Environmental dynamism, human resource flexibility, and firm performance: analysis of a multi-level causal model

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While strategic HRM scholars have conceptualized HR flexibility as an important source of sustainable superior firm performance in dynamic environments, the process through which HR flexibility creates value for the firm has not been empirically investigated. Based on a study of 98 manufacturing and 103 service firms from a wide array of industries in India, this paper attempts to illuminate the black box of causal linkages between environmental dynamism, flexibility of human assets, and firm level human-, operational-, and financial-outcomes by developing and testing a multi-level causal model. Evidence indicates that HR flexibility mediates the influence of environmental dynamism on firm performance and that irrespective of the nature of the industry and the degree of environmental turbulence, superior firm performance ensues when HR flexibility as actually possessed by the firm matches the environmental demands for such flexibility as perceived by the firm managers. The results also support the notion of HR value chain that postulates that HR system has direct impact on firm-level HR outcomes which are most proximal, and its effects on increasingly more distal operational- and financial-outcomes are mediated by HR outcomes. The findings of the study suggest that HR practices as a system have both direct and indirect (mediated by behavioral flexibility) effects on firm-level HR outcomes. Existence of significant direct effects signifies that HR practices play an important role as a structural mechanism in achieving superior firm performance.

Keywords: environmental dynamism; HR flexibility; multi-level firm performance; strategic HRM

The contingent relationship between a firm’s business environment and its performance is well recognized in strategic management and organizational literatures (Thompson 1967; Duncan 1972; Hofer and Schendel 1978). In an uncertain environment, having the flexibility or an option to decide what to do after some of that uncertainty is resolved definitely has value (Merton 1998). From the resource-based view (RBV), a firm can sustain its competitive advantage in a dynamic environment if it possesses strategic flexibility which requires that its resources are inherently flexible, and it has capabilities to reconfigure and redeploy such resources quickly, and at low cost to meet the demands of the changing environment. Real options theory suggests that firms can proactively exploit uncertainties in their environment rather than just absorb them, if they create the strategic flexibility by investing in the real options that the firm can exercise when some of the uncertainties in the environment are removed (Kogut and Kulatilaka 2001). Flexibility is a fundamental approach to the management of environmental uncertainty (Sanchez 1993).
Organizational responses to dynamic environments have been studied in strategic management and organizational literatures mostly in terms of the specific actions taken which range from major changes in strategy, structures, process technologies, or product/service offerings to enhancing flexibilities of operations relating to activities such as production, marketing, financial management, and supplier relationships (Nayyar and Bantel 1994; Volberda 1998). Organizational flexibility has been conceived of as a dynamic capability of a firm to pro-act, or to respond, to changing competitive environment that may create sustainable competitive advantage for the firm (Eisenhardt and Martin 2000; Teece 2007; Teece, Pisano and Shuen 1997). Strategic HRM scholars have advocated flexibility in HR systems and processes for enhancing organizational effectiveness in a dynamic environment (Milliman, Von Glinow and Nathan 1991; Wright and Snell 1998) and they have perceived HR flexibility as a dynamic capability that helps the organization to adapt to changing environmental contingencies (Hitt, Bieman, Shimizu and Kochar 2001; Bhattacharyya, Gibson and Doty 2005). However, in spite of their obvious importance, the role of HR flexibility and the process through which it helps to maintain organizational effectiveness in a dynamic environment have not been adequately addressed through empirical research in the SHRM literature.

The present context of globalizing Indian economy, characterized by rapid growth in a diverse range of industry sectors, provides an ideal opportunity to study the role of HR practices in inducing organizational flexibility required for ensuring organizational effectiveness in a dynamic environment. In the past, a number of scholars have studied different aspects of HR systems and practices of Indian firms and their linkages with firm strategy and performance like: integration between HRM and corporate strategy (Budhwar and Sparrow 1997; Sparrow and Budhwar 1997); strategic HRM practices and industrial relations context (Sen Gupta and Sett 2000); transformation of industrial relations scene (Bhattacherjee 2001); contrasting use of strategic HRM practices across green- and brown-field firms (Sett 2004); link between strategic HRM orientation and financial performance (Singh 2003); and a few case studies on implementation of strategic HRM practices (Som 2007). Also, there has been a number of studies that investigated the effects of some specific HR practices or aspects such as career management (Budhwar and Baruch 2003); recruitment and selection, pay and benefits, training and development, and employee relations (Budhwar and Boyne 2004); employee commitment (Bhatnagar 2007); and performance management system (Rao 2007). Some studies were devoted to HR practices in specific new industries such as BPOs and Call Centres (Budhwar, Luthar and Bhatnagar 2006a; Budhwar, Varma, Singh and Dhar 2006b). However, none of these studies addressed the important research issue of flexibility of HR system and its consequence on firm effectiveness in a dynamic environment.

The objective of the present study, which was conducted across a wide variety of 98 manufacturing and 103 service firms in India, is to bridge this gap in research. It hopes to make three important contributions to the SHRM literature. First, it attempts to unravel how firm responses to environmental dynamism vary across the various dimensions of HR flexibility (Wright and Snell 1998). Second, it explores how the HR flexibility components attenuate the effects of environmental uncertainties on firm-level human-, operational-, and financial-outcomes. Finally, it develops and tests a multi-level causal model that links the dimensions of environmental uncertainty, HR flexibility, and firm performance through a hypothesized causal network. We hope the results of this study help to illuminate the black box of HR–firm performance linkage, and to guide managerial policy and practices aimed at sustaining superior firm performance under conditions of environmental uncertainty.
Theory and hypotheses

Environment dynamism and firm performance

Organizational scholars from diverse research disciplines agree that, in today’s dynamic environment, organizations need to be ambidextrous – aligned and efficient in their management of today’s business demands, while also adaptive enough to be able to meet the demands of the environment they are likely to encounter tomorrow (Duncan 1976; March 1991; Bowman and Hurry 1993; Tushman and O'Reilly 1996; Wright and Snell 1998; Kraatz and Zajac 2001; Feldman and Pentland 2003; Johnson, Lee, Saini and Grohmann 2003; Zajac, Kraatz and Bresser 2000; Gibson and Birkinshaw 2004; Jansen, Van Den Bosch, and Volberda 2005; Helfat et al. 2007; Teece 2007; Raisch and Birkinshaw 2008). While structural ambidexterity embodied in dual structures, under which some business units focus on alignment while others focus on adaptation, has been suggested as means of negotiating the environmental uncertainty previously (Duncan 1976), there is a growing recognition and evidence that the organizational processes and systems can create the necessary context (contextual ambidexterity) that provides an alternative, which may be equally valuable but more difficult to imitate, mode of creating organizational ambidexterity (Brown and Eisenhardt 1997; Marks, Mathieu and Zaccaro 2001; Gibson and Birkinshaw 2004; Raisch and Birkinshaw 2008). Scholars using the dynamic or contingent resource-based perspective argue that sustainability of competitive advantage in an uncertain environment is contingent upon firms meeting two criteria (Grant 1996; Brush and Arzt 1999; Barney 2001; Kraatz and Zajac 2001; Makadok 2001; Priem and Butler 2001a, b; Aragón-Correa and Sharma 2003; Helfat and Peteraf 2003; Chan, Shafer and Snape 2004; Sirmon, Hitt and Ireland 2007; Teece et al. 1997; Zajac et al. 2000). First, they not only meet the initial condition of possessing valuable resources at any given point of time but are also able to renew, reallocate, rejuvenate, and redefine their resources synchronously with the environmental changes. Second, they are able to orchestrate through organizational processes and systems increasing levels of complementarities or co-specialization between the various types of resources they possess that make their competitive advantage more entrenched over time.

This perfectly resonates with the Porterian view of sustainable competitive advantage according to which the more a company’s strategic positioning rests on an array of interlocked activities that not only reinforce one another but also bring in optimization of efforts (where doing one activity reduces the need for another), the harder it becomes for a rival to match or replicate them (Porter 1996). Moreover, deepening of a strategic position occurs as complementarities between the activities grow with accumulated learning and capabilities that take place as the activities are performed.

Recent advances in dynamic capability literature identify a firm’s ability to achieve ‘value-enhancing orchestration of assets’ as one of the micro-foundations of dynamic capabilities of firms (Teece 2007, p. 1344). According to this perspective, firms build long-run stakeholder value through sensing, seizing, and transformational activities that help firms combine and reconfigure specialized and cospecialized assets to meet changing market demands (Teece 2007). Similarly, from the perspective of the real options theory, an organization is viewed as a set of resources that generate ‘strategic choices’ and ‘allow preferential access to future opportunities’ (Bowman and Hurry 1993, p. 760). The dynamic process of organizational change is depicted as a sequential option chain; each investment conferring preferred access to a subsequent investment opportunity (Bowman and Hurry 1993; Trigeorgis 2001; McGrath, Ferrier and Mendelow 2004) that helps the firm to exploit opportunities and/or guard against downside risks in an uncertain
environment. In this perspective, too, the process involves sense making, proactive learning, and appropriate exercise of managerial choices aided by the organizational systems and processes (McGrath et al. 2004).

**Role of HR flexibility**

It is being increasingly realized that in a globally integrated market environment where tangible assets such as financial capital, technology, and physical infrastructure can be easily accessed and acquired through the open market, the enduring sources of sustainable competitive advantage for firms lie in their distinctive intangible assets and in their capabilities to acquire, develop, and leverage those firm specific assets effectively (Spender 1996; Hitt, Keats and DeMarie 1998; Sirmon et al. 2007; Teece 2007). Human resources comprising the knowledge, skills, and abilities as well as the behavioural repertoires and commitment to apply those towards organizational goals by the firm employees are identified as the most critical of such resources in uncertain environments (Miller and Shamsie 1996; Sirmon et al. 2007).

Creation of sustainable competitive advantage in a dynamic environment through intangible resources and capabilities involves three distinct processes: (1) building, (2) bundling, and (3) leveraging resources and capabilities (Sirmon et al. 2007). Environmental uncertainty demands that a firm acquires and develops a broad, rather than a narrow, range of employee skills and behaviours that allow the firm to exploit future market opportunities and/or avoid risks of obsolescence of human assets (Bowman and Hurry 1993). Different environmental contexts require different configurations of resource bundles. For example, maintaining an existing competitive advantage requires consolidation and deepening of existing resource based capabilities, whereas for creating a new source of competitive advantage a firm needs to build new skills or add a new set of complementary resources to the existing ones. So, the firms need to continuously renew, resynthesize, and reconfigure their resources in order to remain viable. Finally, since competitive advantage ultimately comes from not mere possession of resources but their actual use (Penrose 1959), firms need to have the capabilities to mobilize, integrate, and actually deploy the relevant resources and capacities to create value for the customers and the stakeholders. Thus, as conceptualized by Sanchez (1995), a firm needs to possess two basic types of flexibility: (1) resource flexibility – implying the extent to which a resource can be applied to alternate uses; and (2) coordination flexibility – indicating the extent to which the firm can reconfigure and redeploy its resources with ease, speedily, and cost effectively.

Although HR flexibility has been identified as a desirable firm characteristic in earlier work (Kerr and Jackofsky 1989; Lengnick-Hall and Lengnick-Hall 1988; Milliman et al. 1991), the construct was first conceptualized by Wright and Snell (1998) around three generic variables used in SHRM research: (1) employee skills, (2) employee behaviors, and (3) HR practices. Skill flexibility refers to two attributes: the number of potential alternative uses to which employee skills can be applied (resource flexibility), and how individuals with different skills can be quickly redeployed (coordination flexibility). Behavioral flexibility signifies availability of a sufficiently broad range of behavioral scripts among employees which they can adapt to the demands of situations (resource flexibility) while maintaining similarity of responses by different members to similarly perceived situations (coordination flexibility). However, Wright and Snell (1998) conceptualized flexibility of HR practices as ‘the extent to which they can be adapted and applied across a variety of situations’ (p. 762) and ‘how quickly the practices can be resynthesized, reconfigured, and redeployed.’ (p. 763). This conceptualization ignores the
explicit role that HR practices can play in promoting HR flexibility otherwise than by being amenable to flexible and speedy redeployment. Ketkar and Sett (2009) identifies this gap and extends Wright and Snell’s conceptualization of HR flexibility. Based on a survey of extant literature, they identify a set of HR practices (see Appendix 1), which they termed as *flexibility inducing HR practices* (FIHRP), that could help the firms achieve *resource flexibility* by continuously renewing and rejuvenating its human resources in tune with the environmental demands. They argued that these practices, when properly designed and applied in an appropriate context by managers having a clear strategic intent, could help the firms to develop a broader repertoire of employee skills and behaviors that meet the constantly evolving contingencies of a dynamic environment. Drawing upon the common threads of the dynamic resource based view (Grant 1996; Teece et al. 1997; Brush and Artz 1999; Zajac et al. 2000; Kraatz and Zajac 2001; Makadok 2001; Aragón-Correa and Sharma 2003; Chan et al. 2004; Helfat and Peteraf 2003; Sirmon et al. 2007), real options theory (Bowman and Hurry 1993; Kogut and Kulatilaka 2001; McGrath et al. 2004; Bhattacharya and Wright 2005), and dynamic capabilities literature (Eisenhardt and Martin 2000; Makadok 2001; Feldman and Pentland 2003; Helfat et al. 2007; Teece 2007), they argued that such practices constituted a distinct system that provided a firm with capability to maintain a *dynamic fit* of the firm’s human resources with the changing needs of the competitive environment, and thereby support both current and emerging business strategies of the firm.

They argue that FIHRP as a system is distinguished from high performance work system (HPWS) (Huselid 1995; Pfeffer 1995; Appelbaum, Bailey, Berg and Kalleberg 2000), high commitment work system (HCWS) (Arthur 1994; Pfeffer 1998; Wright, Gardner and Moynihan 2003), and high involvement work system (HIWS) (Lawler 1992; Pfeffer 1998; Guthrie 2001; Wall, Cordery and Clegg 2002) by its unique focus on creating organizational *ambidexterity* (Gibson and Birkinshaw 2004; Raisch and Birkinshaw 2008) that is defined as an organizational capability to simultaneously demonstrate alignment and adaptability. Accordingly, they contend that FIHRP represents an ambidextrous HR system that provides both *performance management context* and *social context* of superior firm performance in a dynamic environment by framing the behavior of employees at individual, group, and organizational levels (Gibson and Birkinshaw 2004; Raisch and Birkinshaw 2008).

In their study, Ketkar and Sett (2009) empirically tested and validated a four-factor model of the construct of HR flexibility that included *flexibility inducing HR practices* as a distinct dimension beyond the three existing ones. Empirical support for the flexibility inducing HR practices as a distinct dimension of HR flexibility is considered as a significant advancement in the HR flexibility literature as it identifies the systems and processes that the firms could use to constantly renew and rejuvenate their human resources.

**Environmental dynamism and firm performance: mediating role of HR flexibility**

The contingency theory, contingent resource based view, and organizations and natural environment literatures have all shown that managerial perceptions of the exogenous business environment influence firm strategy which in turn influences firm performance (Lawrence and Lorsch 1967; Thomas, Clark and Gioia 1993; Weick 1995; Aragón-Correa and Sharma 2003; Fiol and O’Connor 2003; Verdu-Jover, Llorens-Montes and Garcia-Morales 2006; Nadkarni and Narayanan 2007). As a heuristic for strategy implementation, managers make a sense of the environmental threats and opportunities, calibrate them with internal strengths and weaknesses of the firm, and then engage in a decision process that involves incremental resource investments or divestments whereby they alter the resource
base of their firm to coalign with the perceived demands of the new environment (McGrath et al. 2004; Sirmon et al. 2007; Teece 2007).

Managerial perception of the environmental uncertainties is therefore an important antecedent of managerial choice that determines how firms actually develop and use their resources and capabilities to deploy their espoused strategies that eventually influence firm performance. This perception-action sequence is to be viewed as an unfolding dynamic process through which managers constantly renew, reconfigure, and redeploy the firm resources, including orchestration of complementary and co-specialized assets, in order to achieve sustainable superior firm performance in the face of environmental uncertainties (Chan et al. 2004; Helfat et al. 2007; Teece 2007). It is aimed at creating organizational flexibility that allows the firm to exercise options on a firm’s future course of action depending on environmental contingencies, and thereby maximizing economic return (Bowman and Hurry 1993; Leiblein 2003; McGrath et al. 2004). By its very nature, this process unfolds over time and takes place in a manner that is socially complex and causally ambiguous – particularly in relation to intangible assets such as human resources – thereby acting as a potential source of sustainable competitive advantage for the firm.

By the above logic, as managers perceive environmental uncertainties emanating from changes in technology, competitor behavior, consumer preferences, etc., they tend to create options for alternate deployment of their human resources in future, by promoting flexibilities in employee skills and behaviors as well as in HR practices (Bhattacharya and Wright 2005). Utilizing the ambidextrous characteristic of the flexibility inducing HR practices, they undertake progressive transformation of the employee skills and behaviors that meet the demands of both current and emerging strategies. These practices empower the employees with skills as well as behavioral routines that are required to serve not only the existing customers and product markets using the existing processes but also the new customer and product market segments that may need use of new processes. Flexible HR practices, on the other hand, help resynthesis, reallocation, rebundling, and redeployment of the progressively transforming human assets, including orchestration of co-specialized resources. For example, developmental employee training and performance management systems may induce acquiring of new competencies and use of discretionary behavior that are needed to address the divergent needs of the existing and the new customers. In order to institutionalize such changes, the firms need to possess coordination flexibility which, for example, may be achieved by having flexible HR practices such as MBO-based performance appraisal and group-based incentive schemes that value and reward discretionary employee behavior using newly acquired competences.

Thus, conceived as organizational systems and processes, the flexible HR practices and the flexibility inducing HR practices together act as sources of dynamic capabilities that are the antecedent organizational and strategic routines by which managers alter their human resource base to generate new sources of competitive advantage in a dynamic environment (Eisenhardt and Martin 2000). The HR practices generate and manage flexibilities of employee skills and behaviors, which in turn influence firm performance. In other words, flexibilities of skills and behaviors mediate the relationships between the HR practices and firm performance. Finally, as argued earlier, measures adopted by the managers to achieve desired levels of HR flexibility mediate the effect of environmental dynamism on firm performance.

**Dimensions of firm performance**

Guest (1997) recommends study of HRM and firm performance linkages within a broad view of performance that reflect the concept of the Balanced Scorecard (BSC) (Kaplan and
Norton 1996). The BSC framework conceives of a strategy map (Kaplan and Norton 2001) or a causal chain of value creation by the firm, which starts with skilled, motivated, and empowered employees running the business processes that create and deliver customer value, which, in turn, enables the firm to appropriate ultimate stakeholder value by selling its products and services. In this linkage, the financial performance lies at a distant end of the causal chain (Guest, Michie, Conway and Sheehan-Quinn 2003). Logically, therefore, a firm’s HR system should have its direct impact on HR outcomes which are the most proximal, and its effect should get progressively attenuated on increasingly more distal operational and financial outcomes (Dyer and Reeves 1995; Becker and Huselid 1998; Wright et al. 2003; Sett 2004).

**A causal model**

Based on the above discussions, we hypothesize a mediated causal model (Figure 1) linking the components of environmental dynamism, HR flexibility and the human, operational, and financial outcomes at firm level.

The corresponding hypotheses may be stated as follows:

*Hypothesis 1a*: Employee Skill Flexibility actually possessed by the firm will mediate the relationship between Environmental Dynamism, as represented by the Need for Skill Flexibility, and the Employee Performance.

*Hypothesis 1b*: Employee Behavioral Flexibility actually possessed by the firm will mediate the relationship between Environmental Dynamism, as represented by the Need for Behavioral Flexibility, and the Employee Performance.

*Hypothesis 1c*: HR Practice Flexibility actually possessed by the firm will mediate the relationship between Environmental Dynamism, as represented by the Need for HR Practice Flexibility, and the Employee Performance.

*Hypothesis 1d*: Overall HR Flexibility actually possessed by the firm will mediate the relationship between Environmental Dynamism, as represented by the overall Need for HR Flexibility, and the Employee Performance.

**Figure 1.** Environmental dynamism, HR flexibility and firm performance: A causal model.
Hypothesis 1e: Employee Performance will mediate the effect of HR Flexibility on firm Operational Performance.

Hypothesis 1f: Firm Operational Performance will mediate the effect of Employee Performance on firm Financial Performance.

Method

Sample and survey

A questionnaire based survey was conducted. About 1100 firms were initially targeted based on the industry classification used by the Centre for Monitoring Indian Economy (CMIE). Only firms with at least 100 full-time employees were included in the sample; the rationale being that smaller firms are unlikely to have sufficiently formalized HR systems that are the focus of this study (see Huselid 1995). About half of the targeted firms were in manufacturing and the other half were from service industries.

To cover as many different types of industries as possible, and at the same time to ensure that the scope of the project remained feasible and manageable, it was decided to choose only one respondent from each firm. Single respondent design has been widely used in SHRM and strategy research, particularly when it involves investigations across a wide array of firms or industries (Huselid 1995; Batt 2002; Worren, Moore and Cardona 2002). Middle/senior level managers working in line or staff functions (other than HR) with minimum 5 years of working experience were chosen as the respondents based on the rationale that: (a) given the research objective, it was essential that the respondent managers possess sufficient first-hand knowledge about the operations and the business environment of the firm which a typical HR manager was less likely to possess; and (b) it was critical to reliably capture the perceptions of the managers about the HR systems as actually implemented as well as the human, operational, and business outcomes they produce. This choice was consistent with the arguments of Batt (2002) that selection of non-HR managers as respondents could improve the reliability of measurements as these managers are expected to be more objective about the HR systems as actually implemented and their consequences, than the HR managers.

A total of 1100 questionnaires were delivered using a face-to-face setting as well as by mailing, depending upon the accessibility of the respondent, out of which 211 usable questionnaires were returned. Although this represents a modest 19% response rate; it is consistent with the previous studies on human resource practices in India (Singh 2003), or elsewhere (Bhattacharya et al. 2005). After testing for outliers, a final sample of 201 firms was used for further analysis. The final sample had 98 firms from manufacturing industry and 103 firms from service industry, suggesting that the sample was fairly representative. These 201 firms were spread all over India. The average age of the firms in the final sample was 30 years and 108 firms had more than 1000 permanent employees. Out of 201 respondents, 58 were Vice Presidents/Directors; 97 were Senior Managers/Assistant General Managers; and 46 were Managers/Senior Consultants/Project Leaders. Their average length of service in the present firm was 6.56 years. Therefore, the final sample of both firms and respondents met the research objectives very well.

Measure of environmental dynamism

Environmental dynamism has been studied in the extant literature in terms of both objective and perceptual measures. In organizational studies and strategy literatures, objectives measures such as rate of change in industry employment and in sales have been used to calibrate environmental dynamism (Judge and Miller 1991; Castrogiovanni 2002).
Often, however, the firm’s environment has been examined through the perceptual lens of the managers because of certain inherent advantages that such an approach offers (Anderson and Paine 1975; Aragón-Correa and Sharma 2003).

There are several advantages of using perceptual measures in process-oriented studies such as the present one. First, the perception of managers shapes their behaviors in terms of adoption of a competitive strategy and organizational practices. This theme of managerial sense making forms a part of the natural process of organizational action (Weick 1995). Therefore, measuring the perception is more important than the objective estimate of environmental dynamism (Duncan 1972; Sutcliffe and Huber 1998). These authors suggest that perceptual measures allow for a stronger test of the relationship between flexibility and environmental uncertainty because if managers perceive the environment as uncertain, they will make decisions that are designed for an uncertain environment. Second, when the environment is prone to frequent changes, perception based data are likely to capture the current reality, rather than the long-term industry trends, better. This is an important research viewpoint because current reality has more proximate implications for managerial actions than distant long-term trends (Boyd, Dess and Rasheed 1993). Third, it enables the researcher to depict the environment from the perspective of organizational members and therefore it does not suffer from ‘aggregation’ (misinterpretations that may occur due to aggregation of several firms in the industry). The fourth advantage is that flexibility is not only reactive but also proactive (Evans 1991). Asking managers about what they perceive about the environmental dynamism faced by their firm helps in incorporating the element of future need for flexibility arising out of anticipation of change which they are likely to have allowed for in their existing systems and practices. Huselid (1993) found that adoption of HR practices was determined by the perception of need for such practices, which in turn was influenced by the volatility of firm’s environment.

In consideration of above advantages and given the objectives of this study, it was felt that use of perceptual measures on firm’s environment would be more appropriate as they capture the subjective and implicit dimensions of the environment that guide managerial actions on the ground. Since each firm was expected to build only the ‘required flexibility’ as perceived by the managers of the firm (Volberda 1998), scale items were developed, following the rationale used by Verdu-Jover et al. (2006), by directly asking the responding managers to indicate the perceived need for HR flexibility in their respective firms.

A multi-item 7-point Likert-type scale was developed in three stages. First, items for the draft instrument were generated through an exhaustive review of literature followed by personal interviews with six senior managers and two academicians from business schools. The selected items tapped four essential dimensions: extent, speed, frequency of significant changes encountered by the firm that require new skills and behaviors, and/or reconfiguration of existing human resources. Next, a panel, of 12 experienced managers representing diverse industries, was requested to review the draft questionnaire. Based on their feedback and after checking the face validity of the items, modifications were made and incorporated into the draft. Finally, the modified draft was pre-tested by administering it on a sample of 16 managers drawn from different industries. The final scale (see Appendix 2) had a total of 15 items: need for skill flexibility (7 items), need for behavioral flexibility (4 items), and need for HR practice flexibility (4 items).

HR flexibility measures

The 53-item HR flexibility scale (skill flexibility: 9 items; behavioral flexibility: 16 items; HR practice flexibility: 7 items; and flexibility inducing HR practices: 21 items) developed
by Ketkar and Sett (2009) was used to measure the various dimensions of HR flexibility prevalent in a firm (see Appendix 3).

**Firm performance measures**
Quasi-perceptual measures developed by Ketkar and Sett (2009) were used to capture firm performance at three levels: employee performance; operating performance; and financial and market performance (see Appendix 4). The scale on employee performance had 10 items and included dimensions such as customer orientation and quality consciousness. The scale on operating performance had 10 items relating to cost, quality, and cycle time of operations, and the scale on financial performance had 5 items covering revenue growth, profitability, operating cost efficiency, market share growth, and overall financial performance.

On the logic that: (a) flexibility in human resources is generated through processes and practices played out over time (Wright, Dunford and Snell 2001) and (b) we needed to capture the equilibrium levels (Bhattacharya et al. 2005), the respondents were asked to indicate the perceived performance on the relevant parameters averaged over the past 5 years (3 years for financial performance). To assess financial performance, the respondents were asked to rate his/her firm’s performance over the past 3 years against the competitors’ on a 5-point scale which had industry average as the mid-point.

**Control variables**
Four control variables used were: firm size (log of number of employees), firm age (log), degree of unionization, and industry type (manufacturing/service). Since the degree of unionization was likely to affect firm performance measures as well as HR outcomes (Arthur 1994; Guest, Conway and Dewe 2004) apart from influencing the firm’s ability to implement HR flexibility enhancing initiatives, it was used as a control and measured through a scale in the questionnaire.

**Analyses**
Given the exploratory nature of the study, the causal linkages between the degree of environmental dynamism, the various dimensions of HR flexibility and the different levels of firm performance were studied in two stages. First, the six sub-hypotheses (Hypotheses 1a to 1f) were individually tested through hierarchical multiple regression. Then, the hypothesized full structural equations model (Figure 1) with latent variables was tested using AMOS 7.0 (Arbuckle 2006), with the covariance/correlation matrix as input. In order to verify whether the hypothesized model is the best representation of the data, it was compared with nested models that were theoretically justifiable (Bollen 1989; Kelloway 1998).

To adjudge the extent of fit of the hypothesized model with the data, we used three fit indexes – one absolute, one relative, and one parsimonious – over and above the chi-square test (Jaccard and Wan 1995). The three fit indexes used were: (a) root mean square error of approximation (RMSEA) (absolute fit index; recommended by Byrne 1998); (b) comparative fit index (CFI) (relative fit index; recommended as the fit statistic of choice for SEM research by Byrne 1998); and parsimony comparative fit index (PCFI). The following cut off values were adopted for the three fit indexes used: (a) RMSEA < .08 for good fit (Loehlin 2004); (b) CFI > .90 for good fit, and .80 to .89 for adequate fit (Byrne 1998); and (c) PCFI ≥ .50 (Mulaik et al. 1989).
Three variants of the hypothesized base model were tested by employing (1) HR practice flexibility (HRPF); (2) flexibility inducing HR practice flexibility (FIHRP); and (3) both HRPF and FIHRP as exogenous variable(s), respectively.

**Results**

**Environmental dynamism**

Exploratory factor analysis followed by confirmatory factor analysis (CFA) supported the three-factor model of the need for HR flexibility construct. To check for unidimensionality, three separate CFAs were carried out on the three underlying dimensions of the scale, followed by a fourth CFA where the three factors were intercorrelated (Anderson and Gerbing 1988). All fit indices, except the parsimonious indices, were within acceptable limits (not reported here). Once unidimensionality was established, the scale reliability was assessed. All the values of Cronbach’s alpha were above 0.7, and the composite reliability indices were above 0.6, signifying that the sub-scales were internally consistent (Fornell and Larcker 1981; Bagozzi and Yi 1988).

Content validity of the survey instrument was ensured through review, personal interviews with senior managers, and multi-stage pretesting before finalizing the instrument. Convergent validity was ascertained by examining Bentler-Bonett coefficient index (BBNFI) and by inspecting the factor loadings (Bollen 1989) for all the sub-scales. The BBNFI was more than 0.9 and all the factor loadings were statistically significant. Discriminant validity was established by conducting pair-wise tests of all the related constructs as suggested by Bagozzi and Phillips (1982). This analysis verifies whether a model representing two factors fits the data significantly better than a one-factor model (Shook, Ketchen, Hult and Kacmar 2004). For each of the three pairs of factors involved, CFA was first performed by constraining correlation coefficient between the two dimensions to unity (Model 1), and then after lifting this constraint (Model 2). Positive and significant chi-square difference between the two models would indicate existence of discriminant validity between the factors involved. Results of the pair [Model 1–Model 2] wise tests show that chi-square difference was positive and significant between the pairs NSF-NHRPF and NBF-NHRPF and positive but non-significant in respect of the pairs NSF-NBF. This suggested that the sub-scales of need for skill flexibility and need for behavioral flexibility failed to show statistically significant discriminant validity. Accordingly, in the SEM analyses of the hypothesized full causal model, the need for HR flexibility scale has been used as a single composite scale having 15 items, without discriminating between the constituent sub-dimensions.

**Descriptive statistics**

Table 1 shows means, standard deviations, and bivariate correlations among the variables. Need for skill flexibility was significantly correlated with the need for behavioral flexibility. However, correlations of both these measures with the need for HR practice flexibility were non-significant.

As expected, the dimensions of HR flexibility were significantly correlated with each other and also with the dimensions of firm performance – except for the correlation between skill flexibility and profitability which was not significant. The direction of all the correlations was positive as expected.

The magnitude of correlation between the individual dimensions of HR flexibility and firm performance was the highest for employee performance and it was progressively less for operating- and financial-performance.
Table 1. Descriptive statistics and zero-order correlations.

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<tr>
<td>1 Need for Skill Flexibility</td>
<td>4.90</td>
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<td>2 Need for Behavioral Flexibility</td>
<td>5.24</td>
<td>1.09</td>
<td>.66***</td>
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<td>3 Need for HR Practice Flexibility</td>
<td>3.97</td>
<td>1.22</td>
<td>.03</td>
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<td>4 Need for HR Flexibility Index</td>
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<td>5 Skill Flexibility</td>
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<td>6 Behavioral</td>
<td>5.18</td>
<td>0.88</td>
<td>.43***</td>
<td>.37***</td>
<td>.23***</td>
<td>.51***</td>
<td>.72***</td>
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<td>7 HR Practice</td>
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<td>1.38</td>
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<tr>
<td>8 Flexibility Inducing HR Practices</td>
<td>4.91</td>
<td>1.12</td>
<td>.43***</td>
<td>.38***</td>
<td>.29***</td>
<td>.55***</td>
<td>.52***</td>
<td>.72***</td>
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<tr>
<td>9 HR Flexibility Index</td>
<td>4.98</td>
<td>0.91</td>
<td>.47***</td>
<td>.44***</td>
<td>.27***</td>
<td>.58***</td>
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<td>Firm Performance</td>
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<td>10 Employee Performance</td>
<td>3.85</td>
<td>0.62</td>
<td>.19**</td>
<td>.21**</td>
<td>.32***</td>
<td>.36***</td>
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<td>11 Operating</td>
<td>3.81</td>
<td>0.63</td>
<td>.14*</td>
<td>.10</td>
<td>.27***</td>
<td>.26***</td>
<td>.38***</td>
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<tr>
<td>12 Sales Revenue</td>
<td>3.94</td>
<td>0.83</td>
<td>.13†</td>
<td>.09</td>
<td>.05</td>
<td>.14†</td>
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<td>.47***</td>
<td>1</td>
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<tr>
<td>13 Profitability</td>
<td>3.73</td>
<td>0.88</td>
<td>.21***</td>
<td>.13</td>
<td>.09</td>
<td>.21***</td>
<td>.13</td>
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<td>.75***</td>
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<tr>
<td>14 Cost Efficiency</td>
<td>3.57</td>
<td>0.85</td>
<td>.12‡</td>
<td>.12‡</td>
<td>.06</td>
<td>.15**</td>
<td>.16**</td>
<td>.26***</td>
<td>.23***</td>
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<td>.63**</td>
<td>.66***</td>
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<tr>
<td>15 Market Share</td>
<td>3.60</td>
<td>0.89</td>
<td>.02</td>
<td>.03</td>
<td>.09</td>
<td>.02</td>
<td>.25***</td>
<td>.35***</td>
<td>.24***</td>
<td>.27***</td>
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<td>.38***</td>
<td>.62**</td>
<td>.44***</td>
<td>.49***</td>
<td>1</td>
<td></td>
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<tr>
<td>16 Overall Performance</td>
<td>3.89</td>
<td>0.77</td>
<td>.12†</td>
<td>.01</td>
<td>.15**</td>
<td>.15**</td>
<td>.28***</td>
<td>.35***</td>
<td>.23***</td>
<td>.37***</td>
<td>.35***</td>
<td>.43***</td>
<td>.53***</td>
<td>.76**</td>
<td>.66***</td>
<td>.61***</td>
<td>.69***</td>
<td>1</td>
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</tbody>
</table>

Notes: N = 201; †p < .10; *p < .05; **p < .01; ***p < .001 one-tailed test.
For testing the mediated relationship as hypothesized under Hypotheses 1a to 1f, a three-step procedure was followed (Baron and Kenny 1986; Mackinnon and Dwyer 1993; Kenny, Kashy and Bolger 1998). First, the mediator (z) was regressed on the independent variable (x) \( z = b_0 + b_1x \); second, dependent variable (y) was regressed on the independent variable (x) to calculate the direct effect \( y = c_0 + c_1x \); and, third, to calculate the indirect effect, dependent variable (y) was regressed on the independent variable (x) by introducing the mediator variable (z) into the equation \( y = a_0 + a_1x + a_2z \). Mediation is shown to exist if two conditions are fulfilled: (i) standardized beta coefficients b1 and c1 are both significant, and (ii) a1 is either non-significant, or is less than c1 (non-significant a1 indicates full mediation; Baron and Kenny 1986; Kenny et al. 1998). To estimate the strength of mediation, Sobel’s Test statistic (Sobel 1982) was calculated for each mediated model.

Results shown in Table 2 indicate that all the six hypotheses were supported. All mediations along the causal path (Figure 1) up to employee performance were full excepting the partial mediation by HR practice flexibility of the link between need for HR practice flexibility and employee performance. Employee performance partially mediated the link between HR flexibility index and operational performance – indicating a significant direct effect of HR flexibility on operational performance. Operational performance fully mediated the relationship between employee performance and the individual parameters of financial performance (value of a1 non-significant at p < .05 level in all but one case).

**Analysis of full causal model**

*With HRPF as the exogenous variable*

The hypothesized model showed good fit with data (\( \chi^2 = 3791.31, \text{df} = 2377, p < .001; \chi^2/\text{df} = 1.59; \text{RMSEA} = .05; \text{CFI} = .87; \text{PCFI} = .81 \)) in spite of significant chi-square test (Jöreskog and Sörbom 1989; Bentler 1990; Kelloway 1998). Only CFI was marginally below the cut-off value for good fit. Next, the hypothesized model was compared with the nested models (Table 3) using the change in chi-square test (Bentler and Bonett 1980; Thompson 2004) as also the three fit indexes. The first comparison with the control-variables-only model showed that none of the path coefficients with employee performance was significant and hence the alternate model was considered non-viable. The second comparison was between the hypothesized model and the partially mediated model 1 (PMM 1). This had an additional direct path from the exogenous variable (HRPF) to the employee performance over and above the hypothesized linkages. The change in chi-square test showed that PMM 1 had significantly better fit with data than the hypothesized model (\( \Delta \chi^2 = -15.92, \Delta \text{df} = 1, p < .001 \)). Therefore, PMM 1 was retained as the best-fitting model and was then compared with the partially mediated model 2 (PMM 2) which had a direct path from the exogenous variable to operating performance in addition to all the linkages in PMM 1. Difference in chi-square (\( \Delta \chi^2 = -6.15, \Delta \text{df} = 1, p < .001 \)) was significant. Hence, PMM 2 was compared with the partially mediated model 3 (PMM 3) which had all the linkages of PMM 2 and an additional direct path from HRPF to financial performance. The change in chi-square was non-significant.

Although the difference in chi-square tended to suggest that PMM 2 is the best-fitting model, PMM 1 was still retained as the best-fitting model because the fit indices (CFI and PCFI) did not improve with the addition of paths. All the path coefficients in this model
Table 2. Mediated sub-models (Hypotheses 1a to 1f): Sobel test results.

<table>
<thead>
<tr>
<th>Hypothesis IV-MV-DV</th>
<th>$a_1$</th>
<th>$b_1$</th>
<th>$c_1$</th>
<th>Sobel statistic</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: NSF-SF-EP</td>
<td>.04</td>
<td>.41***</td>
<td>.17*</td>
<td>4.06***</td>
<td>Full mediation (a1 non-significant at p &lt; .05)</td>
</tr>
<tr>
<td>H1b: NBF-BF-EP</td>
<td>.01</td>
<td>.39***</td>
<td>.23**</td>
<td>4.80***</td>
<td>Full mediation</td>
</tr>
<tr>
<td>H1c: NHRPF-HRPF-EP</td>
<td>.22***</td>
<td>.25**</td>
<td>.32***</td>
<td>2.74**</td>
<td>Partial mediation (a1 &lt; c1)</td>
</tr>
<tr>
<td>H1d: NHRF-HRFI-EP</td>
<td>.01</td>
<td>.57***</td>
<td>.36***</td>
<td>6.28***</td>
<td>Full mediation</td>
</tr>
<tr>
<td>H1e: HRFI-EP-OP</td>
<td>.20**</td>
<td>.62***</td>
<td>.54***</td>
<td>6.81***</td>
<td>Partial mediation (a1 &lt; c1)</td>
</tr>
<tr>
<td>H1f: EP-OP-FP</td>
<td>.15</td>
<td>.66***</td>
<td>.40***</td>
<td>4.30***</td>
<td>Full mediation</td>
</tr>
<tr>
<td>FP=Sales Revenue</td>
<td>.08</td>
<td>.66***</td>
<td>.32***</td>
<td>4.04***</td>
<td>Full mediation</td>
</tr>
<tr>
<td>FP=Profitability</td>
<td>.16</td>
<td>.66***</td>
<td>.31***</td>
<td>2.69**</td>
<td>Full mediation</td>
</tr>
<tr>
<td>FP=Cost Efficiency</td>
<td>.18*</td>
<td>.66***</td>
<td>.34***</td>
<td>2.78**</td>
<td>Partial mediation (a1 &lt; c1)</td>
</tr>
<tr>
<td>FP=Market Share</td>
<td>.13</td>
<td>.66***</td>
<td>.40***</td>
<td>2.73**</td>
<td>Full mediation</td>
</tr>
</tbody>
</table>

Notes: IV=Independent variable; MV=Moderating variable; DV=Dependent variable; N = 201; †p < .10; *p < .05; **p < .01; ***p < .001 one-tailed test.
### Table 3. Nested model comparisons with HRPF as exogenous variable.

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$ (df)</th>
<th>$\chi^2$/df</th>
<th>$\Delta\chi^2$, $\Delta df$</th>
<th>RMSEA</th>
<th>CFI</th>
<th>PCFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesized model</td>
<td>3791.31***</td>
<td>1.59</td>
<td>–</td>
<td>.05</td>
<td>.87</td>
<td>.81</td>
</tr>
<tr>
<td>PMM1</td>
<td>3775.40***</td>
<td>1.59</td>
<td>$-15.92^{***}$, 1 [compared with the hypothesized model]</td>
<td>.05</td>
<td>.88</td>
<td>.81</td>
</tr>
<tr>
<td>PMM2</td>
<td>3769.24***</td>
<td>1.59</td>
<td>$-6.15^{**}$, 1 [compared with PMM1]</td>
<td>.05</td>
<td>.88</td>
<td>.81</td>
</tr>
<tr>
<td>PMM3</td>
<td>3768.04***</td>
<td>1.59</td>
<td>$-1.20$, 1 [compared with PMM2]</td>
<td>.05</td>
<td>.88</td>
<td>.81</td>
</tr>
</tbody>
</table>

Notes: $N = 201$; †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$ one-tailed test.
(PMM 1) were significant (Figure 2). Therefore, both measurement model and structural model relating to PMM 1 were supported (Meyers, Gamst and Guranio 2006). The effect sizes on the variables of interest were all very strong: behavioral flexibility (79%), employee performance (38%), operating performance (49%), and financial performance (28%). The results suggested that the HR system of the firm had a stronger influence on operating performance compared to financial performance of the firm which was expected from theory.

With FIHRP as the exogenous variable

The data supported good fit for the hypothesized model ($\chi^2 = 5559.38$, $df = 3424$, $p < .001$; $\chi^2/df = 1.62$; RMSEA = .06; CFI = .84; PCFI = .78); only CFI was marginally below the cut-off value for good fit. Similar comparisons with the nested models were done as in the previous case (Table 4). Although the change in chi-square test indicated that PMM 2 is the best-fitting model, PMM 1 (Figure 3) was retained based on consideration of parsimony and because values of the three fit indexes were identical for the two variants. All the path coefficients in this model (PMM 1) were significant, indicating support for the structural model. There were strong effect sizes: behavioral

![Figure 2. The best-fit model (with only HRPF in the model).](image)

Notes: Values in bold letters denote the standardized beta coefficients and values on the top right corner of each variable denote squared multiple correlations; $N = 201$; †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$ one-tailed test.

![Figure 3. The best-fit model (with only FIHRP in the model).](image)

Note: Values in bold letters denote the standardized beta coefficients and values on the top right corner of each variable denote squared multiple correlations; $N = 201$; †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$ one-tailed test.
Table 4. Nested model comparisons with FIHRP as exogenous variable.

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$ (df)</th>
<th>$\chi^2$/df</th>
<th>$\Delta \chi^2$, $\Delta df$</th>
<th>RMSEA</th>
<th>CFI</th>
<th>PCFI</th>
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<tbody>
<tr>
<td>Hypothesized model</td>
<td>5559.38***</td>
<td>1.62</td>
<td>–</td>
<td>.06</td>
<td>.84</td>
<td>.78</td>
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<tr>
<td>(3424)</td>
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<tr>
<td>PMM1</td>
<td>5528.28***</td>
<td>1.61</td>
<td>$-31.09***$, 1 [compared with the hypothesized model]</td>
<td>.05</td>
<td>.84</td>
<td>.79</td>
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<tr>
<td>(3423)</td>
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<tr>
<td>PMM2</td>
<td>5523.96***</td>
<td>1.61</td>
<td>$-4.32*$, 1 [compared with PMM1]</td>
<td>.05</td>
<td>.84</td>
<td>.79</td>
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<tr>
<td>(3422)</td>
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<tr>
<td>PMM3</td>
<td>5521.00***</td>
<td>1.61</td>
<td>$-2.96$, 1 [compared with PMM2]</td>
<td>.05</td>
<td>.84</td>
<td>.79</td>
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<td>(3421)</td>
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Notes: N = 201; †p < .10; *p < .05; **p < .01; ***p < .001 one-tailed test.
flexibility (81%), employee performance (45%), operating performance (61%), and financial performance (38%). The effect size of FIHRP on employee performance was 7% higher compared to the effect size of HRPF.

With both HRPF and FIHRP as exogenous variables

The hypothesized model showed reasonably good fit ($\chi^2 = 6824.65$, $df = 4027$, $p < .001$; $\chi^2/df = 1.69$; RMSEA = .06; CFI = .82; PCFI = .77) with only the value of CFI falling marginally below the cut-off value for good fit. However, two path coefficients: HRPF to skill flexibility (.07), and HRPF to behavioral flexibility (.09) were found to be non-significant (at $p < .05$) and weak, indicating lack of adequate support for the structural model (Figure 4). Accordingly, further comparisons with nested models were not undertaken. The effect sizes in the hypothesized model, however, were strong: behavioral flexibility (79%), employee performance (44%), operating performance (60%), and financial performance (37%).

Test for common method variance using Harman’s Test

Cross-sectional and self-reported data are susceptible to common method biases. Following the procedure adopted by several scholars (cf. Korsgaard and Roberson 1995; Mossholder, Bennett, Kemery and Wesolowski 1998; Iverson and Maguire 2000), a post-hoc test was conducted using confirmatory factor analysis (CFA) to test the hypothesis that a single factor (common method) can account for all of the variance in the data. All items of both the independent and the dependent variables were included in a single factor and the fit indices were examined. The single factor model showed poor fit with the data ($\chi^2 = 9513.26$, $df = 2849$, $p < .001$; $\chi^2/df = 3.34$; RMSEA = .11; CFI = .49; PCFI = .48). Comparison of the single-factor model with the three variants of the hypothesized models tested earlier suggested that the (nested) hypothesized models had significantly better fit with the data as compared with the single-factor model ($HRPF$ as exogenous variable: $\Delta \chi^2 = -7262.90$, $\Delta df = 1388$, $p < .001$; $\chi^2/df = 1.54$; RMSEA = .05; CFI = .91; PCFI = .83; $FIHRP$ as exogenous variable: $\Delta \chi^2 = -5995.17$, $\Delta df = 567$, $p < .001$; $\chi^2/df = 1.54$; RMSEA = .05; CFI = .89; PCFI = .81; With both $HRPF$ and $FIHRP$ as exogenous variables: $\Delta \chi^2 = -5037.09$, $\Delta df = 56$, $p < .001$; $\chi^2/df = 1.60$; RMSEA = .05; CFI = .87; PCFI = .81). While this test does not eliminate the possibility

![Figure 4](image-url)
of method bias, it provides evidence that inter-item correlations are not driven purely by method bias (Podsakoff, Mackenzie and Podsakoff 2003).

**Discussion and conclusion**

How flexibility of HR system attenuates the effects of environmental dynamism on firm performance has not been studied in any reported work so far. At the broadest level, the single most important empirical contribution of this study is in illuminating the *black box*, that is, the process through which flexibility of HR system mediates the effects of environmental dynamism on the business performance of firms operating in a dynamic environment. This was achieved by first developing and validating a scale for measuring environmental dynamism as appropriate for HR flexibility study. Thereafter, the hypothesized roles of the constituent dimensions of HR flexibility construct in mediating the effects of environmental dynamism on firm-level human-, operational-, and financial-performance outcomes were studied through multiple regression analyses followed by testing of a multi-level full causal model through structural equation modelling. Generalizability of the results across both manufacturing and service sector firms belonging to different types of industries, which has been identified as an important issue in strategic HRM research (Guest et al. 2003), was ensured by appropriate sample selection of respondent firms and by controlling for the industry effect at the analysis stage.

**Environmental dynamism**

Environmental dynamism was measured in this study using the firm managers’ perceived need for HR flexibility as a surrogate. Three clear factors (need for flexibilities in skills, behaviors, and HR practices) emerged through confirmatory factor analysis, and scale dimensionality and reliability were also established. These results are consistent with the multi-dimensional construct of HR flexibility as conceptualized by Wright and Snell (1998), and Ketkar and Sett (2009). Development of a scale to measure environmental dynamism in the specific context of HR flexibility is expected to help to encourage further empirical work in this important area.

**Mediating role of HR flexibility**

As the next logical step in theory building, the hypothesized mediating role of the individual dimensions of HR flexibility in attenuating the effect of environmental dynamism on firm level human-, operational-, and financial- outcomes were studied empirically. Test results supported all the hypothesized mediated linkages: (a) skill flexibility actually possessed by a firm fully mediated the effect of environmental dynamism on firm-level employee performance in so far as it related to the need for variety and deployability of skills engendered by environmental uncertainties; (b) behavioral flexibility fully mediated the effect of environmental dynamism that called for a wider range of behavioral scripts and behavioral malleability among firm employees, on firm-level employee performance; (c) flexibility of HR practices only partially mediated the influence of environmental dynamism that necessitated flexible HR practices, on firm-level employee performance; (d) overall HR flexibility developed by the firm fully mediated the effect of environmental dynamism on employee performance; (e) employee performance partially mediates the effect of overall HR flexibility on operational performance; and (f) operating performance fully mediates the relationship between employee performance and financial performance of the firm.
The evidences are consistent with both the conceptualization of HR flexibility as a multi-dimensional construct (Ketkar and Sett 2009; Wright and Snell 1998) and the hypothesized mediating role of HR flexibility in attenuating the adverse impact of environmental turbulence on firm performance. Support for the full causal model (Figure 4) suggests that superior firm performance ensues when managers build flexible HR systems that not only help in inducing required variety in skills and behaviour among employees but also enables the firm to redeploy such reconfigured resources in tune with the demands of the changing environment. Continuous development of new skills and behavioral repertoires and their timely and effective deployment are both necessary for ensuring superior firm performance in a dynamic business environment.

Results of the study also indicate existence of a significant direct effect of HR practices on firm-level employee performance (Figures 2 to 4), over and above their indirect effect (mediated through behavioral flexibility). They suggest that in attenuating the influence of environmental dynamism on firm performance, the HR practices of the firm taken together also act as a structural mechanism that shapes the process of development of employee skills and behavior in a manner that fulfills the strategic objectives of the firm. This means that the HR practices may perform two independent but complementary roles. One, they may help in imparting flexible skills and behaviors, which in turn, may help the firm in sustaining superior performance. Another role that HR practices as an institutional or entrenched system can play is in ensuring that the firm continues to develop new skills and behaviors in a consistent manner as the environment undergoes significant changes. For example, a closely coordinated and development oriented performance appraisal and training system would not only ensure new skills are developed but would also provide a diagnostic feedback (through performance appraisal) whether the processes (training activities) are meeting the strategic purpose of the firm. In other words, the HR practices not only trigger processes that change the skills and behaviors of employees but also, as a system, ensure that those processes remain constantly aligned to the strategic objectives of the firm.

Multi-level linkages to firm performance

The findings provide empirical support to the arguments put forward by several scholars (Dyer and Reeves 1995; Becker and Gerhart 1996; Delery 1998; Guest et al. 2003; Wright et al. 2003; Sett 2004) that the HR system of a firm is expected to directly impact the most proximal firm-level HR outcomes, compared to more distal operational and financial outcomes. Goodness-of-fit of all the three variants of the best-fit full causal models that showed this cascading influence of the HR system across the HR value chain were good and the corresponding structural models showed strong and significant path coefficients for the relevant linkages.

Implications for future research

The present study establishes the general proposition that in a dynamic environment superior firm performance results when the flexibility of HR actually possessed by the firm matches the demands of the environment for such flexibilities as perceived by the managers of the firm. Data collected from both manufacturing and service firms belonging to a wide array of industries and facing different degrees of environmental turbulence supported this broad proposition.
Future research may benefit from investigating beyond this general proposition to examine whether different types of environmental change (continuous vs. discontinuous), or different types of strategies adopted by the firms to encounter such change, require different types of HR flexibilities. While the generic processes involved in creating competitive advantage through resources and capabilities are the same (namely, structuring, bundling, and leveraging resources), their actual nature need to be different under different environmental contexts (Sirmon et al. 2007). For instance, even under conditions of low environmental uncertainty, firms may differ widely in their strategic intent in that one firm may choose to protect its existing competitive position by further stabilizing its existing resource base through continuous and incremental improvements; while another firm may choose to extend or elaborate its current capability by building new skills and capabilities and integrating them with the existing ones; while still another may hope to reshape the market by developing completely new resources and capabilities that may render the existing skills and capabilities obsolete. However, when the environmental uncertainties faced by the firms are high, the process of resource bundling based on continuous improvement is unlikely to work. Similarly, when there are discontinuous changes in the customer preferences, technology, or market structure, resources and capabilities focused on exploiting existing market opportunities are less likely to be effective in creating customer value compared with those aimed at creating new opportunities through entrepreneurial leveraging of existing resources (Sirmon et al. 2007). Different environmental contexts and the strategic stance adopted by a firm in a given context may call for different configurations of HR practices and qualitatively different types of employee skills and behaviors necessary for superior firm performance.

Nature of the environmental changes also has important implications for the type of flexibilities (Atkinson 1984) needed by a firm to achieve optimum performance levels. If the changes involve only the levels of product market demand (e.g., higher demands for existing products generated by an expanding base of existing customers), then the firms would need to possess numerical flexibility which means that the firms should be able to quickly enhance the numerical strength of their employees through new acquisitions and/or redeployment of existing employees across its various departments/locations. In contrast, when the environmental changes involve, for example, demand for new products or product features calling for application of new production/service processes, the firms need to exhibit functional flexibility that calls for possession of new employee skills and/or behavioral repertoires required to produce and deliver the new products or services. When the product markets are highly competitive, the firms may always need to possess financial flexibility that entails ability to reduce the employment cost by linking the employee remuneration to the output.

To engage in a more fine-grained analysis of the linkages between environmental dynamism, HR flexibility and firm-level performance, future researchers would need to exercise corresponding degree of discrimination in formulation of context specific hypotheses and in selection of variables of interest relevant to that context; only then they can expect to find meaningful linkages between these variables.

**Implications for practice**

The present study has two major implications for managerial practices. First, the development of a measurement scale for environmental dynamism would help managers to ask the right questions to make an accurate assessment of the need for HR flexibility in the context of likely changes in both macro- and micro-environments in which the firm is
operating. This assessment is expected to facilitate adoption of measures that would induce the right degree of flexibility in employee skills and behaviors as appropriate for meeting the environmental threats and opportunities. The HR flexibility scale developed by Ketkar and Sett (2009) provides the framework for both identifying HR practices that are required for enhancing HR flexibility and measuring the degree of HR flexibility actually possessed by a firm.

Second, the HR value chain deciphered by this study informs managers that the financial performance of the firm can be affected by the HR system only through the prior achievement of relevant HR outcomes (e.g., customer orientation of employees), followed by causally related operational outcomes (e.g., customer satisfaction level). Thus, the managers should be aware that to achieve superior financial performance they have to work through this causal chain and there is likely to be some delay between adoption of some HR initiatives and improvements in firm-level operational and financial outcomes. Also, overall improvements in firm-level performance are quite often the result of not one but a bundle of interdependent HR practices which reinforce one another to produce synergistic effects.

**Limitations of the study**

Given the fact that the primary objective of the study was to decipher the process through which HR flexibility attenuates the impact of environmental dynamism on firm performance, the cross-sectional design of the study is an important limitation. A research design based on time-series data or cross-sectional studies conducted in multiple phases would have been ideal. Future research may endeavour to bring about these refinements.

A single-respondent research design was consciously chosen for the present study to cover as many different types of firms as possible so as to be able to establish the generalizability of the broad proposition of the study. Obviously, this was at the expense of reliability of the data which could have been higher with multiple-respondent design. However, a multi-respondent study with a comparable variety in respondent firms would have required much larger resources.

The results of the SEM modeling were quite satisfactory. However, given the complexity of the causal models tested, the sample to scale items ratio obtaining in the study is considered to be low. There were 53 items in the HR flexibility scale. Against this there were only 201 respondents in the sample. Stevens (2002) recommends as a rule of thumb at least 15 cases per measured variable or indicator, while Bentler and Chou (1987) recommend at least 5 cases per parameter estimate (including error terms as well as path coefficients). Lower indicator to sample ratios generally cause parameter estimates to be unstable and the statistical significance tests tend to lack sufficient power. Future research may remove this limitation by accessing a higher number of respondents which could not be achieved in this study due to resource limitations.

**Note**

1. Descriptions in this section have close similarity with those in the corresponding portions in Ketkar and Sett (2009) because the two studies were parts of a common larger project.

**References**


Arbuckle, J.L. (2006), *AMOS 7.0*, Chicago, IL: SPSS.


### Appendix 1

**Flexibility inducing HR practices**

<table>
<thead>
<tr>
<th>Flexibility inducing HR practice</th>
<th>Supporting literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee selection emphasizing cognitive skills and learning abilities</td>
<td>Stevens and Campion 1999; Youndt, Snell, Dean and Lepak 1996</td>
</tr>
<tr>
<td>2. Strategically planned job rotation and career movements</td>
<td>Allwood and Lee 2004; Collins and Smith 2006; Ichniowski, Shaw and Prennushi 1997; MacDuffie 1995; Collins and Smith 2006; Guthrie 2001; Collins and Clark 2003; Collins and Smith 2006; Gurhrie 2001; Youndt et al. 1996</td>
</tr>
<tr>
<td>3. Comprehensive training emphasizing new skills and learning abilities</td>
<td>Collins and Clark 2003; Collins and Smith 2006; Guthrie 2001; Youndt et al. 1996</td>
</tr>
<tr>
<td>5. Skill-based pay and organization/group-based incentives</td>
<td>Delaney and Huselid 1996; Guthrie 2001; Murray and Gerhart 1998; Shaw, Gupta and Delery 2001; Arthur and Jeff 1999; Delaney and Huselid 1996</td>
</tr>
<tr>
<td>6. Reward schemes based on multiple parameters like problem solving abilities, responsiveness to situational demands, and team work</td>
<td>Foss and Laursen 2005</td>
</tr>
<tr>
<td>7. Open communication system and participatory work practices</td>
<td>Chan et al. 2004; Jansen et al. 2005; Rindova and Kotha 2001</td>
</tr>
<tr>
<td>8. Employee empowerment in a participative work-culture</td>
<td>MacDuffie 1995</td>
</tr>
</tbody>
</table>
1. Need for Skill Flexibility

1. In our firm, the skills required by the employees undergo rapid change
2. Our employees need to continuously upgrade their skills in order to meet changing job requirements
3. Our firm frequently needs new types of skills
4. Our employees often need to learn new skills to match job requirements
5. Our firm often faces shortages or surpluses of manpower due to fluctuations in demand of our products/services
6. We often require different combinations of skills to execute our customer orders
7. We often feel the need to redeploy people across different jobs and/or units

2. Need for Behavioral Flexibility

8. Our competitive environment requires our people to change their old work habits
9. Dynamic nature of our customer needs require our employees to readjust their work routines quite often
10. Diverse nature of our customer needs requires our employees also to show flexible work behavior
11. We make changes in our company policy and/or work processes that often require changes in work habits of our employees

3. Need for Flexibility of HR Practices

12. We often feel that different units/divisions of our firm should follow different HRM policies that better suit their particular needs
13. We often feel that our firm should follow different HRM policies for different groups of employees, as their needs are different
14. Most of our HRM practices have remained unchanged for a long time even though they needed some change to be more relevant to our market conditions
15. Our HRM practices remained unchanged because of resistance within the organization

Note: Respondents were asked to answer the questions keeping in view only the core group(s) of employees that was central to the business of the firm.

Appendix 2

Perceived environmental dynamism – measurement scale items

Likert-type 7-point scale used (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = undecided, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree) with the following items.

<table>
<thead>
<tr>
<th>1. Need for Skill Flexibility</th>
<th>5. Our firm often faces shortages or surpluses of manpower due to fluctuations in demand of our products/services</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Our employees need to continuously upgrade their skills in order to meet changing job requirements</td>
<td>6. We often require different combinations of skills to execute our customer orders</td>
</tr>
<tr>
<td>3. Our firm frequently needs new types of skills</td>
<td>7. We often feel the need to redeploy people across different jobs and/or units</td>
</tr>
<tr>
<td>4. Our employees often need to learn new skills to match job requirements</td>
<td></td>
</tr>
</tbody>
</table>

2. Need for Behavioral Flexibility

<table>
<thead>
<tr>
<th>8. Our competitive environment requires our people to change their old work habits</th>
<th>10. Diverse nature of our customer needs requires our employees also to show flexible work behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Dynamic nature of our customer needs require our employees to readjust their work routines quite often</td>
<td>11. We make changes in our company policy and/or work processes that often require changes in work habits of our employees</td>
</tr>
</tbody>
</table>

3. Need for Flexibility of HR Practices

<table>
<thead>
<tr>
<th>12. We often feel that different units/divisions of our firm should follow different HRM policies that better suit their particular needs</th>
<th>14. Most of our HRM practices have remained unchanged for a long time even though they needed some change to be more relevant to our market conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. We often feel that our firm should follow different HRM policies for different groups of employees, as their needs are different</td>
<td>15. Our HRM practices remained unchanged because of resistance within the organization</td>
</tr>
</tbody>
</table>

Note: Respondents were asked to answer the questions keeping in view only the core group(s) of employees that was central to the business of the firm.
### Appendix 3

**HR flexibility scale items**

Likert-type 7-point scale used (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = undecided, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree) with the following items (Ketkar and Sett 2009).

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Skill Flexibility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Our employees are capable of performing a broad range of jobs available in our firm</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Our firm can shift employees to different jobs when needed</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Team based working help us to manage fluctuations in demand, or varying demands for different skills</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Our employees can become productive in their new jobs quickly</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>We have enough diversity of skills among our employees to meet changing market demands</td>
<td></td>
</tr>
<tr>
<td><strong>2. Behavioral Flexibility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>The flexibility of our employees’ work habits helps us to change according to market demands</td>
<td>18</td>
</tr>
<tr>
<td>11</td>
<td>People in our firm change their work habits in response to changes in the competitive environment</td>
<td>19</td>
</tr>
<tr>
<td>12</td>
<td>Our employees respond to changing situations fast</td>
<td>20</td>
</tr>
<tr>
<td>13</td>
<td>People in my firm readily change their work habits as demanded by changes in the working environment</td>
<td>21</td>
</tr>
<tr>
<td>14</td>
<td>Most of our employees are flexible enough to adjust to dynamic work requirements</td>
<td>22</td>
</tr>
<tr>
<td>15</td>
<td>Our employees adjust to changing work requirements within a short period.</td>
<td>23</td>
</tr>
<tr>
<td>16</td>
<td>Our employees’ response to changing nature of their jobs help us remain competitive in the market</td>
<td>24</td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td>---</td>
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<td></td>
</tr>
<tr>
<td><strong>3. Flexibility of HR system</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>People in our firm show flexibility in their behavior in order to meet customer requirements</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Our employees do not resent even if they are required to meet divergent goals set by the company</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Flexibility of our HR practices helps us to adjust to changing demands of the environment</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Changes in our HR practices enable us to remain competitive in the market</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Our firm modifies its HR system to keep pace with the changing competitive environment</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Our HR practices adjust meaningfully to changed business scenarios</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Our HR practice parameters are designed so that they quickly adjust to changes in business conditions</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Our HR practices, as a whole, are flexible</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>We make frequently changes in our HR practices to align the HR system, with changing work requirements</td>
<td></td>
</tr>
</tbody>
</table>

| **4. Flexibility inducing HR system** |   |
| 33 | We recruit people based on their learning abilities rather than pure technical skills |
| 44 | We regularly involve our employees in decision making on job related matters |
| 34 | We use selection methods that help us to detect employee flexibility and adaptability |
| 45 | We have a vibrant employee suggestion scheme and we get a significant number of useful suggestions |
| 35 | We provide adequate facilities to our employees for skill upgrading and learning new skills |
| 46 | Our company policy requires managers/team leaders to hold regular meetings with our employees to discuss the problems faced or consider suggestions for improvement |
| 36 | Our training modules give adequate emphasis on improving learning skills of our employees |
| 47 | We use multiple channels of communication with our employees to make them aware of our company performance, future directions, and how they could contribute |
| 37 | Our performance appraisal system closely tracks employee skill development keeping in view our future needs |
| 48 | We set clear performance goals and our Performance Appraisal system gives timely feedback to our employees |
| 38 | We use multiple channels of communication to create employee awareness about the importance of continuous skill development |
| 49 | Our firm has a good performance linked reward scheme |
39 We train people in multiple skills keeping in view our possible future needs  
40 Our firm offers monetary incentives for skill upgrading or acquiring new skills  
41 Our salary structure has a skill based pay component  
42 Our promotion policy gives preference to employees with a superior skill set  
43 Team based working helps our employees to pick up a wider range of skills  
Good performance is always recognized and rewarded in our firm  
Our Performance Appraisal system is flexible enough to accommodate adjustments to performance parameters as may be required due to changing business priorities  
We have a formal employee counselling system that helps employees to continuously improve their performance  
Extent of job rotation in our firm.

Note: Respondents were asked to answer the questions keeping in view only the core group(s) of employees that was central to the business of the firm.

Source: Ketkar and Sett (2009).
Appendix 4

Firm performance scale items

A. Financial performance (compared with industry average over the last 3 years)
Likert-type 5-point scale used (5 = excellent, 4 = above industry average, 3 = industry average, 2 = below industry average, 1 = poor) with the following items (Ketkar and Sett 2009).

1. Growth of Sales Revenue
2. Profitability (Profit/Sales)
3. Operating Cost Efficiency (Total Cost/Sales)
4. Growth of Market Share
5. Overall Firm Performance

B. Operational performance (compared with the situation 5 years previously)
Likert-type 5-point scale used (5 = very much improved, 4 = improved, 3 = slightly improved, 2 = no change, 1 = become worse) with the following items.

1. Customer Satisfaction Level
2. Product/Service Quality
3. Efficiency of Operations
4. Employee Productivity
5. Ability to meet customer needs in terms of quality, cost and delivery schedule
6. Rate of New Product/Service Development
7. Successful Launch of New Product/Service
8. Time to develop a new product/service
9. Ability to retain existing customers
10. Ability to attract new customers

C. Firm-level employee performance (compared with the situation 5 years previously)
Likert-type 5-point scale used (5 = very much improved, 4 = improved, 3 = slightly improved, 2 = no change, 1 = become worse) with the following items.

1. Customer Orientation
2. Quality Consciousness
3. Cost/Efficiency Consciousness
4. Team Orientation
5. Organizational Commitment
6. Willingness to change
7. Willingness to learn
8. Problem-solving Skill
9. Ability to handle multiple types of tasks
10. Output per employee

Source: Ketkar and Sett (2009).