INSTITUTE OF DEVELOPING ECONOMIES

IDE DISCUSSION PAPER No. 723

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Following Osterman's research framework of High Performance Work Organizations (HPWOs), the author, using his data sets from the three surveys conducted in India in 2001 and in 2011-2012, examined the adoption and diffusion of HPWOs in India and the factors behind them. It was found that HPWOs spread in India between 2000 and 2011, showing the regional variations in the diffusion and the contributing factors behind the adoption. The opposition of the trade unions against the HPWOs would become less significant once a single HPWO practice was introduced in the workplace. While the HPWOs did not show any significant association, the analysis suggests that trade unions affect managerial decisions to a greater degree than India's restrictive labor law against employment downsizing.

Keywords: High Performance Work Organizations (HPWOs), Trade Union, India, Employment Security, Labour Laws

JEL Codes:　J51, J53, M51, M54

1. Introduction

Scholars have conducted much research on high-performance work systems/practices (HPWSs, HPWPs) over the past two decades (Posthuma, Campion, Masimova, and Michael 2013). Among others, these studies include strategic human resource (HR) management, focusing on the effects of HPWSs on employee satisfaction and perceptions from the management disciplines, as well as on firm profits and productivity from the economics disciplines. Some studies have also tried to understand the effects on labor management and industrial relations. In the late 1980s and early 1990s, studies in developed countries (mainly the US) initially dominated, but today, research on what has been happening in developing countries (including Asia) is not small at all in number. Osterman's (1994, 2000, 2006) study might be the only one that used his own data collected at two points in time (1992 and 1997), which examined the adaptation and subsequent spread of flexible work organizations or high-performance work organizations (HPWOs) over these two periods. His studies were about the US situation; no such study has ever been carried out regarding the situation in India, a country emerging as an economic superpower in the coming years.

The objectives of the present paper are to study the following three issues that relate with industrial relation studies. First, to what extent have HPWO practices spread over the past decade in India? Do variations across regions exist? Second, which factors have played a role in spreading HPWO practices, and do they differ between now and a decade ago? Third, will HPWO practices affect the employment level in the near future? For these purposes and adopting Osterman's (1994) framework, I use the three sets of data that I collected in India, one in Bangalore (now Bengaluru, a city in south India) in 2000, another in Bangalore in 2011–2012, and the other in the National Capital Region (NCR), the surrounding regions of Delhi (India's capital city in the north) in 2011.

Among the labor studies concerning India's situation, the workings and effects of labor market institutions are probably the most sought-after, sometimes the most controversial topics, depending on the results. Besley and Burgess (2004) conducted one such study that examined the effects of restorative labor legislation on economic performance. While they focused on layoffs and dismissals, it is important to note that these and job security were in fact two sides of the same coin in terms of employment. Liu,

Guthrie, Flood, and Maccurtain (2009) empirically examined the mediating effects of employment security on the opposition of trade unions to the adoption of HPWSs. The effect of trade unions is an important issue to study in terms of India's situation, too. Despite some data constraints, this study can shed light on the relations among HPWOs, trade unions, and employment in India, which in turn will make an important contribution to comparative studies of industrial relation systems (e.g., Kochan, Lansbury, and Verma 1995; Katz and Darbishire 2000).

2. Background

2-1. HPWS, HPWO, and Osterman's Studies

Among so many studies on HPWSs, while the research does not necessarily use the same set of management practices as their analytical variables, they share some conceptual framework of HPWS. Kalleberg, Appelbaum, Bailey, and Berg (2000) argued that opportunities for substantive participation in decision making, appropriate incentives, and training and selection policies that would guarantee an appropriately skilled workforce were the three basic components required for effective HPWSs. Posthuma et al. (2013) stated that the HR systems that enhanced employee competencies, commitment, and productivity were often called HPWSs. The central interests of the research on HPWSs are to study whether work organizations and work groups, including quality control (QC) circles on the shop floor, as well as HR practices, affect performance indices such as (labor) productivity, profits, efficiency, sales, and level of quality, among others, via changes or spread of employee perception in some cases. If they do, the question is which practices contribute to these impacts.

After the 1980s, the HPWSs drew researchers' attention, where international comparative studies on shop floor practices had played a role, especially those that investigated the sources of competition among Japanese companies in comparison to their US counterparts (e.g., Macduffie 1995; Ichniowski and Shaw 1999). At the same time, industrial relations in the US had been undergoing a transformation process (Kochan, Katz, and McKersie 1986). The focus on "alternative" and "innovative" practices differing from

the traditional, scientific management, or Taylorism was the starting point of the HPWS studies.

In the early period of the subsequent research stages in the 1990s, Osterman (1994) focused on work organization. He took work teams, QC, total quality management (TQM), and job rotation as the elements of the index for flexible work organization practices and studied their diffusion among US companies. Osterman's (2000) subsequent study then considered if these practices were offering mutual gains to both firms and employees and found that the adoption of HPWO practices was associated with increased layoff rates in subsequent years and no compensation gains. However, in another study using the same data, Osterman (2006) found that higher wages were associated with HPWO systems for core (or involving) blue-collar workers. One of the distinguishing features in his series of studies was that he constructed a panel data and examined the effects.

Using Osterman's (1994) research framework, Ota (2005) examined to what extent the HPWO practices had spread in Bangalore (a southern city in India, sometimes called India's Silicon Valley) by using the original survey in 2000. The appropriateness of adopting Osterman's framework for Ota's study in India would be that "innovation," one of the important characteristics of HPWOs, was also an indispensable part of a developing country's economic development. The timing of his study (in 2000) was also a factor behind his work as it had been almost a decade since economic liberalization started in India in 1991, and Sodhi (1996) had done a related study about the situations in 1983 and 1993. I can locate my study along this line.

2-2. The Indian Context

Prior to 1980, India's economic orientation was to construct a "socialist pattern of society" which "means that the basic criterion for determining the lines of advance must not be private profit but social gain"[1]. Since then, its economy has been gradually liberalized; today, fierce competition among firms, the dominant feature of the market economy, is

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[1] Planning Commission (Government of India). *Second Five Year Plan*. Planning Commission, Accessed at http://planningcommission.nic.in/plans/planrel/fiveyr/2nd/2ndindex.htm (March 12, 2015).

taking place. In this context, there has been growing interest in HPWS practices among practitioners and researchers, contributing to the development of a body of research, especially in the HR field (Shri Ram Centre for Industrial Relations and Human Resources 2001; Som 2007, 2008; Cooke and Saini 2010; Mohinder 2010; Azmi 2011; Jaina, Mathew, and Bedic 2012).

However, the interest in HPWSs in India had started earlier than its economic liberalization in 1991. Bharat Heavy Electricals Limited (BHEL), a public sector unit, became the first company in India that introduced QC, one of Osterman's (1994) HPWO components, in 1981. In the following year, the Indian QC Forum started with a membership of 158 organizations (Dey 1992: 16; Lal 1993: 797). Tata Motors (then TELCO) also initiated QC in the same year (Roy and Antony 1996). In fact, the success of Maruti (Chattergee 1990), a joint-venture automaker between the Indian government and Suzuki of Japan, in starting operations in the early 1980s had a lot to do with Indian businesses' growing interest in the innovative shop floor practices that the manufacturing companies in Japan adopted to enhance flexibility (Ota 2005: 116–117). The English-speaking Indian managers' access to US management journals must have added to this development of their interest in innovative practices back then.

Regarding the adoption of HPWOs in India, Sodhi (1996) compared the practices that large-scale firms in India adopted in 1983 and 1993. Some of his findings are as follows (Sodhi 1996: 51-54):

- Jobs were being organized "to a great extent" in workgroups in about 41% of the companies in 1993 compared to 19% in 1983.

- In 1983, the practice of job rotation existed in 46% of the companies studied versus 63% in 1993.

- In 1983, self-directed work teams existed in 32% compared to 53% in 1993.

In his one-time survey, Sodhi (1996) asked about the prevailing situation in 1993 and retrospectively about the practices adopted in 1983. My observation is that the responses regarding the 1983 situation may require some caution due to the usual criticism against this retrospective survey method. Another issue is that managers and staff, especially in the HR

function in India, shift firms rather frequently for career considerations, and the concern is that there may not be many people who know the practices adopted a decade ago. Nonetheless, his study offers important findings, all the more so as economic liberalization started in between, in 1991.

Using original data collected in one city (Bangalore) seven years after Sodhi's survey, Ota (2005) found that many of the responding establishments had introduced work teams (51.9%), QC (51.7%), TQM (45.7%), and job rotation (69.6%). Ota (2005) included not only large-scale firms but also medium- and small-scale firms with 50 or more employees. He also inquired about the practices among "core employees" (defined below), while Sodhi (1996) did not. Thus, we need to be cautious in the interpretation, but we can safely conclude that HPWOs had spread even among small- and medium-sized enterprises in India's relatively developing city of Bangalore.

Now, to what extent have HPWOs spread since then? Do variations exist in their dissemination across regions? Which factors are behind the adaptation and diffusion of HPWO practices, and would they differ between now and a decade ago across regions? Could HPWO practices affect the employment level in the near future? I will try to answer these questions in the next section by using Osterman's (1994) framework with the three sets of my original data, collected in Bangalore in 2000 and 2011–2012 and in the NCR in 2011. I should warn about some data constraints due to my approach in conducting the survey, which I explain below. However, my study is unique compared to those of Osterman and others because of its focus on the local rather than the national situation, including medium- and small-scale establishments, thus allowing an observation of regional variations in HPWO adoption.

Two particular perspectives that I add to my analysis relate to trade unions and employment security. While the union organization rate is considered relatively low,[2] having declined since the 1990s (Kuruvilla, Das, Kwon, and Kwon 2002), Indian trade unions continue to be influential (Frenkel and Kuruvilla 2002). The proof is that the much-discussed

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[2] The trade union organization rate is unclear due to the problem of the official statistics in India, but 5–10% comprises the range given by the union leaders and scholars during the interviews.

labor law, the *Industrial Disputes Act (1947)* (ID Act), has never been amended, at least at the central government level, to allow easier layoffs and dismissals of workers. Do trade unions prevent the adoption of HPWOs in India? Liu et al. (2009) also studied the effectiveness of trade unions in the adoption; therefore, this issue is of particular interest.

In fact, while Osterman (2000) showed that the adoption of HPWO practices was associated with increased layoff rates, Liu et al. (2009) found the mediating effects of employment security on the trade unions' opposition to the adoption of HPWSs. In India, as I mentioned above, the ID Act places restrictions on layoffs and dismissals of employees, as well as on the closure of the units with an employment size of 100 or more, by mandating the company to obtain permission from the government. Besley and Burgess (2004) demonstrated that this restriction would adversely affect economic performance. On the other hand, Teitelbaum (2011) showed that while the ID Act negatively correlated with industrial output, it had been relatively insignificant. By using a dummy variable of employment size of 100 or more and otherwise, I could study the approximate effect of this restriction on employment, using my data while examining the effects of HPWO adoption on the employment level.

3. Survey, Data, and Definitions of Main Variables

For analyses, I used the data from the surveys I conducted in Bangalore in 2000 (BLR2000) and in 2011–2012 (BLR2011) and in the NCR in 2011 (NCR2011). While BLR2000 was a mail survey, I conducted interviews for BLR2011 and NCR2011 to avoid response leakages. While my study followed Osterman's (1994) framework, I designed the questionnaire myself to reflect the local needs. In India, it is extremely difficult to obtain cooperation from firms with this type of survey. For instance, the response rate for Sodhi's (1996) mail survey was only 5.3%. I concluded from my pre-interviews and pre-survey in 1999 that to obtain high response rates, certain adjustments, to some extent compromising, were necessary. I tried to make the survey as concise as possible, the final version consisting of only four, letter-sized sheets (including the cover letter with instructions), by reducing the question items and not asking for too precise figures. Providing response choices rather than

requesting participants to write the answers themselves was another way. While this led to exceptionally high response rates for my BLR2000 survey, the tradeoff in data constraints was unfortunately unavoidable.[3]

The definitions of the main variables in the survey were the same as Osterman's. He focused on the practices with which the core jobs/core employees were associated:

- *Core employees* comprise the largest group of nonsupervisory, nonmanagerial workers in the establishment who are directly involved in making its products or providing its services. They may be assembly line workers or service representatives in a retail business.

- *Core jobs* are those executed by the core employees.

Osterman (1994) described HPWOs as composed of four practices: self-directed (autonomous) work teams, QC, TQM, and job rotation. The explanations for the first three practices are as follows:

- *Self-directed (autonomous) work teams.* Employees supervise their own work and/or make their own decisions about the pace/flow and occasionally about the best way to perform the tasks.

- *QC.*   Quality circle/s or problem solving group/s.

- *TQM*. Total quality management refers to the QC approach that emphasizes the importance of communication, feedback, and teamwork).

In my surveys, I provided the response choices of "Yes, 50% or more of the core employees involved/participated" and "Yes, less than 50% of the core employees involved/participated," instead of requesting the respondents for the coverage rates so that it would be easier for them.

As for job rotation, after the pre-interviews and pre-survey, I realized the need to differentiate between systematic job rotation and rotation with the (immediate) supervisors' discretion. Thus, I included this view in my surveys, but I had to give up the question of their coverage to avoid response complexity. In my analyses, therefore, HPWOs comprised the three practices of work teams, QC, and TQM, whether the penetration level was at 50% or

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[3] Therefore, I only discuss the findings with a .05 statistical level of significance in consideration of these constraints in the following analyses.

more. Similar to Osterman's (1994) approach, I requested the respondents to answer in terms of the situations and practices adopted in the establishment/unit where they actually worked.[4]

These features affected the surveys of 2011, while I added several new questions reflecting the prevailing industrial relations situation in India at that time. My reason for not changing the surveys drastically was again the consideration of the response rates. Interviewing in person would not help much in this regard, and I needed to avoid taking a lot of the respondents' time.

In contrast to the data used by Osterman (1994), Sodhi (1999), or Liu et al. (2009), which each covered the entire country, my data over two periods of time were restricted to a city and a region (Bangalore and the NCR). My reasons were the control of regional differences across India and the practical consideration of the reminders, especially for the BLR2000 mail survey. The advantage of my surveys, other than the regional variations under control, was that they reflected the more local situations, allowing me to observe the controlled variations.

My data also included medium- and small-sized firms at the local level, which made it difficult to identify the survey populations. No business directory or membership directory of business associations provided a comprehensive list of target populations in India, which was another research constraint. Moreover, in my surveys, I inquired about the respondents' HR practices. Therefore, I set the cutoff employment size at 50, and I asked about this in my first telephone contact with each prospective respondent. However, a few establishments had an employment size of less than 50.[5] In the following sections, I describe how each survey proceeded, providing more details for BLR2000 as this survey set the constraints for my study and the surveys in 2011.

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[4] I gave the following explanation: the situations and practices might be different from those adopted by the company *per se* if they did not work at the company headquarters. However, if they worked at the headquarters *that had several units*, they were instructed to answer regarding one particular unit only with which they had the most familiarity.

[5] I asked about employment size by giving the response choices, too. The pre-survey indicated that the respondents tended to skip the question when asked to provide the figures.

Survey in Bangalore in 2000 (BLR2000)

BLR2000 was a mail survey conducted from January to May 2000 in the southern city of Bangalore, the capital of Karnataka State, which was then growing in its reputation as a site for the information technology (IT) industry. In fact, Bangalore had also been a manufacturing base because public sector companies, such as Bharat Electronics Limited (BEL), BHEL, and Hindustan Machine Tools (HMT), had located their factories in the city, and entrepreneurships and spinoffs from them had been vibrant. The service industry had also flourished due to the city's rapid development in the 1990s, especially compared to other parts of India. Therefore, the survey tried to cover several industries, except the agricultural/primary industry.

Using the business and membership directories mentioned below, I first called the companies, explaining to the highest-ranking HR managers (usually vice presidents and general managers, sometimes presidents/CEOs) the purpose of my survey and requesting their participation. Once I obtained their consent, I mailed the survey. The business directories were the problem. I obtained the following four directories to increase the sample population, as well as the number of responses: "Details of Medium and Large Industries in Karnataka, March 1998" from the State Ministry of Industry (MI Directory); a directory of large-scale industries from the Employees' State Insurance Corporation (ESI Directory);[6] the "South India Membership Directory 1999," the membership directory from the Confederation of Indian Industry (CII); and "The Greater Mysore Chamber of Industry (GMCI) Membership Directory 1998" from the GMCI (now the Bangalore Chamber of Industry and Commerce [BCIC]). The MI and ESI officials told me that their directories were "the latest and comprehensive," but I found that they were hardly so. In fact, the MI Directory only listed company addresses, while the ESI Directory had the organization names only! Many organizations had also been closed or nonexistent, and some addresses were wrong, among other inaccurate entries. I therefore used the publicly available yellow

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[6] The ESI Act (1948) mandates the ESI Corporation to implement ESI, a social security scheme covering only the company employees. The ESI in Bangalore was supposed to maintain the list of companies with an employment size of 200 or more, but when I contacted companies listed, many organizations had less than 50 employees.

pages and tried to match the organizations, sometimes in vain; I then turned to the CII directory and GMCI directory, which had some missing information, too.

I also used my personal networks and requested the CII, GMCI, and Federation of Karnataka Chambers of Commerce & Industry (FKCCI) to help in my survey to increase the response rate. Therefore, my method might not be exactly in line with the instructions in social research textbooks, but I considered these efforts unavoidable, all the more so because even the official directories were in such an incomplete state, as described above.

The survey had three sections: managerial policies; organizational profiles such as size, year of establishment, employee skill levels, etc.; and questions about HR and industrial relations. On my first telephone contact, I requested that the designated respondent be the most familiar with the issues concerned.[7] After making over 1,000 calls, I successfully contacted 301 establishments and obtained 189 responses[8] at a 62.8% response rate, which was much higher than Sodhi's (1996) 5.3%.

Survey in NCR in 2011 (NCR2011)

The survey period of NCR2011 was between October and December 2011. Because of the difficulties I experienced in Bangalore in 2011, including the response leakages, as well as my time constraints, I decided to conduct the survey in the interview mode. The NCR included Delhi and surrounding urban areas, with cities such as Gurgaon, Faridabad, Noida, and Ghaziabad, spreading over four states. However, I only focused on the establishments in Gurgaon and Noida, both adjacent to Delhi.

At the same time, Gurgaon and Noida were well known for their local manufacturing

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[7] In all three surveys, many of the respondents were general managers and managers in HR and related departments. There were cases where managing directors, other directors, and executives in technical departments other than HR or personnel were the respondents. The staff, who appeared to be below the managerial category but familiar with the issues of concern, were also among the respondents, but very few in number.

[8] I requested the respondents to send back the questionnaires with the enclosed, self-addressed stamped envelopes within two weeks from my telephone call. If the questionnaires were not returned, I contacted them as a reminder one week after the designated date, and then I called once more a month later. The return rates before the designated date was 50.8%, 33.3% returned after the first reminder, and 15.9% after the last call. The contacts included my personal visits and/or interviews in their offices upon their requests.

activities; therefore, I limited NCR2011 to this industry, with firms having an employment size of 50 or more. Anticipating the difficulties of data collection, I set the target at 100 responses from the beginning, and I continued the survey until I reached that number. The target sample size was not large, which was why I confined my survey to the manufacturing/industry sector. Another reason was the industrial unrest prevailing then in the manufacturing sector in Gurgaon and Noida, and I aimed to capture the scenario through my survey. I also tried to contact only the Indian (domestic) private firms, excluding foreign-owned or public sector units from the sample.

However, out of 100 respondents, two units belonged to foreign multinationals and four establishments to the service industry. I excluded these four units in the service industry, reducing the sample size to 96 for my main analyses below, which included one of the two foreign multinationals. Therefore, NCR2011 basically represented the survey of the domestic, private, and manufacturing/industry sector.

For contacting the establishments, I used two directories covering Gurgaon that were available on the Internet, consisting of the membership lists of the Gurgaon Industrial Association (GIA) and the Gurgaon Chamber of Commerce & Industry (GCCI).[9] For Noida, I used the Centre for Publications (2007), as well as the "Online Noida – Greater Noida Industries Directory" and "Greater Noida Directory," both available online.[10] Initially, I aimed at recruiting 50 respondents each from Gurgaon and Noida, but it turned out to be quite difficult for the latter, with 87 establishments from Gurgaon and only 17 from Noida.

We first contacted prospective respondents by telephone and explained the survey objectives. Once they agreed to participate, we visited their offices and interviewed them, using the structured questionnaire. We called 851 establishments, out of which 383 cases did not belong to the manufacturing/industry sector, had an employment size below 50, were

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[9] The GIA membership form was available as a PDF file at
http://www.giaonline.in/Registationform/members_list.pdf (July 11, 2011).
The GCCI membership list could be accessed at
http://www.gurgaonchamber.org/Members_GurgaonChamber/List_M.htm (accessed September to November 2011).

[10] The URL for the former was http://www.parichowk.com/products_services.aspx, and the URL for the latter was http://www.greaternoidadirectory.com/index.php?category=91. They were accessed from September to November 2011. Since then, they had either become defunct or did not retain the same forms as of March 2015.

closed or nonexistent, or we had the wrong names or numbers. Therefore, 468 establishments were eligible, at a response rate of 21.4% (= 100/468).

Survey in Bangalore in 2011 (BLR2011)

BLR2011, the second survey in Bangalore, was conducted from November 2011 to mid-January 2012. It followed an interview method similar to that of NCR2011. In contacting firms, I used the latest directories of CII and BCIC (formerly GMCI), as well as the "FKCCI Directory – 2009" (FKCCI 2010), a directory of another chamber of commerce and industry based in Karnataka, for the verification of old addresses. We called 526 establishments, out of which 166 were defunct as was the case with NCR2011, reducing the eligible number to 360. Out of these, I obtained responses from 131 establishments, including 87 units from the manufacturing/ industry sector, for a 36.4% response rate (= 131/360).

I had aimed to construct a panel data as Osterman (1994, 2000, 2006) did, which I intended to exploit for more detailed analyses, but out of 131 establishments, only 41 were such cases. Not only was the sample size small, but statistically significant differences also existed between the panel and nonpanel establishments for BLR2000 in terms of the distribution of HPWOs. Besides these, all the analyses that I conducted in this study (as discussed in the next section) using the panel data did not yield any significant results,[11] which was really disappointing.

However, the significance of constructing a panel data after more than a decade might be less obvious as we would be assuming a linear relationship between the two points in time, with the lengthy interval. Would this be a plausible assumption, especially in a developing country with high economic growth rates? In between, the global financial crisis in 2008 affected India, too.[12]

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[11] For this study, I checked the homepages of as many as possible establishments included in BLR2000 (which were not available back then) and accommodated minor corrections on the firm profiles, namely, the years of existence for four establishments and transfer of ownership to a private Indian (domestic) firm for one establishment.

[12] The reason for the decade-long interval is that my permanent residence is not in India. Regarding the linear/nonlinear relationship, several establishments among the panel firms had their industries changed, for instance, from manufacturing to service, as well as their

With these limitations of my data set, I could not regress my first data on the second one, as Osterman (2000) did. However, to overcome data constraints, time series and cross-sectional uses of data would allow a more objective perception of the results.

4. Analyses[13]

4-1. Spread of HPWOs and Regional Variations

I first examine the adoption and spread of HPWOs and their regional variations. Table 1a shows the distribution of HPWO practices with the percentage of establishments at 50% or a higher level of penetration. While 26.8% of the establishments used teams, 23.4% applied QC, and 25.0% employed TQM in Bangalore in 2000; they spread to 35.9%, 50.4%, and 55.0%, respectively, in 2011. The adoption of teams appeared somewhat stagnant, while QC and TQM doubled in their proportions. Osterman (2000) stated that this stagnant diffusion of teams in the 1990s in the US was due to its difficulty in practice, while Gallie, Zhou, Felstead, and Green (2012) showed the decline of self-directing teams in the UK between 1992 and 2006. Hence, this result with the Bangalore data was accommodative. The trends were the same in the manufacturing samples. However, the NCR2011 results in the manufacturing sector were different. Teams diffused in the NCR more widely at 57.3% than in Bangalore in 2011; so did QC at 63.5%, while TQM was much lower at 36.5%. Therefore, regional variations existed in the diffusion of HPWOs.

Table 1b summarizes the diffusion of job rotation in addition to the above-mentioned three practices at any level. Several interesting points emerged regarding job rotation. First, while it was higher in BLR2000 compared to the other three practices, the spread of job rotation was lower than theirs, at a stagnant level or even less in 2011 at around 65%. In fact, Sodhi (1996) found that the adoption rate for job rotation in 1993 was 63.1%, suggesting the

core jobs from IT engineering to services. For example, company A, which was producing leather products in 2000, became a laundry service provider in 2011, downsized from the employment size category of "100–499" to "less than 100." Had my sample covered the large-scale firms located all over India such as Sodhi (1996) did, the outcome regarding the panel data might have been different.

[13] The sample sizes (N) in the following analyses differ even when I use the same data set. This is because the sample sizes per se were not large, and I did not exclude the cases with blank responses.

possibility of a saturation rate of diffusion for job rotation, between 60% and 70%.

Second, the distributions of the type of job rotation differed in Bangalore and the NCR (Table 1c). While 28.2% of the establishments adopted the systematic job rotation in BLR2000, it increased by approximately 5% points to 33.6%. The discretionary rotation declined by 8% points over the same period, meaning that an increasing number of firms were adopting the systematic job rotation. NCR2011 showed that the systematic type rather dominated among the establishments that adopted the job rotation practice. Thus, systematic rotation appeared to be the way forward.

Table 1d shows the number of three practices (teams, QC, and TQM) that the establishments adopted. The table reconfirms the spread of HPWO practices during this time, as well as across regions. Tables 2a and 2b present the diffusion of the practices among panel establishments. Table 2a indicates a much more rapid spread among panel establishments than nonpanel ones. Table 2b shows that very few establishments stopped using the practices.

4-2. Factors Behind Adoption of HPWO Practices

I now present the analysis of which factors were behind the adoption/nonadoption of HPWO practices. Here I used five data sets: the entire sample data for BLR2000 and BLR2011, and manufacturing sample data for BLR2000, BLR2011, and NCR2011. Table 3a summarizes the value allocations for each variable, and Table 3b presents the descriptive statistics. For this analysis, I used the seven HPWO-dependent variables: 1) adoption of one HPWO practice, 2) two or more HPWO practices, 3) all three HPWO practices, 4) teams, 5) QC, 6) TQM, and 7) job rotation. For each dependent variable, I used the 50% or higher penetration level of practices, except for job rotation. I used the dummy variables for them. Here I only present the results with the independent variables of the number of HPWOs and those that appear significant and noteworthy.[14]

However, I briefly discuss the model first. Using the dummy variables for the independent variables, I ran bivariate logistic regressions for all the analyses. The model

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[14] The bivariate logistic regression model for job rotation was statistically insignificant by itself. This might have to do with the nature of the variable; its penetration was at any level.

included the following dependent variables: years of the establishment, industry, ownership, "independent," "export," employment size, whether the core employees were contract workers, core proportion, skill levels, presence of trade unions, two managerial policies/values regarding quality and cost, and two HR-related policies of employment security and well-being. All the variables were dummy, except for years of the establishment and proportion of the core employees. Some of them require explanations.

Independent. This corresponded to Osterman's (1994)'s *LARGER*, which he defined as the establishment being part of a larger organization.

Export. This matched Osterman's *INTERNATIONAL*; at the same time, in the Indian context, it could approximate the establishments' force or impetus to grow further.

Size of establishment (100/above). As I explained above, we could approximately observe the effects of the legislative restriction on layoffs and dismissals.

Contract. The surveys asked, "Are the majority of the core employees casual/part-time/contract workers?" Therefore, casual and part-time workers were also included. Nonetheless, it would be safe to state that this variable basically represented the contract workers as the most prevalent form of employment engaged in executing the core jobs, despite *the Contract Labour (Abolishment and Regulations) Act's (1970)* prohibition of such use at the central government level (Shyam Sundar 2012).

Core proportion. This referred to the proportion of the core employees to the total number of personnel.

Skill. As an observation of the respondents, the response was subjective.

Union/majority. The surveys asked, "Are the majority of the core employees organized into trade union(s)/employee association(s)?" In India, seven workers can register their trade union under the *Trade Unions Act (1926)*. The effects of political parties have been historically observed by and large, too; therefore, the multiplicity of unions is a characteristic, sometimes small in size per union. The Trade Unions Act does not stipulate the employers' recognition of unions. Thus, simply asking employers if trade unions existed in their organizations might not capture the real situation because they could simply ignore these unions. The cutoff of the membership rate as the majority would be appropriate under these

circumstances to determine the trade unions' influence.

Policy: quality and *policy: cost reduction*. The surveys asked, "Do the following describe your managerial policies?" (including 15 items). The respondents answered by using a five-point scale.[15] In this analysis, I used those related to quality ("Reinforce/improve the quality of existing products/services") and cost reduction ("[Further] cost reduction") to find out whether the respondents emphasized the quality factor or the cost factor and their effects on the adoption of HPWOs. This approximated Osterman's (1994) *STRATEGY*.

Employment security and *well-being*. Similarly, I included the dependent variables to investigate the effects of the establishments' orientation toward employee welfare on the adoption of HPWOs. The employment security item in the survey was "Providing employment security to the personnel/retention of the personnel" which related to the arguments regarding both the restrictive labor law on layoffs and dismissals and employment security as discussed by Liu et al. (2009), among others. For well-being, Osterman (1994) found that the emphasis on employees' personal and family well-being was significantly related to the adoption of HPWOs in the US in the early 1990s. The item in my surveys was "Increase the well-being of employees in regard to their personal or family situations."

I did not ask about the proportion of the female staff to the core employees in BLR2000, so I could analyze the effects of the female proportion on the adoption of HPWO practices only with BLR2011 and NCR2011. However, it was insignificant in any equation and did not affect the coefficients of the other variables. Therefore, the female proportion did not have any effect on HPWO adoption.

Table 4 presents the results of logistic regressions. I only refer to the statistically significant variables at the .05 level. For BLR2000, the skill level was associated with the adoption of HPWO practices; the higher the skill level of the core job, the more likely did an establishment adopt HPWO practices. For the entire industry of BLR2000, the higher core proportion was likely related to the establishments' adoption of any HPWO practice.[16] For

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[15] The response choice of "not applicable" (NA) was also given in addition to the five-point scales in consideration for the ease of response. I recategorized this as "not important at all" for interpretation as NA conversely would never be considered "most important." Only a few responses were NA in any case.

[16] While the years of the establishment variable was significant in Ota's (2005) study

the manufacturing/industry sector, if the establishments emphasized cost reduction, they were likely to adopt one of the HPWO practices. This is an interesting result, but the regression itself was insignificant at the .05 level.

For the analysis using BLR2011, first, the results showed that if the majority of core employees were organized into trade unions, the establishments were unlikely to adopt a single HPWO practice. However, once it adopted the single practice, their oppositions appear to be less significant. This case was not observed in BLR2000. On the other hand, *export* and *cost reduction* appeared to be positively associated with HPWO adoption. For the manufacturing sector, if the core employees were contract or nonpermanent workers, the establishments tended to adopt HPWO practices.

The analysis using NCR2011 presented different outcomes. While the trade union variable appeared to be an obstacle for HPWO adoption, the equation was insignificant ($p = 0.1336$). However, it is noteworthy that the establishments that valued employment security tended not to adopt multiple HPWO practices. In Liu et al.'s (2009) analysis, the employment security variable itself was insignificant, while its sign was negative.[17] At the same time, a higher skill level reduced the likelihood of adopting multiple practices, in contrast to the result of the BLR2000 analysis. However, core proportion was positively associated with multiple adoptions.

As the results differed depending on the independent variables, it might be difficult to draw definite conclusions. Nonetheless, my analysis here indicated that trade unions could be a hindrance to the first time adoption of a HPWO practice in India. Table 3b shows that the trade union organization rates were approximately 10% in the NCR and as high as 55% in the manufacturing sector in Bangalore in 2011. Regional variations such as this would affect the introduction of managerial initiatives.

("years of operation" variable there), it was not so in my analysis, which I assumed was due to the differences in independent variables.

[17] I inserted the intersection of *union/majority* and *employment security*, but all the three variables (*union/majority*, *employment security,* and their intersection) became insignificant. In a passive sense, the trade union opposition would become insignificant.

5. HPWO Practices, Trade Unions, and Employment

Finally, I discuss the relationship between adoption of HPWO practices and employment. I used the survey question "Is the present size of the workers ideal overall?", which was posed in terms of core employees and "supervisory (staff)." The respondents answered by using a five-point scale of choices. I recategorized the "redundant" and "almost ideal but slightly redundant" responses as "redundant," and "scarce" and "almost ideal but slightly scarce" as "scarce." For this rather qualitative analysis, I used seven data sets. In addition to the five data sets I used in the previous section, I used the merged files of BLR2011 and NCR2011 for both entire industries and manufacturing/industry sector because the analysis using the BLR2011 and NCR2011 data separately did not yield robust results, except for one case.

Regarding the independent variables, while I dropped "contract" and the four items relating to managerial policies from the body of independent variables used for the analysis in the previous section, I added profit trends (on a five-point scale),[18] number of HPWO practices adopted, and job rotation at any level of penetration (dummy variable). Table 5 presents the results. In this analysis, I also estimated the employment size effect, as well as the union effect.

The noteworthy results are as follows. First, adoption of HPWO practices did not lead to the core employees' redundancy, while it positively reduced the sense of scarcity among core employees when I used the merged file. Therefore, adoption of HPWO practices would unlikely contribute to employment generation, at least directly and in the short term; rather, the result indicated efficient management in terms of the employment size.

Second, for NCR2011, the redundancy in core employees was positively associated with the presence of trade unions organizing the majority of employees. I obtained the same results by using the merged files. As Frenkel and Kuruvilla (2002) pointed out, Indian trade unions continued to be influential.

Third, the employment size dummy of 100 or more employees was not significantly

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[18] For BLR2000, I asked about the profit trend after the economic liberalization of 1991. For BLR2011 and NCR2011, I inquired about the trend of the preceding five years.

associated with either the sense of redundancy or scarcity of core employees. This result indicated that establishments in India that already had hired more than 100 employees were not bothered by the restriction on layoffs and dismissals, just as Teitelbaum (2011) argued.

There were other interesting findings. Export was significantly associated with the sense of scarcity of core employees, which is understandable, while the sign was opposite with the analysis using BLR2000 for all the industries in terms of core redundancy. The regional dummy "bngl_ncr" in the 2011 merged files was also positively associated with both scarcity and redundancy, indicating the mismatch between demand and supply in the labor market of Bangalore. The 2011 merged data did not find any significant association in terms of redundancy or scarcity of supervisory staff.

The results using BLR2000 did not show any significant impacts of adoption of HPWO practices, presence of trade unions, and restrictive regulation on layoffs and dismissals in terms of core employees. However, job rotation appeared to significantly reduce the sense of redundancy.

6. **Conclusions**

Following Osterman's (1994) framework, I examined the adoption and diffusion of HPWOs in India, the factors behind them, and the effects HPWOs will have on the employment level in the near future. While data constraints existed and the sample populations were not necessarily clearly defined, my analyses revealed several factors. First, HPWOs spread in India between 2000 and 2011. The stagnant diffusion of work teams that Osterman (2000)—among others—found, appears to be a regional variation in India.

Second, my study uncovered an interesting finding regarding job rotation. While I could not analyze in the same vein as Osterman, I argue that the saturation rate of diffusion for job rotation may exist, somewhere between 60% and 70% in India. My results also indicate that the systematic rotation appears to be the way forward there. However, from the viewpoint of "high performance" equaling "flexible" (Osterman 1994; 2000; 2006), isn't a practice that accommodates the discretion of supervisors for its execution more flexible? While deepening of management initiatives in India occurred during the period of my two

surveys, additional research is needed regarding job rotation.

As to the diffusion of HPWOs, the data from the survey in Bangalore in 2011–2012 showed that establishments engaging in export were likely to adopt HPWOs, which was not the case in 2000. However, in both 2000 and 2011, the establishments that placed emphasis on cost reduction tended to adopt those practices. Notably, those cases were only observed in Bangalore and not in NCR in 2011. The effects of trade unions that organized the majority of employees, as well as employment security, also differed across the regions. While organization rates of trade unions are not generally considered high in India, their opposition to the HPWOs would become less significant once a single HPWO practice was introduced in the workplace.

Regarding the sense of redundancy/scarcity of employment, while the HPWOs did not show any significant association, the presence of trade unions hinted at the effects against employment downsizing. Additionally, restrictive legislation toward layoffs and dismissals, which the ID Act mandated for establishments with 100 or more employees, appeared insignificant. My analysis suggests that trade unions affect managerial decisions to a greater degree than the ID Act in terms of employment adjustment.

In terms of employment, contract labor is rather prevalent in India today. My analysis shows the positive relation of adoption of one HPWO practice and the establishments where the majority of the core employees were contract (or non-regular) workers in the manufacturing industry in Bangalore in 2011. This may be because replacing regular workers with contract workers is done to lower costs, considering that the qualifications of both worker types may not differ. This will be the result of restrictive legislation toward layoffs and dismissals; therefore, we need more studies on India's labor market institutions.

Finally, this study presents regional variations between Bangalore and NCR, that is, within one country. Will these variations be converging in the future, and if so, how? Answering this question requires further investigation.

References

Appelbaum, Eileen, Thomas Bailey, Peter Berg, and Arne L. Kalleberg. 2000. *Manufacturing Advantage. Why High Performance Work Systems Pay Off*. Ithaca: ILR Press.

Azmi, Feza Tabassum. 2011, Strategic Human Resource Management and its Linkage with HRM Effectiveness and Organizational Performance: Evidence from India. *The International Journal of Human Resource Management* 22(18): 3888-3912.

Besley, Timothy and Robin Burgess. 2004 Can Labor Regulation Hinder Economic Performance? Evidence from India. *Quarterly Journal of Economics* 119(1): 91-134.

Centre for Publications. 2007. *Directory – Cum – Handbook: Corporate & Business Houses in Delhi and Surrounding Areas*. New Delhi: Centre for Publications.

Chand, Mohinder. 2010. The Impact of HRM Practices on Service Quality, Customer Satisfaction and Performance in the Indian Hotel Industry. *The International Journal of Human Resource Management* 21(4): 551-566.

Chattergee, Bhaskar. 1990. *Japanese Management: Maruti and the Indian Experience*. New Delhi: Sterling Publishers.

Cooke, Fang Lee, and Debi S. Saini. 2010. (How) Does the HR Strategy Support an Innovation Oriented Business Strategy? An Investigation of Institutional Context and Organizational Practices in Indian Firms. *Human Resource Management* 49(3): 377-400.

Dey, BR. 1992. Quality Circles in India: A Survey. *The TMTC Journal of Management* 4: 15-34.

Federation of Karnataka Chambers of Commerce & Industry.(FKCCI). 2010. *Federation of Karnataka Chambers of Commerce & Industry. Industrial, Commercial & Services Directory – 2009*. Bangalore: Business-X.

Frenkel, Stephen and Sarosh Kuruvilla. 2002. Logics of Action, Globalization, and Changing Employment Relations in China, India, Malaysia, and the Philippines. *Industrial and Labor Relations Review* 55(3): 387-412.

Gallie, Duncan, Ying Zhou, Alan Felstead, and Francis Green. 2012. Teamwork, Skill Development and Employee Welfare. *British Journal of Industrial Relations* 50(1): 23-46.

Ichniowski, Casey, and Kathryn Shaw. 1999. The Effects of Human Resource Management Systems on Economic Performance: An International Comparison of U.S. and Japanese Plants. *Management Science* 45(5): 704-721.

Jaina, Harish, Mary Mathew, and Akanksha Bedic. 2012. HRM Innovations by Indian and Foreign MNCs Operating in India: A Survey of HR Professionals. *The International Journal of Human Resource Management* 23(5): 1006-1018.

Katz, Harry C., and Owen Darbishire. 2000. *Converging Divergences. Worldwide Changes in Employment Systems*. Ithaca: ILR Press.

Kochan, Thomas A., Harry C. Katz, and Robert B. McKersie. 1986. *The Transformation of American Industrial Relations*. Ithaca: Cornell University Press.

Kochan, Thomas, Russell Lansbury, and Anil Verma. 1995. *Employment Relations in the Growing Asian Economies*. London: Routledge.

Kuruvilla, Sarosh, Subes Das, Hyunji Kwon, and Soonwon Kwon. 2002. Trade Union Growth and Decline in Asia. *British Journal of Industrial Relations* 40(3): 431-461.

Lal, Meera. 1993. Quality of Work-Life through Quality Circle. *Indian Journal of Labour Economics* 36(4): 796-801.

Liu, Wenchuan, James P. Guthrie, Patrick C. Flood, and Sarah Maccurtain. 2009. Unions and the Adoption of High Performance Work Systems: Does Employment Security Play a Role? *ILR Review* 63(1): 109-127.

Macduffie, John Paul. 1995 Human Resource Bundles and Manufacturing Performance: Organizational Logic and Flexible Production Systems in the World Auto Industry. *Industrial and Labor Relations Review* 48(2): 197-221.

Osterman, Paul. 1994. How Common is workplace Transformation and Who Adopts It? *Industrial and Labor Relations Review* 47(2): 173-188.

Osterman, Paul. 2000. Work Reorganization in an Era of Restructuring: Trends in Diffusion and Effects on Employee Welfare. *Industrial and Labor Relations Review* 53(2):

179-196.

Osterman, Paul. 2006. The Wage Effects of High Performance Work Organization in Manufacturing. *Industrial and Labor Relations Review* 59(2): 187-204.

Ota, Hitoshi. 2005. Flexible Work Organisation, Human Resource Practices and Worker Perception in India: A Case Study of Bangalore City. *Indian Journal of Labour Economics* 48(1): 115-129.

Posthuma, Richard A., Michael C. Campion, Malika Masimova, and Michael A. Campion. 2013. A High Performance Work Practices Taxonomy: Integrating the Literature and Directing Future Research. *Journal of Management* 39(5): 1184-1220.

Roy, Devdoot Deb and Sanjay P. Antony. 1996. Evolution of Small Group Activity at TELCO, Jamshedpur. *Management and Labour Studies* 21(3): 158-174.

Shri Ram Centre for Industrial Relations and Human Resources. 2001. *Indian Journal of Industrial Relations* 37(1).

Shyam Sundar, K.R. 2012. The Contract Labour in India: the Battle between Flexibility and Fairness. In K. R. Shyam Sundar (ed.) *Contract Labour in India: Issues and Perspectives*, pp 11-76. New Delhi: Indian Society of Labour Economics.

Sodhi, J.S. 1996. *Industrial Relations and Human Resources in India*. New Delhi: Shri Ram Centre for Industrial Relations and Human Resources.

Som, Ashok. 2007. What Drives Adoption of Innovative SHRM Practices in Indian Organizations? *The International Journal of Human Resource Management* 18(5): 808-828.

Som, Ashok. 2008. Innovative Human Resource Management and Corporate Performance in the Context of Economic Liberalization in India. *The International Journal of Human Resource Management* 19(7): 1278-1297.

Teitelbaum, Emmanuel. 2011. *Mobilizing Restraint: Democracy and Industrial Conflict in Post-Reform South Asia*. Ithaca: ILR Press.

Table 1a. Distribution of High Performance Work Organization Practices:
  Percentage of Establishments at the 50% or higher level of penetration

Type of Practices	BLR2000	N	BLR2011	N	NCR2011	N
Teams	26.8%	183	35.9%	131	57.0%	100
Teams-Mnf.	23.8%	147	36.8%	87	57.3%	96
QC	23.4%	184	50.4%	131	64.0%	100
QC-Mnf.	23.0%	148	56.3%	87	63.5%	96
TQM	25.0%	184	55.0%	131	35.0%	100
TQM-Mnf.	24.3%	148	59.8%	87	36.5%	96

Source for the Data: Author's Survey. The source of all the following
tables is the same.

Note: Added "-Mnf." is the Manufacturing/industrial Sector's Sample.

Table 1b. Distribution of High Performance Work Organization Practices:
  Percentage of all the Adopting Establishments

Type of Practices	BLR2000	N	BLR2011	N	NCR2011	N
Teams	51.9%	183	79.4%	131	85.0%	100
Teams-Mnf.	49.7%	147	79.3%	87	85.4%	96
QC	51.6%	184	84.7%	131	94.0%	100
QC-Mnf.	54.7%	148	89.7%	87	94.8%	96
TQM	45.7%	184	76.3%	131	92.0%	100
TQM-Mnf.	45.9%	148	80.5%	87	91.7%	96
Job Rotation	69.6%	181	64.6%	130	66.0%	100
Job Rotation-Mnf.	68.8%	144	63.2%	87	65.6%	96

Note: Added "-Mnf." is the Manufacturing/industrial Sector's Sample.

Table 1c. Job Rotation: Systematic or Left to the Supervisor's Discretion
 Percentage of all the Adopting Establishments

Type of Practices	BLR2000	BLR2011	NCR2011
Systematic	28.2%	33.6%	57.0%
Systematic-Mnf.	25.8%	34.5%	56.3%
Discretion of (immediate) supervisor	38.8%	30.5%	9.0%
Discretion-Mnf.	39.7%	28.7%	9.4%

Notes: Added "-Mnf." is the Manufacturing/industrial Sector's Sample.

Ns for BLR2000, its mnf., BLR2011, its mnf., NCR2011 and its mnf., are 188, 151, 131, 87, 100 and 96 respectively.

Table 1d. Total Number of Practices
 Percentage of Establishments at the 50% or higher level of penetration

No of HPWO Practices	BLR2000	BLR2011	NCR2011
0	56.1%	25.2%	23.0%
1	22.2%	28.2%	21.0%
2	14.3%	26.7%	33.0%
3	7.4%	19.8%	23.0%

Note: Ns for BLR200, BLR2011 and NCR2011 are 189, 131 and 100 respectively.

Table 2a. Total Number of HPWO Practices among BLR Panel Establishments
  Percentage of Establishments at the 50% or higher level of penetration

No of HPWO Practices	P-BLR2000	P-BLR2011	P-BLR 2000-Mnf.	P-BLR 2011-Mnf.
0	73.2%	26.8%	71.1%	26.3%
1	19.5%	19.5%	21.1%	18.4%
2	4.9%	34.1%	5.3%	34.2%
3	2.4%	19.5%	2.6%	21.1%

Note: N for the Entire Panel (P-BLR2000 and P-BLR2011) is 41, and that for the Manufacturing Sector's Panel (P-BLR2000-Mnf. and P-BLR2011-Mnf.) is 38.

Table 2b. Distribution of the Adoption Status of HPWOs over Times among Panel Establishments
  Percentage of Establishments at the 50% or higher level of penetration

Type of Practices	No	Abandoned Since	Adopted Since	Have Maintained
Teams	55.0%	5.0%	37.5%	2.5%
Teams-Mnf.	51.4%	5.4%	40.5%	2.7%
QC	45.0%	2.5%	40.0%	12.5%
QC-Mnf.	43.2%	2.7%	40.5%	13.5%
TQM	35.0%	7.5%	50.0%	7.5%
TQM-Mnf.	35.1%	8.1%	48.6%	8.1%

Notes: Added "-Mnf." is the Manufacturing/industry Sector's Sample.
"No" means they had not adopted the practice both in 2000 and 2011. "Abandoned Since" means that the practice had been in place in 2000 but not in 2011. "Adopted Since" means that the practice had not been in place in 2000 but in place in 2011.
N for the entire panel sample is 40, and for the manufacturing sector 37.

Table 3a. Variable Definitions

Est. Years	Years since the unit founded
Manufacturing (Industry)	1 if the establishment is in the manufacturing (and industry) sector; 0 otherwise
Tertiary	1 if the establishment is in the tertiary sector; 0 otherwise
Private Sector	1 if the establishment is (a part of) the private sector company; 0 otherwise
Foreign	1 if the establishment is (a part of) the foreign multinational company; 0 otherwise
Independent	1 if the establishment is independent: not part of a group/larger establishment or joint venture; 0 otherwise
Export	1 if the establishment exports their products/services; 0 otherwise
Size 100/above	1 if the employment size is 100 or more; 0 otherwise
Profit Trend	Five point scale regarding the profit trend of the establishment in the last 5 years/since 1991 up to 2000. (with the choices of "Increasing substantially", "Fluctuating with upward trend", "Stagnant", "Fluctuating with downward trend" and "Decreasing"
Contract	1 if the majority of the core employees are contract workers (or casual/part time workers); 0 otherwise
Core Proportion	The proportion of the core employees in the total number of personnel
Skill	1 if core job is very or extremely skilled; 0 otherwise
Union/Majority	1 if the majority of core employees are organized in trade union(s)
HPWO Num.	Number of HPWOs Practices that the establishment adopts
Rotation	1 if the establishment adopts rotation at any level of penetration; 0 otherwise
Policy: Quality (#)	"Reinforce/improve the quality of existing products/services" as whether managerial policy was important or not; five-point Likert scale
Policy: Cost Reduction (#)	"Cost reduction" as whether managerial policy was important or not; five-point Likert scale
Employment Security (#)	"Providing employment Security/retention of the personnel" as whether managerial policy was important or not; five-point Likert scale
Well-being (#)	"Increase the well-being of employees in regard to their personal or family situations" as whether managerial policy was important or not; five-point Likert scale
bngl_ncr	1 if it is Bangalore Survey; 0 otherwise
HPWO Any	1 if the establishment adopts any of HPWO practice at 50% or a higher level of penetration; 0 otherwise
HPWO 2/3	1 if the establishment adopts two or three HPWO practices at 50% or a higher level of penetration; 0 otherwise
Core Redundant	1 if the Core employees are redundant; 0 otherwise
Core Scarce	1 if the Supervisory employees are redundant; 0 otherwise
Supervisory Redundant	1 if the Core employees are scarce; 0 otherwise
Supervisory Scarce	1 if the Supervisory employees are scarce; 0 otherwise

Note: (#) Response of N.A. was made as "1" (=not important at all), as the response of N.A. was very minimal in number.

Table 3b. Descriptive Statistics

Variable	NCR 2011 Manufacturing			BLR 2011 Manufacturing			BLR 2011 All Industry			BLR 2000 Manufacturing			BLR 2000 All Industry			2011 Merged Manufacturing			2011 Merged All Industry		
	Mean	S.D.	Obs	Mean	S.D.	Obs	Mean	S.D.	Obs	Mean	S.D.	Obs	Mean	S.D.	Obs	Mean	S.D.	Obs	Mean	S.D.	Obs
Policy: Quality	4.60	0.51	96	4.66	0.68	87	4.57	0.80	131	4.65	0.70	150	4.68	0.65	186	4.63	0.60	183	4.58	0.69	231
Policy: Cost Reduction	4.25	0.77	96	4.69	0.60	87	4.47	0.82	131	4.57	0.71	147	4.48	0.80	183	4.46	0.72	183	4.38	0.80	231
Employment Security	4.30	0.56	96	4.55	0.64	87	4.52	0.67	131	3.78	1.05	148	3.79	1.06	184	4.42	0.61	183	4.42	0.64	231
Well-being	4.16	0.69	96	4.39	0.70	87	4.35	0.72	131	3.74	0.85	149	3.77	0.86	185	4.27	0.70	183	4.26	0.71	231
Est. Years	20.23	10.07	96	31.92	16.11	87	27.34	17.14	131	26.77	19.58	151	25.12	20.01	189	25.79	14.48	183	24.19	14.90	231
Manufacturing (Industry)	–	–	–	–	–	–	0.66	0.47	131	–	–	–	0.80	0.40	189	–	–	–	0.79	0.41	231
Tertiary	–	–	–	–	–	–	0.13	0.34	131	–	–	–	0.10	0.30	189	–	–	–	0.07	0.26	231
Private Sector	0.99	0.10	96	0.76	0.43	87	0.73	0.45	131	0.68	0.47	151	0.66	0.47	189	0.88	0.33	183	0.84	0.37	231
Foreign	0.01	0.10	96	0.18	0.39	87	0.21	0.41	131	0.20	0.40	151	0.21	0.41	189	0.09	0.29	183	0.13	0.34	231
Independent	0.76	0.43	96	0.51	0.50	87	0.51	0.50	131	0.57	0.50	151	0.59	0.49	189	0.64	0.48	183	0.61	0.49	231
Export	0.60	0.49	96	0.80	0.40	87	0.69	0.46	131	0.74	0.44	151	0.71	0.46	189	0.70	0.46	183	0.65	0.48	231
Profit Trend	4.38	0.69	95	4.12	0.94	86	4.22	0.89	129	3.43	1.23	142	3.59	1.24	177	4.25	0.82	181	4.29	0.81	228
Size 100/above	0.31	0.47	96	0.72	0.45	87	0.76	0.43	131	0.71	0.46	151	0.73	0.45	189	0.51	0.50	183	0.57	0.50	231
Contract	0.56	0.50	96	0.28	0.45	87	0.28	0.45	131	0.08	0.27	151	0.08	0.27	188	0.43	0.50	183	0.41	0.49	231
Core Proportion	62.54	21.51	96	59.60	20.89	86	59.74	21.19	129	57.67	19.82	148	60.08	19.85	184	61.15	21.21	182	60.87	21.26	229
Skill	0.35	0.48	96	0.28	0.45	87	0.37	0.48	131	0.33	0.47	151	0.38	0.49	189	0.32	0.47	183	0.36	0.48	231
Union/Majority	0.09	0.29	96	0.37	0.49	87	0.27	0.44	131	0.55	0.50	150	0.48	0.50	188	0.22	0.42	183	0.19	0.39	231
HPWO Num.	1.57	1.09	96	1.53	1.07	87	1.41	1.07	131	0.70	0.94	151	0.73	0.97	189	1.55	1.08	183	1.48	1.08	231
Rotation	0.66	0.48	96	0.63	0.49	87	0.65	0.48	130	0.69	0.47	144	0.70	0.46	181	0.64	0.48	183	0.65	0.48	230
HPWO Any	0.77	0.42	96	0.78	0.42	87	0.75	0.44	131	0.42	0.50	151	0.44	0.50	189	0.78	0.42	183	0.76	0.43	231
HPWO 2/3	0.56	0.50	96	0.53	0.50	87	0.47	0.50	131	0.21	0.41	151	0.22	0.41	189	0.55	0.50	183	0.51	0.50	231
Core Redundant	0.07	0.26	96	0.22	0.42	87	0.24	0.43	131	0.39	0.49	148	0.36	0.48	185	0.14	0.35	183	0.17	0.38	231
Core Scarce	0.04	0.20	96	0.21	0.41	87	0.20	0.40	131	0.24	0.43	148	0.29	0.45	185	0.12	0.33	183	0.13	0.34	231
Supervisory Redundant	0.05	0.22	96	0.22	0.42	87	0.22	0.42	131	0.28	0.45	138	0.27	0.45	169	0.13	0.34	183	0.15	0.36	231
Supervisory Scarce	0.03	0.17	96	0.24	0.43	87	0.20	0.40	131	0.21	0.41	138	0.22	0.42	169	0.13	0.34	183	0.13	0.33	231
bngl_ncr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.48	0.50	183	0.57	0.50	231

Table 4. Adoption of HPWO Practices

Independent Variables	BLR 2000 Manufacturing Any One Practice	BLR 2000 All Industries Any One Practice	BLR 2011 Manufacturing Any One Practice	BLR 2011 All Industries Any One Practice	BLR 2011 All Industries 2 or 3 Practices	NCR 2011 Manufacturing Any One Practice	NCR 2011 Manufacturing 2 or 3 Practices
Independent	−0.031	0.025	−1.055	−0.761	−0.065	0.062	0.304
	(0.483)	(0.455)	(0.842)	(0.592)	(0.487)	(0.664)	(0.632)
Export	−0.199	−0.114	2.207 **	1.414 **	1.562 ***	0.707	−0.632
	(0.467)	(0.429)	(0.880)	(0.562)	(0.546)	(0.660)	(0.569)
Size 100/above	−0.296	−0.345	−0.736	−1.197	−0.646	−0.230	−0.183
	(0.441)	(0.405)	(0.857)	(0.736)	(0.555)	(0.642)	(0.597)
Contract	1.036	0.332	2.389 **	0.726	0.198	0.505	−0.001
	(0.833)	(0.682)	(0.996)	(0.616)	(0.508)	(0.628)	(0.553)
Core Proportion	0.011	0.018 **	0.025	0.019	0.019	−0.010	0.029 **
	(0.010)	(0.009)	(0.017)	(0.011)	(0.011)	(0.014)	(0.014)
Skill	1.125 ***	1.258 ***	0.004	0.422	−0.944 *	−1.067 *	−1.678 ***
	(0.421)	(0.380)	(0.839)	(0.577)	(0.507)	(0.634)	(0.612)
Union/ Majority	−0.110	−0.068	−1.853 **	−1.277 **	−0.384	−1.933 **	−1.307
	(0.440)	(0.406)	(0.857)	(0.646)	(0.520)	(0.913)	(1.245)
Policy: Quality	−0.248	−0.023	−0.859	−0.200	−0.201	−0.128	0.460
	(0.315)	(0.295)	(0.809)	(0.341)	(0.318)	(0.713)	(0.568)
Policy: Cost Reduction	0.760 **	0.308	1.394 **	0.649 *	0.796 **	−0.115	−0.406
	(0.324)	(0.240)	(0.619)	(0.340)	(0.352)	(0.425)	(0.366)
Employment Security	−0.147	−0.040	−0.282	0.100	0.507	−0.664	−1.234 **
	(0.201)	(0.181)	(0.645)	(0.374)	(0.382)	(0.611)	(0.592)
Well−being	0.187	0.246	0.494	0.036	−0.086	−0.088	0.016
	(0.255)	(0.232)	(0.573)	(0.365)	(0.345)	(0.529)	(0.466)
Constant	−2.619	−3.075	−4.416	−2.992	−5.496 *	6.391 *	4.406
	(2.142)	(2.028)	(4.609)	(2.978)	(2.885)	(3.727)	(3.248)
	Number of obs = 142	Number of obs = 178	Number of obs = 86	Number of obs = 129	Number of obs = 129	Number of obs = 95	Number of obs = 95
	LR chi2(14) = 20.97	LR chi2(16) = ** 29.73	LR chi2(14) = ** 26.97	LR chi2(16) = *** 32.79	LR chi2(16) = *** 35.83	LR chi2(12) = 17.44	LR chi2(12) = *** 31.85
	Log likelihood = −86.797	Log likelihood = − 107.605	Log likelihood = −31.930	Log likelihood = −56.957	Log likelihood = −71.188	Log likelihood = −42.690	Log likelihood = −49.286
	Pseudo R2 = 0.108	Pseudo R2 = 0.121	Pseudo R2 = 0.297	Pseudo R2 = 0.224	Pseudo R2 = 0.201	Pseudo R2 = 0.170	Pseudo R2 = 0.244

Notes: Independent variables included years of the establishment, industry dummies (manufacturing [industry] and tertiary), and ownership dummies (private−sector and foreign firms), none of which was statistically significant at the 0.05 level. Standard errors are shown in parentheses.

*Statistically significant at the .10 level; **at the .05 level: *** at the .01 level.

Table 5. Factors Contributing to Employment Redundancy and Scarcity

Independent Variables	BLR 2000 Manu-facturing Core Redundant	BLR 2000 All Industries Core Redundant	BLR 2000 All Industries Core Scarce	BLR 2000 All Industries Supervisory Redundant	BLR 2000 Manu-facturing Supervisory Scarce	NCR 2011 Manu-facturing Core Redundant	2011 Merged Manu-facturing Core Redundant	2011 Merged All Industries Core Redundant	2011 Merged Manu-facturing Core Scarce	2011 Merged All Industries Core Scarce
Est. Years	0.023 * (0.012)	0.021 * (0.011)	−0.010 (0.013)	0.015 (0.012)	−0.004 (0.019)	0.118 (0.077)	−0.025 (0.018)	−0.003 (0.015)	0.034 * (0.020)	0.024 (0.016)
Manufacturing (Industry)	–	0.397 (0.909)	−1.671 ** (0.762)	0.620 (1.239)	–	–	–	−0.631 (0.595)	–	−0.338 (0.778)
Tertiary	–	0.764 (1.078)	−1.203 (0.950)	0.926 (1.346)	–	–	–	−1.133 (0.906)	–	0.571 (0.975)
Private Sector	−0.426 (0.658)	−0.226 (0.589)	0.064 (0.771)	−1.363 ** (0.627)	−0.870 (0.868)	(omitted)	1.817 ** (0.924)	1.682 (1.258)	−0.490 (1.463)	−0.229 (1.066)
Foreign	0.923 (0.883)	0.749 (0.828)	1.296 (1.090)	−0.552 (0.916)	0.897 (1.462)	(omitted)	#	1.361 (1.363)	−0.842 (1.676)	−1.074 (1.186)
Independent	0.710 (0.572)	0.689 (0.524)	1.220 * (0.701)	−0.392 (0.590)	2.551 ** (1.118)	2.537 (2.508)	−0.620 (0.509)	−0.444 (0.445)	−1.018 * (0.616)	−1.044 ** (0.525)
Export	0.940 * (0.514)	0.938 ** (0.479)	−0.402 (0.462)	0.719 (0.566)	−0.254 (0.570)	0.533 (1.701)	−0.774 (0.575)	−0.638 (0.475)	2.527 ** (1.165)	1.972 *** (0.718)
Size 100/above	0.482 (0.490)	0.609 (0.471)	−0.225 (0.459)	0.416 (0.552)	0.389 (0.588)	0.036 (1.993)	−0.018 (0.540)	0.030 (0.473)	−0.001 (0.638)	−0.033 (0.580)
Profit Trend	−0.303 * (0.169)	−0.333 ** (0.164)	−0.117 (0.182)	−0.096 (0.184)	−0.034 (0.219)	1.193 (1.748)	0.116 (0.303)	0.194 (0.264)	−0.350 (0.321)	−0.339 (0.269)
Core Proportion	−0.019 * (0.011)	−0.014 (0.010)	0.003 (0.010)	−0.001 (0.012)	−0.014 (0.013)	−0.038 (0.038)	−0.012 (0.011)	−0.005 (0.009)	0.018 (0.014)	0.020 * (0.012)
Skill	−0.813 * (0.484)	−0.517 (0.437)	0.310 (0.459)	−1.179 ** (0.540)	0.358 (0.552)	1.505 (1.730)	1.167 ** (0.525)	0.557 (0.422)	0.404 (0.575)	0.502 (0.498)
Union/Majority	0.350 (0.458)	0.558 (0.433)	−0.688 (0.496)	0.213 (0.497)	−1.622 ** (0.635)	4.869 ** (2.160)	1.210 ** (0.521)	1.427 *** (0.492)	−0.182 (0.610)	−0.186 (0.570)
HPWO Num.	0.011 (0.230)	0.022 (0.210)	−0.388 * (0.230)	0.064 (0.247)	−0.140 (0.282)	−0.606 (0.754)	−0.076 (0.232)	0.071 (0.200)	−0.572 ** (0.285)	−0.582 ** (0.250)
Rotation	−0.025 (0.475)	0.148 (0.431)	−0.719 * (0.423)	−1.081 ** (0.484)	−0.104 (0.531)	−0.253 (1.802)	−0.241 (0.512)	−0.101 (0.419)	0.325 (0.591)	0.392 (0.515)
bngl_ncr	–	–	–	–	–	–	1.759 *** (0.619)	1.300 ** (0.567)	1.253 (0.779)	1.586 ** (0.729)
Constant	−0.220 (1.366)	−1.247 (1.655)	1.192 (1.766)	−0.304 (1.892)	−0.944 (1.926)	−12.642 (9.629)	−3.236 * (1.801)	−3.986 ** (2.000)	−4.128 * (2.432)	−3.625 * (2.174)
	Number of obs = 129 LR chi2(12) = ** 25.56 Log likelihood = −74.196 Pseudo R2 = 0.147	Number of obs = 161 LR chi2(14) = *** 36.10 Log likelihood = −88.267 Pseudo R2 = 0.170	Number of obs = 161 LR chi2(14) = *** 29.17 Log likelihood = −81.734 Pseudo R2 = 0.151	Number of obs = 148 LR chi2(14) = *** 32.55 Log likelihood = −71.061 Pseudo R2 = 0.186	Number of obs = 120 LR chi2(12) = ** 22.61 Log likelihood = −51.415 Pseudo R2 = 0.180	Number of obs = 94 LR chi2(10) *** = 29.16 Log likelihood = −10.334 Pseudo R2 = 0.585	Number of obs = 180 LR chi2(12) = *** 26.42 Log likelihood = −61.122 Pseudo R2 = 0.178	Number of obs = 225 LR chi2(15) ** = 27.30 Log likelihood = −86.916 Pseudo R2 = 0.136	Number of obs = 180 LR chi2(13) = *** 34.59 Log likelihood = −47.548 Pseudo R2 = 0.267	Number of obs = 225 LR chi2(15) = *** 41.58 Log likelihood = −65.672 Pseudo R2 = 0.240

Notes: Standard errors are shown in parentheses. # indicates that the model became significant after "foreign" was dropped for the problem of
*Statistically significant at the .10 level; **at the .05 level: *** at the .01 level.