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Recognizing Risk in Human Capital Investments: A Real Options Approach to Strategic Human Resource Management

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Keywords
job, human resource, employee, work, firms, labor, market, skill, management, capital

Comments

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Recognizing Risk in Human Capital Investments: A Real Options Approach to Strategic Human Resource Management

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Abstract

An issue that has not yet been explored in the field of strategic human resource management (SHRM) is that of managing the 'risks' involved in human capital management of the firm. We address this issue using the real option theory framework. We argue that certain HR practices manage risk and generate opportunities for the firm by creating 'options' for its human capital management. These HR options help ensure stability of returns from human capital and thus sustain competitive advantage. Different types of HR options and the role of certain HR practices in creation of these options are discussed.

INTRODUCTION

Over the past 10 years, significant research attention has been devoted to empirically examine the relationship between HR practices and firm performance. Numerous studies have established the positive linkage between high performance HR practices and superior firm performance (Arthur, 1994; Delery & Doty, 1996; Huselid, 1995; Youndt, Snell, Dean, & Lepak, 1996). This linkage has been empirically validated in studies replicated in several countries (Guthrie, 2000; Harel & Tzafrir, 1999; Kim, 1999; Wood, 1998).

Researchers now call for examining how these HR practices translate into greater firm performance (Becker & Gerhart, 1996; Becker & Huselid, 1998; Delery, 1998; Wright & Sherman, 1999). Becker and Huselid (1998) suggest two primary processes through which this impact takes place. First the "…HRM-firm performance relationship could be largely driven by a more efficient management of a firm's HR, and the consequent contribution to lower operating costs…" (p 56). This translates to HR practices being a set "cost reducing" techniques.

The second means through which HR practices can impact firm performance is through the notion of HRM as a strategic asset. Grounded in the resource-based theory, Becker and Huselid (1998) argue that interrelated *systems* of HR practices are inimitable and can provide a strategic lever for the firm. These systems are the basis for the "…acquisition, motivation, and development of the intellectual assets that can be a source of competitive advantage." (p. 55)

More focus among academics has been on this latter process where HR practices are hypothesized to impact the intellectual capital (or human capital), which is viewed as one of a firm's most strategic assets (Snell, Youndt, & Wright, 1996; Wright, McMahan & McWilliams, 1994). This focus on HR practices as impacting the asset of human capital shifts the focus to HR as having a strategic role, rather than simply being viewed as a "cost center" (Becker & Huselid, 1998). However, this treatment of the human capital as an asset has universally focused only on the upside value inherent in an asset. If one accepts the argument that human capital should be treated as an asset, then one necessarily must recognize that any asset entails risk and part of the strategic management of a firm requires managing that risk. The issue of managing the risk of human assets has been unexplored in the Strategic HRM literature.

This paper is an attempt to address this gap in the literature. We argue that like all other investments in real assets, human capital investments also carry the risk of loss of value. The risk may take several forms like depreciation or obsolescence of skills and abilities, employee turnover, non-conforming behavior, requirement of skills different than those possessed by the current employees, need to cut down the numbers and so on. Managers need to manage these

risks in order to stabilize returns from the firm's human capital. Thus, this issue should be examined within the framework of the Strategic HRM literature. We suggest that in addition to direct reduction of operating costs or the creation of intangible assets that generate revenues, HR practices can also play an important role in the management of risk associated with investments in human capital.

One important risk-management framework that is being applied in the strategic management field is the real options theory (Bowman & Hurry, 1993; Dixit & Pindyck, 1994, McGrath, 1997, 1999), which claims that real options formed on real assets will minimize risks of loss of value and maximize future opportunities for investments in these assets. Real options are contracts written on real assets that give the owner time-deferred choices regarding future investments in these assets. This way real options stabilize returns from the real assets. This paper uses this framework to analyze risks and opportunities in SHRM and how HR practices as bundles of options may contribute in managing these risks and opportunities, thereby creating value for the firm.

The paper is organized in two sections: the first section discusses real options theory (as distinct from financial options theory) and its main assertions; the second section discusses the application of real options theory in SHRM, the different HR options, and their role in managing risks and maximizing returns from human capital.

REAL OPTIONS THEORY

Financial Options

In financial markets, options are contracts written on financial assets (stocks, commodities, foreign currency) in order to manage risks of depreciation of value, or to avail of the benefits of future appreciation of value. 'Calls' (options to buy) are contracts that give the owner the right, but not the obligation, to buy the underlying asset at a predetermined strike price within a future expiration date. 'Puts' (option to sell) give the owner the right, but not the obligation, to sell the underlying asset at a strike price within the expiration date. Financial investment managers often maintain a combination of these two types of contracts in order to minimize risks and maximize opportunities for returns from financial investments.

Options are created due to uncertainties about the returns from investments. The greater the volatility of the underlying asset price/returns, the higher is the uncertainty. The seller of the call options, who owns the asset, wants to buffer against the risk of loss in his investments and to guarantee a return for the asset, through the strike price. The buyer of the call option wants to keep the investment opportunities open for that asset without sinking in the whole amount in the

current period. If the market price of the stock remains below the strike price, the holder will not exercise the option. So the seller of the option retains the stock and keeps the premium as profit, while the buyer only loses the premium. If the market price rises above the strike price, the option will be exercised. The holder will buy the stocks and sell them at the market price, thereby making profit. The seller also makes profit, but loses the opportunity of greater profits.

Put options work exactly the opposite way. The buyer of a put option expects the market price of the stock to go below the strike price so that he/she can buy the stock from the market at a lower price at a future date and sell it at the strike price with profits. The seller on the other hand expects the market prices to go up, so that the option is not exercised and he/she retains the premium as profit. Consequently, if the market price goes above the strike price, the put option will not be exercised.

Real Options

Real options theory scholars seek to understand decisions regarding investments in real options that are similar to financial options in structure but for which the assumptions made in valuing financial options do not hold (Bowman & Hurry, 1993; Dixit & Pindyck, 1994). The primary assertion of this theory is that real options create alternative choices for decisions regarding investments in real assets. These choices are time deferred so the organization is able to base its decisions on actual circumstances that may occur in the future, rather than on the expectation (or inaccurate approximation) of the future. Since the future is uncertain, these deferred choices greatly reduce the risk that investments will lose their entire value or will become worthless. Real options give the owner the rights to real assets without making the full investment at the present time period, and to keep the opportunities for future investments open. The real options theory has been applied to the decision-making process for investments in real assets like new technology, new collaborations, new venture creation, new projects etc. (Hurry, Miller, & Bowman, 1992; Kogut, 1991; Kogut & Kulatilaka, 1994; Kulatilaka & Marcus, 1988).

Real options are created on real assets. Real assets are similar to financial assets because they generate returns, are valuable, require capital investment, carry the risk of depreciation of value, and the opportunity of appreciation of value. The dissimilarity between real assets and financial assets lies in the fact that real assets may have ‘intangible’ or ‘invisible’ (Itami, 1987) components that may not be easily valued. For example it is difficult to put a value on a firm’s reputation, brand image, knowledge base etc. Thus it is difficult to arrive at a full valuation of real assets.

Unlike financial options, real options are not precisely defined or neatly packaged (Amram & Kulatuilaka, 1999). There are other dissimilarities between real and financial options as well. First, financial options are almost perfectly tradable because efficient financial markets exist for them. Real options are not perfectly tradable because market imperfections and asymmetries are present in their markets. Second, the exact valuation of real options may not be possible even with passage of time. This is because of the 'invisible' components of the real assets, which makes valuation of real options extremely difficult. Third, financial options have specific maturity dates, whereas real options typically involve unknown or uncertain expiration dates. Fourth, financial options are explicitly written contracts, while real options exist implicitly in the resources, capabilities, and processes of the firm, and may not be written. For this reason Sanchez (1993) prefers to denote these as 'shadow' options. The basic underlying principle of real options nevertheless remain the same as financial options i.e. risk minimization and opportunity maximization.

Types of Real Options

A wide variety of real options have been discussed by scholars in various fields of study. These are: option to defer investments (Ingersoll & Ross, 1992; McDonald & Segel, 1986), options for staging investments (Majd & Pindyck, 1987; Trigeorgis, 1993b), options to alter operating scale (Pindyck, 1988; Trigeorgis & Mason, 1987), option to abandon (Myers & Majd, 1990), option to switch (Kulatilaka, 1993; Kulatilaka & Trigeorgis, 1994), options to grow (Kester, 1984, 1993; Myers, 1977; Pindyck, 1988), flexibility options (Amram & Kulatilaka, 1999; Bowman & Hurry, 1993), learning options (Amram & Kulatilaka, 1999), and multiple interacting options (Kulatilaka, 1998; Trigeoris, 1993a). Table 1 summarizes the different kinds of real options discussed in the literature.

We shall discuss real options according to the functions they serve (Sanchez, 1993). *Timing* options create choices for the time of investment. Options to defer investments, options for staging investments, growth options, and learning options fall in this category. Options to defer investments reduce risks by allowing for a delay in investments till the value of the investment becomes more apparent. For example when an oil company takes a lease for drilling sites rather than outright purchase, it is deferring the investment decision till the end of the lease period. At the end of this period it still has the option to purchase the site. This keeps the opportunities open, in case oil is struck at the site. Options for staging investment entails a series of investment outlays rather than a single outlay upfront. This creates the option to 'default' at any given stage, thereby limiting the risk of non-performance of the asset. This option is valuable in all R&D-intensive industries, especially pharmaceuticals, and in highly uncertain,

long-development capital-intensive industries, such as energy-generating plants or large-scale construction (real or commercial estates). Growth options i.e. investments that create growth opportunities, are created because the future of these investments is uncertain. By buying the initial options (e.g. a patent, or by investing partially in a new venture), the firm gains access to the potential upside while limiting the losses they would incur from unfavorable outcomes. Similarly, learning options are limited investments made to test the market.

Table 1: Different Types of Real Options

Amram & Kulatilaka, 1999	Bowman & Hurry, 1993	Sanchez, 1993	Trigeorgis, 1996
Timing options (delay investments)	*Incremental* options (choice for further investment or abandonment)	*Timing* options	Option to *defer* (hold a lease till prices justify full investment)
Growth options (investment creates growth opportunities)	*Flexibility* options (choice to switch)	*Product* options (which products may be developed, produced and marketed)	*Staged* investment option (series of outlays, option to abandon and minimize loss)
Staging Options (invest in stages rather than all at once)		*Implementation* options (how to choose among alternative resources and capabilities)	Option to *alter* operating scale (to expand, to contract, to shut down and restart)
Exit options (reduces the size of the investment at risk)			Option to *switch* (change output mix or input mix)
Flexibility options (the option to shift production, input, output in response to shift in demands or costs)			*Growth* options (early investment e.g. acquisition, projects etc. to open up future opportunities)
Operating options (expand, contract scale of operation)			Option to *abandon* (permanently abandon present operation)
Learning options (limited investment to test the market)			*Multiple interacting* options (a collection of various options, both upward-potential enhancing and downward-protection)

Volume options create choices for the scale of operation. Options to alter operating scale, and options to abandon (or exit options), belong to this category. Options to alter operating scale involve expanding, contracting, shutting down, or restarting production or operating facilities. This enables the firm to capitalize on growth opportunities, as well as to reduce the scale of operation, in response to changes in the demand and supply conditions. These are typically found in natural resource industries, such as mine operations, construction, as well as in cyclical industries like fashion apparel, consumer goods, and commercial real estates. Flexible automation is a technology that enables firms to create options to alter operating scale. Options to abandon are part of options to alter operating scale in the sense that they allow for shutting down of the operation.

Switching options create choices regarding combinations and sources of input and output. Options to switch, and flexibility options belong to this category. Option to switch inputs or outputs mix allows the firm to respond to the changes in demand/supply conditions as well as to reduce costs and to improve quality. A production facility that can switch among alternative energy inputs, relationships with a variety of parallel suppliers, or outsourcing of certain functions, are some examples of switching options. Researchers have also called this option as flexibility option (Amram & Kulatilaka, 1999; Bowman & Hurry, 1993) or implementation option (Sanchez, 1993).

We find that real options aim to minimize the following types of risks and uncertainties associated with investments in real assets: a) uncertainties of returns, b) uncertainties of volume, and c) uncertainties of cost and quality. Uncertainties of returns arise due to unexpected depreciation of value and capital loss. At the same time there are opportunities for unexpected growth and capital appreciation. Uncertainties of volume arise because of unexpected and/or seasonal variations in the quantity of output. Demand may contract unexpectedly, or it may expand beyond expectations. Uncertainties of costs and qualities are related to inputs and output mix. There may be unexpected changes in the price of or combination of input-output. Firms need to be flexible in terms of supply of inputs and production of output (changes in quality or specifications). At the same time there are opportunities for reducing costs, improving quality, and develop new products.

In the next section we discuss these types of risks in relation to human capital management.

RISK AND HUMAN CAPITAL MANAGEMENT

Several researchers have discussed human capital as a valuable strategic asset for the firm (Becker & Huselid, 1998; Becker, Huselid, Pickus, & Spratt, 1997; Pfeffer, 1994; Snell, Youndt & Wright, 1996; Wright, McMahan, & McWilliams, 1984). The knowledge, skills, and behaviors that are embodied in the employees of a firm constitute the ‘intellectual’ or ‘human’ capital of the firm. Hamel & Prahalad (1994) and Ulrich & Lake (1990) discuss how people are the main sources of ‘competencies’ and ‘capabilities’ of the firm, that leads to profitability. Following these scholars, we assert that the human capital of the firm are valuable (provide returns), require investments of time and money, carries the risk of loss of value as well as the opportunity of appreciation of value, and thereby constitute a form of real asset for the firm. It is important to note that human capital, like real assets, provide current as well as future returns.

Types of Risks in Human Capital Management

Risk is uncertainty about outcomes or events, especially with respect to the future (Miller & Bromiley, 1990). Risk impairs forecasting and planning activities and makes it harder for decision-makers to plan future actions. A firm's investments in its human capital involve risks because the performance of or the returns from human capital is uncertain and these may vary over time. Based on real options theory, we conceptualize the following types of risks and uncertainties associated with the management of human capital.

Uncertainties of returns or performance. Uncertainties of returns or performance prevail because of skill obsolescence, demand for new skills, and turnover. As the competitive environment changes, firms must adapt by developing new technologies, products, and capabilities. If current employees do not upgrade or adapt their skills and knowledge to the changed circumstances, it represents the risk of obsolescence of skills. Also, the new skills may not be readily available in the market or there may be high competition for these skills. For example, many companies have been caught unprepared for the demand for computer skills as more and more companies develop web-based business processes or e-commerce. This has resulted in an acute shortage of employees with the right skills for e-business. Similarly, in recent years there is an increasing thrust towards flexible automation systems for production. Introduction of these technologies requires a set of skills different from the assembly line mass production systems, which may not be present within the firm and may be difficult to acquire. Uncertainties of returns also exist because of possible turnover of employees, which represents capital loss. Due to the tight labor market and low unemployment in recent years in USA, many employers, especially small businesses, are finding it hard to retain their key employees. For example, two years ago BankOne announced that through its FirstUSA division it was going to create Wingspanbank.com, an internet bank which would achieve 1 million customers within its first 18 months of operation. However, in its first year of operation, 5 of the original 7 top managers of the business had left, and the business itself had attracted only 100,000 customers.

Uncertainties of volume. Uncertainties of volume arise due to seasonal or cyclical trends in employment, or due to sudden fluctuations of demand and supply of the number of employees. For example the shipping industry typically experiences greater volume of work during the holiday season compared to rest of the year, which requires that companies employ a larger number of employees during this period. In summer, the hotel and resorts industry faces higher requirement for employees due to vacation seasons. Firms that face volume fluctuations in production demands have associated fluctuations in their human capital

demands. A high number of full time or permanent employees is a risk in case of such volatile demand. (Note that this form of risk assumes a stable skill set and thus is distinct from risks associated with skill obsolescence, non-availability, or capital loss). For example, Boeing laid off 12,000 employees in 1994 in an effort to put their staffing at a level consistent with the demand. However, within one year they received a record number of orders with guaranteed delivery dates. They faced a demand that far exceeded their ability to produce given the number of employees. Consequently, they failed to deliver on guaranteed orders and paid millions of dollars in compensatory fees to their customers.

Uncertainties of costs and combinations. Uncertainties of costs are associated with the *fixed cost* of employees (i.e. *cost escalation* and/or need for *cost reduction)*. High employee costs, especially when profitability is volatile, represent a severe drag on the cash flow of the firm. For example, over the past five years airlines have made record profits. However, in negotiating contracts with their unionized workforce, these firms have strongly resisted sharing these profits via wage increases. This stems from a concern with creating a high fixed cost wage structure in the face of a future economic (and thus, industry) downturn.

Uncertainties of combination arise when there is a need for reallocation of employees or their skills within the firm due to qualitative/quantitative variations in demand and supply. For example day to day scheduling may require shifting of employees around different operations as per requirement. This may also be necessary for reducing employee costs or for keeping it under control. If employees do not have the breadth of skills or knowledge, this may not be possible, and gives rise to the risk of combination.

This list of specific risks is by no means exhaustive. To examine every specific risk associated with managing human capital is beyond the scope of any one paper. We argue that risks involved in human capital management are similar to risks involved in real assets management where it may take the form of uncertainties of returns, uncertainties of volume, and uncertainties of cost and combination. We suggest that HR practices form the basis for options contracts for managing these forms of risk associated with human capital assets.

HR Practices as Real Options

HR practices are mechanisms through which the human capital of the firm are acquired, maintained, and motivated. Thus through HR practices, the firm invests in its human capital and manages them. We argue that certain HR practices act as ‘options’ on human capital, which minimize risks and maximize opportunities in human capital management.

We have several reasons to consider HR practices as ‘HR options’ that are similar to real options. First, just as real options are based on real assets, tangible or intangible, HR

practices as options, are generated for managing human resources, which is a real asset with intangible components. Second, the value of the real assets underlying the real options fluctuates over time. The value of employee competencies are also not static, they vary over time either upwards or downwards or both (i.e. some skills may become more important while others may become redundant or less important). Third, like real options, HR practices are semi-contracts in the sense that they generate rights on the part of both the firm and the employees, the underlying assets being employee knowledge, skills, and behaviors that are valuable to the firm. Rousseau & Wade-Benzoni (1994) discuss HR practices as 'psychological' contracts that refer to beliefs that individuals hold regarding promises made, accepted, and relied upon between employees and the firm. In a sense, many HR practices act as investments in human capital, and represent, to some extent, bets on the value of that human capital at a future date.

Fourth, real options create alternative decision choices for decision-making in real asset investments. For example the firm may have the option to continue investment, abandon investment, or switch from one type of investment to another. HR practices also generate alternative choices for the firm in the management of their human capital. For example for skill acquisition the choice is between recruiting or contracting out. The recruitment and selection function also have the choices of recruiting for specialized or generalized skills, undertaking a wide or narrow search, and internal vs. external selection. The training function entails the choice of behavior or skill training, broad-based or specialized skill training, in-house, on-the-job or external training. The compensation management function offers the choice of the extent of fixed vs. variable pay, the degree of variability of pay as linked to various output parameters. All of these decision choices entail different types and levels of risk with regard to the value of the resulting human asset. Thus we see HR practices as real options acting on human capital and providing alternative decision choices for the firm. Table 2 provides a comparative analysis of financial options, real options and HR options.

Table 2: A Facet Analysis of Financial, Real, and HR Options

Dimension	Financial Options	Real Options	HR Options
Options written on	Financial securities e.g. stocks, currency, commodities	Real assets, tangible or intangible e.g. projects, products, technology, new venture	Knowledge, skills & behaviors of employees, volume of employees, cost of employees
Value of underlying asset	Underlying security has value	Underlying asset has value	Employees add value through application of their knowledge, skills and behaviors
Variability of asset value	Price of security varies over time	Value of assets varies over time	Applicability of knowledge, skills and behaviors vary over time
Function of options	Risk management tool, future scope for investment	Risk management tool, future scope for investment	Risk management tool, future adaptability and switching
Purpose of options	Speculative instrument on future prices	Speculative investments on future courses of actions	Investment for future skills & behaviors, variability of volume and costs
Instruments used	Calls, puts	Project partnering, patents, joint ventures etc.	Combinations of HR practices
Rights under the contract	Right to buy or sell securities at a set price on a future date	Right to develop, abandon, or switch projects	Scope to modify practices according to future requirements
Premium or current investment	Premium to be paid at the time of the contract	Partial investment in the current period	May entail extra cost in the current period
Utility of options	Allow the investor to cover risks and benefit from volatile prices with far less investment	Allow firms to buffer against greater loss of value with lower sunk cost	Allow firms to buffer against future obsolescence of knowledge and skills and helps develop appropriate behaviors for changed circumstances

HR Options and Risk in Human Capital Management

Recent work in SHRM has found that certain 'high performance work systems' (HPWS) comprising of HR practices like selective recruitment, contingent employees, training, performance appraisal, performance-based incentive compensations, voice and participative mechanisms, contribute significantly to the profitability of the firm (Arthur, 1994; Delery & Doty, 1996; Huselid, 1995; MacDuffie, 1995). But, as Becker et al. (1997) point out, to date there is not much evidence as to *how* such systems create value i.e. the process through which HPWS influence the human capital of the firm that ultimately leads to profitability. We suggest that some these HR practices and their variations create 'options' for the firm, which minimize the risk of loss of human capital value and maximize choices to capture future opportunities, all of which contribute positively to firm profitability.

In discussing how these HR practices may act as HR options for the firm, we find that it is necessary to analyze the qualitative variations of these practices. For example, selectivity in recruitment may be selective towards specialized skills (professional certifications, specialized education etc.) or for broad-based, generalized skills (persons with high general ability scores). Similarly, training may enhance specialized skills (vertical training) or may develop broad-based skills (horizontal training). It is necessary to make such qualitative distinction for the purpose of analyzing the role of HR practices under the options framework.

Most SHRM researchers have taken a 'index' approach to HPWS, focusing on the extent to which a broadly defined set of practices is used across all employees of a firm. As Lepak & Snell (1999) points out, a more fine-grained perspective in the form of different variations of practices for different groups of employees may yield a richer understanding of human capital management. Accordingly, we consider qualitative variations of HR practices that manage various kinds of risks associated with human capital investment (see Fig 1).

HR options for managing uncertainties of returns. Uncertainties of returns of human capital arise from skill obsolescence, demand for new skills, and capital loss. We discuss HR options for each of these three factors separately.

Training for new or future skills are HR options for managing skill obsolescence. Research on training, till date, has mostly looked at the relationship between presence of formal training and firm performance, with positive findings (Bartel, 1994). We discuss training in terms of the type of training imparted. Management of risks related to skill obsolescence demands that the firm develop a broad inventory of skills so that there is continual supply of new or different skills. Training imparting new skills or modified skills that may be required in the future is suitable for managing this type of risk. Risks of skill obsolescence vary according to the type of

skill. For example, driving skills do not become obsolete as fast as computer skills. We argue that the content of training program is related to the degree of risk of skill obsolescence. Firms requiring skills that could become obsolete fast, would have more training programs geared towards new or upgraded skills. These types of training represent 'growth' HR options which gives the firm choices for growing through new or upgraded skills, thereby minimizing the risks of skill obsolescence.

Another way firms can generate growth options for their human capital management is through recruitment. Selectivity in recruitment refers to setting higher standards for choosing the employee to hire. Selectivity may be manifested in several ways, by requiring college or professional degree, by administering selection tests and so on. If selectivity is for broad-based skills rather than specialized skills (as tested through general ability tests etc.), then growth options are created because such employees are trainable and can upgrade their skills easily. Thus we propose that training for new or upgraded skills, and selectivity in recruitment for broad-based skills represent HR 'growth' options to minimize risk of skill obsolescence, and maximize future growth opportunities through generation of new skills.

Another HR practice that acts to ensure updated and market-specific skills of is the skill based compensation plan. As Murray & Gerhart (1998) point out, "By paying for attributes (knowledge, skills, and abilities) of individuals, organizations hope to direct the attention of their employees to developmental opportunities and to encourage skill-seeking behavior" (pp. 68). Snell & Dean (1994) suggest that person contingent skill-based pay rewards continuous learning and derives value from increased flexibility in a dynamic environment. Researchers have found positive linkages between skill-based pay and firm performance (MacDuffuie, 1995; Murray & Gerhart, 1998). Skill based pay creates opportunities for developing multiple and broad-based skills, manage risks of skill obsolescence and generate options because employees are rewarded for learning new skills and developing a broad array of talents (Lawler & Ledford, 1985).

Thus, we propose that,

Proposition 1: Firms that have greater risks of skill obsolescence and greater demands for new skills would create greater number of growth HR options in the form of training for new or upgraded skills, selectivity in recruitment for broad-based skills, and skill based compensation plans.

A major difference between human assets and other forms of real assets is that the firm never 'possess' human assets in the true sense. Employees may leave the organization at their will, thereby taking critical skills with them. Voluntary turnover is increasingly becoming a major

risk for organizations, especially in the higher management and critical skill category where demand exceeds supply. Research on voluntary turnover have identified overall job dissatisfaction arising from dissatisfaction with pay/promotion/supervisory relations, as well as dissatisfaction with job content like autonomy, responsibility etc. as organizational factors that contribute to greater turnover (Griffeth & Hom, 1995).

Risks of capital loss i.e. turnover of employees are managed through various HR practices like highly competitive pay, employee stock options, participation programs, voice mechanisms, and attractive benefits packages. Firms pay highly competitive salaries in order to attract and retain the skills they need. The higher the value of the skills, the higher is the competitiveness in pay. In this sense, the firms pay a 'premium' for the skills that are more critical for the firm. For example, currently, IT skills are fetching high premium in the job market. Employee stock options are a form of deferred pay. Employees are given options for buying stock of the company on a later date at a price below the expected market price. This is an incentive to the employee to stay with the company (the stock options may not be exercisable if they leave the company). Programs that allow for employee participation in decision-making (participative committees, quality circles etc.), voice mechanisms (grievance procedure, suggestion schemes), and attractive benefits packages (401K plans for retirement with high employer contribution, health insurance, life insurance, disability insurance, cafeteria plans for dependant care and medical expenses, health club memberships, child care assistance, tuition-remittance for self or dependants etc.) are all various HR practices for attracting employees and motivating them to stay with the company. There is ample evidence that these practices improve employee morale and satisfaction with their job. For example Peterson & Tracy (1992) found that employee involvement in joint problem-solving committees in unionized setup significantly reduced employee grievances, and improved overall company performance. Wager (1997) found support that positive labor-management relationship in the form of prompt settlement of grievances, perceived fairness in employment conditions on the part of employees, joint problem solving by union and management, management seeking input from the union before initiating changes, and the practice of free exchange of information, have positive effect on perceived performance. Shaw, Delery, & Gupta (1998) show that greater benefits and procedural justice significantly reduce quit rate of employees.

These HR options are exclusive to human capital management. We call them HR options to manage employee turnover. We hypothesize that firms that face greater risks of employee turnover would use these HR options to mange these risk.

Proposition 2: Firms that have greater risks of employee turnover would create greater number of HR options to manage turnover through practices like highly competitive pay, employee stock options, participation programs, voice mechanisms, attractive benefits etc.

HR options for managing uncertainties of volume. Uncertainties of volume arise because of fluctuating demands in terms of numbers. Contingent labor, part time, contractual employees are HR options that allow the firm to 'alter operating scale' i.e. vary the total number of employees, according to the fluctuations in demand. Purcell (1998) discusses how use of contingent labor is increasingly becoming associated with high performance HRM. For example retail outlets hire temporary employees during the holiday season, many companies implement projects through external consultants, hospitals fill a number of positions through part time or temporary employees, schools hire temporary employees for substituting. Contingent labor, part time employees, contractual employees may also be considered as timing options in relation to acquisition of human skills for which uncertainties of future demand exist. Timing options manage uncertainties of volume by 'deferring' or 'staging' the investment. Through these options the firm has the choice not to commit itself fully in the current period in acquiring these skills. The firm 'leases' the human capital in the form of contractual/temporary employees or it may 'stage' investment in the form of part time employees. For example, CNA Insurance company manages most of their major IT projects through outside contractors because of the uncertainty of continuation of demand. At the same time these practices allow the firm to invest in 'growth' options by leasing the skills that may become critical skills in the future. The firm has the choice in the future to internalize these jobs, depending on actual demand conditions. The option to 'abandon' i.e. the choice to give up the investment in order to minimize losses, is inherent in these HR practices. For example the CNA Insurance company recently closed down its Detroit IT center, terminating most of the IT contractual employees.

Thus, we postulate that firms that face greater fluctuations of volume would employ greater number of contingent/part time/contractual employees.

Proposition 3: Firms that have greater uncertainties of volume would create greater number of HR options to alter operating scales, HR timing options, and HR growth options in the form of contingent labor, part time employees, contractual labor etc.

HR options for managing uncertainties of cost and combination. Uncertainties related to cost exist when there are greater fluctuations in firm performance but the costs are relatively fixed. Firms vary with respect to their performance, the 'blue-chip' firms have stable performance over the years, while small and highly leveraged firms may have greater fluctuations in performance. If fixed costs are very high then a firm with fluctuating performance

has the risk of losses in case of downturns in revenues. Employee costs constitute a major portion of overall costs of the firm. If employee costs are mostly fixed, then it is a big drag on the firm's cash flow, especially in case of fluctuating performance (as seen in the semiconductor industry). In such cases these firms would create options to manage employee costs.

The options to manage employee costs are found in variable compensation plans. Gerhart & Milkovich (1990) noted that organizational and unit level incentive plans cause labor cost to be more variable than fixed. Wide use of highly variable compensation plans is found in the sales profession, where has under high uncertainty of performance, sales agents are paid on full commission basis (e.g. jewelry sales), while under less uncertain conditions, commission is added to base pay (e.g. financial services sales).

Apart from the extent of variable pay in the total compensation package, variable compensation plans also entail decisions regarding the choice of parameters for measurement of performance, extent of variability of these parameters, and the level of measurement of these parameters. Variable compensation plans that are based on performance, can range from individual bonus plans and individual merit pay plans to plans based on group/unit/firm performance such as profit sharing and gain sharing. Studies of the performance impact of individual level plans have shown mixed results (Gerhart & Milkovich, 1992). Studies on firm level profit sharing and gain sharing plans, however, have generally shown positive impacts on performance (Gerhart & Milkovich, 1990; Schuster, 1986). We argue that performance based variable plans that are designed at the firm or unit level generate options to 'switch'. Firm or unit level variable compensation plans better align employees interest with that of the firm, leading to greater transparency, commitment and adaptability on the part of the employees. This creates the opportunity that employees would accept variations in their pay according to variations in firm performance.

Thus we propose that,

Proposition 4: Firms that have greater uncertainties of cost would create greater number of HR options to alter costs and HR options to switch costs in the form of variable pay and performance based incentive plans at the firm or unit level.

Uncertainties of combination arise when there is a need for reallocation of skills within the firm due to variations in demand/supply. HR practices that may act as options to manage uncertainties of combination are job rotation, and team based work. Many companies formally or informally rotate employees among different kinds of jobs in order to develop the flexibility of skills as well as to retain the culture of shifting responsibilities, so that when the need arises, employees may be easily reallocated. Under team based work, temporary teams are formed for

particular projects or jobs. Thus there is a continuous shifting of employees, that helps the firm maintain its flexibility, and mange costs. In essence these HR practices represent 'switching' options. Accordingly we propose that.

Proposition 5: Firms that have greater uncertainties of combination would create greater number of switching options in the form of job rotation and team-based work.

DISCUSSION

The field of Strategic HRM has long struggled with determining the ways in which HR practices can create value for firms. While the recent focus on high performance HR practices has yielded promising empirical data to support a relationship between these practices and firm performance (Becker & Huselid, 1998), little is still known about the specific ways in which this value is created (Becker & Gerhart, 1996; Delery, 1998; Wright & Sherman, 1999). Even the hypothesized mechanisms of lower operating costs and creation of inimitable human assets (Becker & Huselid, 1998; Wright, McMahan, & McWilliams, 1994) are based in rather static and cross sectional assumptions about the competitive environment. In addition, the focus on high performance employment practices only narrowly addresses all of the levers that HR can use to manage a firm's workforce.

A real options approach to Strategic HRM addresses these issues. First, it provides another theoretical rationale for how HRM can create value for a firm through its emphasis on minimizing risks and expanding a firm's ability to capitalize on opportunities. Second, it provides a more dynamic component to decision making through viewing HR investments as potentially changing in value over time. Finally, it undertakes a more fine-grained analysis of HR practices to study qualitative variations of these practices that firms use to manage their human capital pool. Thus, the real options framework provides a valuable contribution to understanding the issues inherent in and the role that HR plays in creating value through human capital for firms in dynamic environments.

We use the real options framework to analyze the different types of risks associated with human capital management, and the HR practices that may act as options to minimize these risks. In doing so we provide a new direction of research in strategic human resource management, one that acknowledges that investments in human capital are similar to investments in other types of real assets, and thus carry risks. Our purpose is to provide a framework for analyzing these risks and the role of different HR practices that may mitigate these risks.

Limitations

In extending the real options framework to the field of Strategic HRM, specifically focusing on the management of human capital, some caveats are in order. First, there is one fundamental difference between human capital and other physical forms of real assets, that is, firms never fully possess human capital, it basically resides in people and is lost when people leave the organization. This is true for most of the invisible assets like reputation, product image, learning, knowledge – the ownership of the asset is never under full control of the firm, it depends more on other players in the field e.g. employees, customers etc. This was recognized as a specific form of risk in an earlier section. It is important to note that this only *increases* the risk associated with investments in human capital, thus, again pointing to the relevance of an options theory framework for examining such investments.

Second, extending real options thinking to human capital relies on the assumption that human capital has value, and that the value changes over time. Currently, the valuation of human capital is at best problematic, and at worst, impossible. However, as noted previously, the valuation of real options is less important than for financial options. More important is the underlying logic for strategic decision making. Thus, while an ability to place an exact value on all forms of human capital would be quite useful in the application of real options thinking to Strategic HRM, it is by no means necessary. Rather, the underlying logic of real options provides an extension of how researchers and practitioners can approach the management of human capital.

Third, a criticism against the application of real option theory to SHRM may be that this framework suggests greater outsourcing of HR functions and less commitment towards employees. We disagree for two reasons. First, it is increasingly recognized that in order to be maximally effective, HRM has to deal more with 'strategic' functions and less with routine functions, which may be easily outsourced (Becker & Huselid, 1998). The real options logic further strengthens this contention, while providing a framework for engaging in this strategic role.

Second, creation of options does not entail reduced commitment towards employees; rather, it calls for stabilizing the employment relationships across a variety of strategic and economic scenarios. Risk in returns in investments in human capital cannot be ignored, and to do so would result in greater, rather than less variability in relationships with employees over time. Options to switch generate the capability for managing changes incrementally, rather than drastically through layoffs etc., by incorporating different choices in the HRM process. Options to defer and staged investment options specifically act towards not getting into a situation when

a firm is forced to retrench employees that are no longer required. It may be contended that HR options actually increase a firm's commitment towards its existing employees because the firm is generating alternative choices for managing their employees. It may be said that organizations using such HR options enhance employee-organization fit rather than employee-job fit so that when the job changes, the employee still remains valuable to the firm (Tsui et al., 1995).

Fourth, by no means we want to imply that the use of HR options is suitable for all organizations. The extent of use of HR options and their usefulness will depend upon the extent of risks associated with the human capital of the firm. Firms facing greater risks may use greater number of options. For example in a high velocity industry, like the IT industry, these HR options are being used extensively, while they may not be so common in relatively stable industries where HR risks are low. Again, different types of HR options may be used in different industries according to the type of risk present. For example, the risk of volume fluctuations may be more in the trucking industry, while risk of skill fluctuations may be low.

Finally, one could argue that the basic linkages we propose between HR practices and environmental conditions or performance outcomes are certainly not new to the strategic HRM literature. However, we note that past explications of these relationships have usually focused purely on cost or revenue considerations as noted previously. An increasingly dynamic environment results in corresponding increases in risk for any investment in human capital. For the field of HRM to ignore such risk would result in far less than optimal strategic decision making.

Future Directions

We believe that the emphasis on risks in human capital management raises a number of issues that need further investigation. First, this theoretical framework sets the stage for empirically investigating the relationship between different types of risks associated with human capital management, and presence of HR options. It would also be one of the first empirical analysis of the real options theory. Second, We believe that HR options would have synergistic effects when they act in a 'bundle' as multiple interacting options. Research is needed to analyze the different 'bundles' of HR options based on the purpose they serve together. For example the synergistic effect selectivity of recruitment for broad-based skills, training for broad-based skills, and skill based pay taken together may be more effective in reducing uncertainty of return, rather than each of them individually.

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Figure 1: HR options and Risk in Human Capital Management

RISKS IN HUMAN CAPITAL MANAGEMENT	HR OPTIONS TO MANAGE RISKS
UNCERTAINTIES OF RETURN 1. Skill obsolescence 2. Demand for new skills 3. Capital loss	**1. GROWTH OPTIO NS** a) Training for new skills b) Selectivity in recruitment for a) broad-based skills b) Skill based pay **2. TURNOVER MANAGEMENT OPTIONS** a) Competitive pay b) Employee stock option c) Participation programs d) Voice mechanisms e) Attractive benefits
UNCERTAINTIES OF VOLUME	**OPTIONS TO ALTER SCALE OF OPERATION, TIMING OPTIONS** a) Contingent employees b) Contractual employees c) Part time employees
UNCERTAINTIES OF COST AND COMBINATION	**1. OPTIONS TO ALTER COSTS** a) Variable compensation plans b) Outcome-based plans at the a) firm/unit level b) Skill-based pay **2. OPTIONS TO SWITCH COMBINATIONS** a) Job rotation b) Team based work