dimensions that capture the relative degree of discretion or uniformity in the compensation system used by a firm, which are discussed below:

Decentralization Versus Centralization of Decisions. This refers to the extent to which pay allocations are directly controlled by specialized functional units within the firm (normally a Human Resource Department at the corporate or business unit level) or the authority and process to make these decisions are deliberately spread out throughout the firm (Carroll, 1987, 1988).

Degree of autonomy given to supervisors. This refers to the extent to which supervisors are given flexibility to make compensation decisions subject to budgetary constraints, enjoying the freedom to make judgments and create exceptions as necessary to deal with special circumstances (e.g., the supervisor has a hunch that one of his/her key contributors is interviewing with competing firms) (Lea & Brostorm, 1988).

A compensation strategy that provides a greater degree of discretion is more likely to be appropriate for high technology

firms for several reasons. First, the complexity and uncertainty facing these firms make it difficult to reach the most reasonable pay allocations from a centralized location. Second, information asymmetries within the firm would tend to create conditions where centralized pay decisions are unlikely to be the most opportune ones. Third, knowledge workers tend to have more information about the contributions of their colleagues than professional bureaucrats or managers so that their input in these pay allocations (e.g., team leaders) is important. Finally, supervisors need to have substantial autonomy in making pay determinations for their subordinates because many factors should be considered when judging the performance and contributions of R&D workers (difficulty of task, integration in a team, ideas generated) which are difficult, if not impossible, to ponder in a centralized system. The next two hypotheses follow from the above arguments:

Hypothesis 4.1: High technology firms are more likely to emphasize discretion in their compensation strategies.

Hypothesis 4.2: A compensation strategy emphasizing discretion is more likely to be effective among high technology firms.

Aggregate Versus Individual.

This compensation strategy refers to the unit of analysis used to measure employee performance. At one extreme, the firm may reward the individual based on his/her assessed contributions. At the other extreme, the firm may link financial

rewards to the performance of teams or larger units (e.g., department). An aggregate compensation strategy is more appropriate when the following conditions are present (Gomez-Mejia & Balkin, 1992):

- o The performance of the group or team may be measured more precisely than the contributions of each individual.
- o There is a high degree of uncertainty, interdependence, and complexity in the tasks carried out by employees.
- o The firm wishes to encourage a high degree of cohesiveness in the work force and foster a climate of cooperation.
- o The organization intends to promote innovation through the use of cross-functional teams.
- o Freeriding is not a major problem as employees are intrinsically interested in their tasks.

Reliance on aggregate incentives is expected to be common among high technology firms as these incentives are appropriate to the idiosyncratic characteristics of these companies discussed earlier. These incentives can help fuel innovation by bringing together disparate individuals to achieve common goals (King & Sethi, 1992). Freeriding should not be a significant concern

among high technology employees as most of these workers are highly educated (often with a doctorate or a post graduate degree). Most projects are completed by teams so that linking rewards to group performance fits naturally with the tasks being accomplished. The following hypotheses are derived from the above arguments.

Hypothesis 5.1: High technology firms are more likely to emphasize aggregate incentives in their compensation system.

Hypothesis 5.2: Aggregate incentives are more likely to be effective among high technology firms.

Time Orientation

This compensation strategy refers to the time horizon used to reward employees (Chandler, 1993). Among high technology firms, this is an important issue because the results of particular research projects may require years to be assessed, especially if one is to consider the commercial value of these projects. Some estimate that feedback concerning the relative success or failure of a major research effort may require as much as 10 years (Van Fleet et al., 1995).

We expect that high technology firms will emphasize long-term incentives for several reasons. First, as noted above, performance information becomes more accurate with time. Second, long-term incentives will tend to create more loyalty of individuals to the firm, a major challenge faced by these

companies. Third, long-term incentives may impose "golden handcuffs" on employees, making it more costly to change employers because of forfeited accrued gains. Some companies may actually place restrictions on when this long-term income may be received. Lastly, reliance on long-term incentives is less expensive to the company in the short term as these are often awarded in the form of promissory notes. This enables high technology firms to channel scarce dollars into R&D investments. The last set of hypotheses follows from the above arguments:

Hypothesis 6.1: High technology firms are more likely to have a long-term orientation in their compensation system.

Hypothesis 6.2: High Technology firms are more likely to have an effective pay system if it is designed with a long-term orientation.

METHODS

Sample

The sample consisted of 173 firms representing 40 different states. Each firm had at least 500 employees, with sales revenues falling in the 141-500 millions dollars a year range for most participating organizations. The information from each firm was provided by the most senior human resource director in charge of compensation. None of the organizations used for this study were "unrelated diversified" or "conglomerates" to ensure that the firm may be used as the unit of analysis. Additional demographic data about these firms is available from the authors given space limitations.

Operational Measures

Compensation Strategies

The human resource directors were asked to describe the compensation strategies used by their firm by responding to a set of items tapping each of the appropriate compensation dimensions. These represent a subset of items and composite scales that were validated in earlier research by Gomez-Mejia (1992) and Balkin and Gomez-Mejia (1990). These are shown in the Appendix for each of the compensation constructs hypothesized to vary according to the firm's technological orientation, namely individual versus job, risk sharing, market versus internal consistency, decentralization versus centralization, aggregate vs. individual, and time orientation.

High Technology

The technology intensity of each firm was measured on a 1 to 5 scale, with each anchor point representing a range of the firm's total operating expenses devoted to research and development activities: (1) under 5%; (2) 5-10%; (3) 11-16%; (4) 17-22%; (5) More than 22%.

Control Variables

Six control variables were used in the study that may have an influence on compensation strategies and their effectiveness (Gomez-Mejia & Balkin, 1992). These include: Labor costs as a

proportion of total costs, firm size, life cycle stage, whether or not the firm is owner managed, whether or not there is any single individual or institution outside the firm that owns %5 or more of the company's stock, and the industrial sector of the firm. The variance explained by these factors on the dependent variables were partialled out in the analysis.

Pay Effectiveness

Pay effectiveness was measured using a five item composite scales validated in an earlier study by Balkin and Gomez-Mejia (1987). The response format for each item ranged from (1) strongly disagree to (5) strongly agree. The items are shown in the appendix.

Analysis

The hypotheses were tested via multiple regression. The first set of regressions (Table 1) examined the extent to which technological intensity exerted an influence on each of the compensation strategy dimensions, as predicted by the first part of each of the hypotheses. The control variables were entered first, and R&D intensity was entered last, with each of the compensation strategy dimensions representing a separate dependent variable. The second set of regressions (Table 2) tested the interaction hypothesis with pay effectiveness as the dependent variable. The control variables and the compensation strategies were entered first, with the cross-product terms for

R&D intensity and each of the corresponding compensation strategy scales entered last.

RESULTS

Table 1 presents a summary of the regression results with each of the compensation strategies as a separate dependent variable, and technological intensity as an independent variable, partialling out the control variables listed above. The corresponding hypothesis being tested is noted under each heading across the top. As can be seen in that table, the R&D intensity variable had a statistically significant impact on each of the compensation strategy measures, with the effect being greatest for risk sharing and market vs. internal consistency.

The results show that the greater the R&D intensity: (1) The more a firm is likely to use the job as the unit of analysis [for this dependent variable a high score means greater reliance on job based criteria]; (2) the more risk sharing there is in the compensation system; (3) the more the organization utilizes the market as a frame of reference [for this dependent variable a high score means greater reliance on internal consistency]; (4) the more discretion exists to make pay decisions; (5) there is heavy reliance on aggregate incentives; and (6) there is a longer time orientation in the reward schema.

Table 2 tests the interaction hypotheses. As can be seen in the lower portion of the table, five of the six cross-product terms were found to be statistically significant (with market vs. internal consistency representing the only exception). The additional percent of variance in pay effectiveness accounted for by the cross-product terms ranged from a $\Delta R^2 = .017$ for risk sharing (Hypothesis 2.2) to a $\Delta R^2 = .068$ for job as the unit of analysis (Hypothesis 1.2).

DISCUSSION AND CONCLUSIONS

The study reported here indicates that high technology firms formulate a unique set of compensation strategies that distinguishes them from other companies. Furthermore, the compensation strategies are associated with the effectiveness of the pay system as a function of a firm's technological intensity. In other words, high technology firms adopting a certain profile of compensation strategies tend to have a more effective pay system than those that don't. This profile is characterized by greater emphasis on the individual rather than the job as the unit of analysis, more risk sharing, an external market orientation, substantial discretion in making pay decisions at multiple points within the firm, an emphasis on aggregate incentives, and a longer time orientation.

These results corroborate and extend earlier findings by Balkin and Gomez-Mejia (1984, 1987) based on a sample of high

technology firms from "Route 128" in the Boston area. Their study examined how the compensation mix of high technology firms differs from traditional firms. They found that a higher proportion of variable pay tends to be more effective among high technology firms, particularly those that are smaller in size and at early stages of the life cycle.

These pioneer studies by Balkin and Gomez-Mejia suffered from three major limitations that are overcome in the research reported here. First, the geographic area was rather restricted (Boston) so that imitation may have accounted for some of their findings. Second, broader compensation strategies were not considered because the focus was on the structure of the compensation package itself (i.e., pay mix). Third, Balkin and Gomez-Mejia categorized businesses into two mutually exclusive types: high technology versus traditional. While this dichotomy may be useful for comparative purposes, it is obviously an oversimplification of reality. The measurement approach used here to depict high technology is more accurate because level of technological intensity is assessed on a continuous scale. When we analyze compensation strategies of high technology firms in this article, we are referring to pay policies adopted by firms at the high end of the technology spectrum. This does not mean that firms with lower technological intensity do not adopt these types of pay strategies but that these policies are used less

frequently and might be less effective for them given the limitations, challenges, and needs they face.

In terms of the larger human resource strategy literature, this study has several implications. First, compensation plays a major role in the implementation of a firm's strategy. That is, an innovation strategy or a strategic choice of becoming more technology intensive is supported by a corresponding set of pay strategies. Second, a greater match between pay strategies and the firm's overall strategic thrust is related to pay effectiveness. This is an important issue because compensation represents the largest single expense item for high technology firms, which are labor intensive and required to have specialized and highly skilled work force at premium wages. Third, compensation strategies are not universally effective and must consider the context in which they are being used.

In concluding this article, it is important to note several limitations of the study that raise some challenges for future research. First, the pay effectiveness measure is based on an assessment of the human resource executives. This can be problematic if these executives try to justify compensation strategies they may have helped formulate and implement. Second, we only used one cognizant respondent from each firm so that it is possible that different perspectives may be obtained if other organizational members had participated in the survey (e.g.,

union members, supervisors). Third, compensation represents only one area of human resource management. It is likely that other human resource practices also play a role in the results reported here, so that pay does not act in isolation. For instance, staffing, training and development, work flows, and performance evaluation may all have a singular and combined impact on pay effectiveness. Lastly, the percent of variance explained in the dependent variables is not very large, hovering around 5%. This suggests that other factors not considered here may exert a substantial influence on pay effectiveness.

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Table 1

**Summary of Regression Results with Compensation Strategies as Dependent Variables
and Technological Intensity as Independent Variable, Partialing out Control Variables (N=173)**

	Individual vs. job		Risk-sharing		Market vs. internal consistency		Discretion vs. uniformity		Aggregate vs. individual		Time orientation	
	(Hypotheses 1.1)		(Hypotheses 2.1)		(Hypotheses 3.1)		(Hypotheses 4.1)		(Hypotheses 5.1)		(Hypotheses 6.1)	
	<u>B/SE</u>	<u>Beta</u>	<u>B/SE</u>	<u>Beta</u>	<u>B/SE</u>	<u>Beta</u>	<u>B/SE</u>	<u>Beta</u>	<u>B/SE</u>	<u>Beta</u>	<u>B/SE</u>	<u>Beta</u>
Control Variables												
Labor costs as a proportion of total costs	-.124 (.080)	-.124	.004 (.063)	.006	-.138 (.084)	-.020	-.035 (.070)	-.037	.044 (.093)	.038	.117 (.079)	.111
Firm size	.113 (.097)	.127	-.031 (.076)	-.044	.103 (.099)	.111	-.169* (.086)	-.205	-.103 (.111)	-.099	-.263** (.094)	-.280
Life stage	.035 (.164)	.022	-.054 (.127)	-.046	-.090 (.167)	-.057	-.302* (.145)	-.212	.060 (.186)	.034	.028 (.158)	.017
Owner managed	.158 (.125)	.094	-.142 (.099)	-.109	.236 (.126)	.142	-.191 (.106)	-.129	-.245 (.139)	-.133	-.263* (.120)	-.154
External ownership	-.396* (.169)	-.176	.372** (.134)	.213	-.250 (.178)	-.107	.257 (.151)	.123	.391* (.197)	.151	.508** (.168)	.213
Industrial sector	-.596 (.778)	-.058	-.350 (.610)	-.044	-.174 (.676)	.019	-.052 (.572)	-.007	-.456 (.911)	-.038	-.438 (.643)	-.049
Predictor												
R&D Intensity (High Tech)	-.199** (.078)	-.222	.223*** (.061)	.321	-.329*** (.080)	-.352	-.197** (.070)	.234	.264** (.091)	.254	.193** (.076)	.205

*P ≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001

Table 2
Summary of Regression Results Showing Impact of Compensation Strategies and
Their Cross-Product Terms (Interactions) with Technological Intensity
on Pay Effectiveness as a Dependent Variable (N=173)

	Dependent Variable: Pay Effectiveness			
	B/SE	Beta	T	ΔR^2
Control Variables				
Labor costs as a proportion of total costs	.009 (.068)	.010	.132	
Firm size	.031 (.071)	.040	.443	
Life stage	-.072 (.116)	-.056	-.622	
Owner managed	-.122 (.197)	-.042	-.622	
External ownership	.229 (.134)	.118	1.713	
Industrial sector	-.217 (.478)	-.031	-.455	
R&D intensity (High tech)	.116 (.060)	.209	2.560**	
Compensation Strategies				
Individual vs. job (Job base)	-.015 (.064)	-.017	-.230	
Risk-sharing (Risk)	-.076 (.044)	-.091	1.276	
Market vs. internal consistency (Consist)	.102 (.062)	.120	1.640	
Discretion vs. uniformity (Disc)	-.056 (.072)	-.060	-.789	
Aggregate vs. individual (Aggr.)	.061 (.052)	.081	1.159	
Time orientation (Time)	.026 (.061)	.032	.431	
Interactions				
High tech x Job base (Hypotheses 1.2)	-.015 (.064)	-.017	-4.110***	.068***
High tech x Risk (Hypotheses 2.2)	.089 (.044)	.568	2.012*	.017*
High tech x Consist (Hypotheses 3.2)	-.030 (.044)	-.115	-.692	.001
High tech x Disc. (Hypotheses 4.2)	.143 (.049)	.902	2.893**	.036*
High tech x Aggr. (Hypotheses 5.2)	.127 (.422)	.824	3.381***	.047***
High tech x Time (Hypotheses 6.2)	.159 (.041)	.983	3.821***	.060***

*P ≤ 0.05, ** P ≤ 0.01, *** P ≤ 0.001

Note: Regression coefficients for compensation strategies and interaction terms shown in table correspond to each of these variables entered one at a time after control variables were entered first

Appendix

Compensation Strategies and Pay Effectiveness Measure

Individual vs. job

- (a) We have a job-based pay system. That is, factors within the job are key determinants of the amount of pay received by incumbents.
- (b) We have a skill-based pay system. That is, individuals are rewarded in part on their mastery of job skills.*
- (c) The job is a more important factor than an incumbent's ability or performance in the determination of pay rates in this organization. Heavy emphasis is placed on job evaluation procedures to determine pay levels.

Risk Sharing

Performance emphasis

- (a) Firm has a strong commitment to distribute rewards based on contributions to organization.
- (b) There is a large pay spread between low performers and high performers in a given job.
- (c) An employee's seniority does not enter into pay decisions.

Risk emphasis

- (a) In this organization a portion of an employee's earnings is contingent on group or organization performance goals being achieved.
- (b) We designed compensation system so that a substantial portion of our compensation costs is variable.
- (c) We believe that employees should be risk takers with some of their pay.

Incentives vs. fixed pay

- (a) The base salary is an important part of the total compensation package.*
- (b) The base salary is high relative to other forms of pay that an employee may receive in this organization.*
- (c) The benefits are an important part of the total pay package.*
- (d) The employee benefits package is very generous compared with what it could be.*
- (e) Pay incentives such as a bonus or profit sharing are an important part of the compensation strategy in this organization.
- (f) Pay incentives are designed to provide a significant amount of an employee's total earnings in this organization.

Market Positioning

- (a) Preferred position of organization's salary levels with respect to competitors is clearly above market.
- (b) Preferred position of organization's benefits

Market vs. internal consistency

- (a) Internal pay equity is an important goal of our pay system.
- (b) We try hard to achieve comparable pay relationship across different parts of the organization.
- (c) In our organization we give a higher priority to internal pay equity than we do to external market factors.

Discretion vs. uniformity

Decentralization vs. centralization of pay policies

- (a) Pay policy is not centralized in this organization.
- (b) The Personnel staff in each division/business unit has freedom to develop its own compensation programs.
- (c) There is a minimum of interference from corporate headquarters with respect to pay decision made by line managers.

Autonomy/Flexibility

- (a) Pay system is not highly regimented.
- (b) Compensation structure is very flexible and can be modified as needed.
- (c) While general rules exist, many pay decisions are "one of a kind" with considerable discretion on a case by case basis.

Aggregate vs. Individual

Individual performance is emphasized as a basis for pay rather than group performance.

Long- vs. short-term orientation

- (a) The pay system has a futuristic orientation. It focuses on employee's attention on long-term (two or more years) goals).
- (b) The pay system rewards employees for short-term accomplishments during a fixed time period.

Pay Effectiveness

Our pay policies and practices are highly effective.

Management is very happy with the way the compensation system contributes to the achievement of overall organizational goals.

All things considered, the compensation strategies used in our organization truly give shareholders "their money's worth".

Our pay policies and practices greatly contribute to retention, attraction, and motivation of employees.

Note: Asterisk denotes that item is reverse scored.

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