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Workplace Organization

and Human Resource Practices:

The Retail Food Industry

by Avner Ben-Ner, Fanmin Kong, and Stacie Bosley

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University of Minnesota

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ABSTRACT

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Most retail food firms adhere to traditional human resources management practices, with employees enjoying little involvement in decision-making and little participation in company financial returns. More than one tenth of non-food firms have innovative human resources systems, with much individual and group involvement in decision-making and financial returns, but only a minuscule proportion of food firms have such systems. At the other end of the spectrum, more than one-fifth of food stores and eating and drinking places (and nearly one-third of food wholesale firms) have traditional systems, as compared to only one-tenth of non-food firms.

The tasks and the human resource practices typical of retail food firms are consistent with each other. Core employees in these firms perform tasks that are generally simpler and less variable than those in other industries, and the firms' human resource practices generally give workers less autonomy and incentives than those in other industries. Whether the structure and variability of tasks are the result of a particular business strategy or adoption of a certain technology is not known. Which came first, these simple tasks, the workers who perform them, or these human resource policies is similarly unknown.

We arrive at these conclusions through analysis of an original data set composed of 806 Minnesota firms, including 211 food firms, which allows us to characterize the change in human resource practices since the early 1980s, and to examine differences in the organization of work across companies. Work organization and human resource practices in the retail food industry have changed substantially, although the change has been less pronounced than in most other industries.

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1. Introduction

The most familiar workplaces, the most transparent production processes and the most frequent encounters between employees and customers, are in the retail food industry, in food stores and eating and drinking places. Many individuals have some working experience in this industry, especially during their youth. Yet little is known about how work is organized in this industry: what kind of human resource practices are employed, and how all this compares with other industries.

This paper seeks to shed some light on these issues, as well as to investigate the factors that lie behind differences in practices within the industry. The paper focuses on trends since the early 1980s. It is heavily oriented towards empirical findings at the expense of theoretical development, using an original data set composed of 806 Minnesota firms. It describes the diversity of human resources practices within the retail food industry, and explains what might be its sources, as well as compares these practices with those in other industries.

We observe that most retail food firms adhere to traditional human resources management practices, with employees enjoying little involvement in decision-making and little participation in company financial returns. More than one tenth of non-food firms have innovative human resources systems, with much individual and group involvement in decision-making and financial returns, but only a minuscule proportion of these firms have such systems. At the other end of the spectrum, more than one-fifth of food stores and eating and drinking places (and nearly one-third of food wholesale firms) have traditional systems, as compared to only one-tenth of non-food firms.

The tasks and the human resource practices typical of retail food firms are consistent with each other. Core employees in these firms perform tasks that are generally simpler and less variable than those in other industries, and the firms' human resource practices generally give workers less autonomy and incentives than those in other industries. Whether the structure and variability of tasks are the result of a particular business strategy or adoption of a certain technology is not known. Which came first, these simple tasks, the workers who perform them, or these human resource policies is similarly unknown.

The next section describes the US retail food industry and its environment, followed by a discussion in section 3 of the employment patterns in the industry. Section 4 describes the sample at hand, and draws a detailed picture of human resource practices in the retail food industry and other industries in the mid-1990s, and traces the evolution of these practices since the early 1980s. This section also lays out a theoretically grounded way of sorting out human resource practices found in different organizations, and comparing them across organizations and industries. Section 5 consists of an empirical investigation of work organization, focusing on categories of practices and on human resources systems. The results indicate the importance of specification of human resource practices and systems, and highlight the role of complexity and other attributes of the tasks executed by employees. The final section contains brief conclusions.

2. The Retail Food Industry Environment

The *food-store segment* of the retail food industry is competitive, with low margins and high volume. Composed of a variety of types of outlets from superstores to conventional supermarkets to neighborhood convenience stores, it is responsible for over $400 billion in annual sales. In addition to the challenges of low margins, the industry has seen flat inflation-adjusted sales for a decade and the percent of disposable household income spent on food-at-home has been continually declining from 10.2% in 1970 to 6.5% in 1996 (Progressive Grocer, 1997). Both demographic changes, such as the decrease in population growth and the increase in the number of working women, and changes in consumer tastes and preferences have drastically altered the demand for retail food.

Demand-side changes were accompanied by numerous changes at the firm and store level. At the firm level, the industry has experienced increasing concentration in ownership since the early 1980s, with an average of 54 mergers or acquisitions per year, and average chain size has increased. Many suspect this movement is motivated by the desire to reduce costs through economies of scale. But despite increasing concentration of ownership, the existence of various types of food outlets has allowed for relatively easy entry into the industry, and the amount of annual store entry and exit has been roughly equal (Kinsey, 1998). Store size has been increasing, as has the number of specialty departments and services within stores. These changes have been driven largely by changing consumer demands and economies of scale, and they have often been accompanied by increased organizational decentralization (Walsh, 1993).

Changes in technology usage have also altered the nature of retail food stores. The introduction of scanners, computerized ordering and electronic registers have provided some efficiency gains and reduced labor costs. A collaborative industry-wide initiative entitled Efficient Consumer Response (ECR) has had a significant impact on the industry in recent years. The ECR initiative began in 1993 with the purpose of re-engineering the grocery supply chain. This initiative relies heavily on the industry-wide use of technology and store management practices to improve processes such as inventory management, information control and management, and product flow.

The *food service segment* comprises a wide range of eating and drinking establishments, from bars and restaurants to fast food chains and institutional dining halls and cafeterias that are found in many workplaces (the institutional establishments are excluded from the analysis of this paper). It has seen a growth in the volume of its sales, which reached $320 billion in 1997, with an average real sales growth rate of approximately two percent per year over the last decade (National Restaurant Association, 1996). It has also seen growth in its share of total food expenditures, which has increased from 25% in 1955 to over 40% today (National Restaurant Association and Deloitte & Touche LLP, 1997). This obviously parallels the opposite trend in expenses on food purchased in stores. The food service industry's growth has been fueled by demographic changes and increases in the standards of living (particularly of baby boomers), as well as in the increase in the average number of hours spent working, especially by women, causing many Americans to seek time-saving solutions for the basic need of eating while combining it with a measure of entertainment.

3. Employment in the Retail Food Industry

As of 1997, retail food stores employed nearly 3.5 million workers and combined with food service establishments to employ over 11 million workers. This represents an increase of 59% over 1980 as compared with a 1.7% increase in broad manufacturing employment (mining, construction, manufacturing, transportation and public utilities), and a 32% increase in non-food related commerce employment (wholesale and retail trade) over the same time period (Bureau of Labor Statistics). The industry has traditionally had relatively high levels of unionization, high utilization of part-time labor, and high full and part-time turnover rates. It also has a poor reputation for its failure to provide long-term desirable employment. Little-desirable retail food employment opportunities, combined with current low unemployment rates and increased worker mobility, have made recruitment and retention difficult. The difficulty of recruiting good new employees has been among the top three concerns of retail food executives in recent years (Food Institute, 1995). According to a 1996 survey of U.S. supermarkets, the average number of interviews to fill a store-level position has been rising and turnover rates remain high for both full and part-time employees (Canadian Council of Grocery Distributors and Food Marketing Institute, 1997). The National Restaurant Association also found in a 1996 survey that labor – in terms of availability, quality, and training – was among the top two challenges that restaurant operators anticipated (National Restaurant Association, 1996).

Recent technology initiatives such as ECR and the increases in consumer expectations create even greater challenges for staffing today's retail food operations. The introduction of new technologies and increased service expectations has altered the skill requirements of managerial and non-managerial jobs, and this is forcing retail food firms to recruit, train, manage, and compensate employees accordingly. The education and skill level of store-level employees has been cited as a major constraint to the implementation of ECR practices (Kurt Salmon Associates, Inc., 1996). And food service operators are reporting problems with the skill level of both hourly and salaried employees and applicants (National Restaurant Association and Deloitte & Touche LLP, 1997). The emphasis on higher levels of customer service in food service establishments and stores, through such initiatives as prepared foods and home shopping, has had the added effect of making retail food operations more labor intensive. This provides even greater pressure to recruit and retain good employees.[1]

In many ways the retail food industry is a reflection of the larger economy: its high rate of employment growth and difficult recruitment is typical of other service industries; its degree of union strength tends to move along the same trend as union strength in the overall economy; increased concentration in food store ownership is reflected in many other industries; and the impact of new technologies and increased consumer service expectations are being experienced economy-wide. The retail food industry also has its differences from the economy at large: its utilization of part-time labor is much higher; its level of turnover is typically higher; its unionization rates in the food store segment are higher; and it suffers from a somewhat unusual poor employment reputation. One might expect these similarities and differences to be reflected in retail food workplace organization and human resource practices. The next section compares

[1] The wholesale food industry was projected to employ approximately 900,000 people and generate annual sales of over $500 billion by 1996 (Darnay, Arsen and Gary Alampi, 1995). Its workplace is different from the retail food workplace in many ways. It is primarily centered around transportation and sales of food products to retail outlets so there is little contact with consumers, more employees are salaried, and the average wage is much higher.

and contrasts the retail food industry with other industries in terms of its workplace organization and human resource practices and the determinants of practices and organization.

4. Workplace Organization and Task Attributes in the Minnesota Sample

Our empirical work concentrates on the broadly-defined retail food industry, to include food stores, eating and drinking places, and food wholesale firms. Our sample, a subset of *The Minnesota Human Resources Management Practices Survey* (MHRMPS)[2], consists of private for-profit firms with at least 20 employees in diverse industries outside agriculture, headquartered and operating principally in the state of Minnesota. The choice of a single state, Minnesota, offers several important advantages. First, the workforce in these firms is likely to be more homogeneous than in firms operating in many states. Second, all firms are subject to the same state laws and regulations. Third, crucial firm-level data that are not in the public domain are available from State of Minnesota agencies.

Due to funding considerations, the survey was administered in two rounds. The first was in mid-1994 to early 1995 to 587 firms (including all known publicly traded firms and firms with ESOPs), and the second in early 1996 to 1,434 firms (including all food firms, and a random sample from all other industries outside agriculture). The overall response rate for the survey was about 43%; this compares favorably with previous work of similar sample size. Of 874 respondents, 806 are used in this analysis; the remaining 68 were dropped either because they were duplicates (7), because the firm does not operate principally in Minnesota (11), or because there were fewer than 20 employees at the time of the survey (50). By far, most of the

[2] The survey instrument was developed as part of the project directed by Ben-Ner at the Industrial Relations Center at the University of Minnesota, "The Organization of Work: Determinants and Consequences." For a detailed description of the data, see Ben-Ner (1997).

responding firms had been in operation for more than 15 years.[3] All variables used in our analysis come from the MHRMPS, with the exception of the number of employees, which was obtained from the Department of Economic Security at the State of Minnesota (DES), Dunn and Bradstreet private firms file, and IRS Form 5500.

The empirical work reported in this paper focuses on all 211 food firms that responded to the survey, with frequent comparisons with 595 non-food firms. The distribution of the sample across industries of interest is presented in Table 1. Because of missing responses to some items in the survey and especially because of inability to obtain reliable employment figures for all firms in the sample, the actual number of firms used in different analyses varies and is usually smaller than 211. As for the 595 non-food firms, the manufacturing firms include all manufacturing, construction, mining, transportation and public utility firms. The commerce firms include all non-food wholesale and retail trade firms, and the service firms include finance, insurance, real estate, and service firms, as defined by the 1987 two-digit Standard Industrial Classification (SIC) Code.

a) A cross-sectional portrait of the retail-food workplace, 1994

The 1994 descriptive statistics for food and non-food firms are in Tables 2 and 3. Table 2 indicates that food firms are smaller and younger on average than non-food firms. Unionization is by far highest among food stores and lowest among eating and drinking places, with food

[3] The respondents were primarily human resources managers; in smaller companies, respondents were commonly top executives.

wholesale firms in between.[4] There are noticeably less publicly traded food firms in the current sample, which to some extent maps the general ownership situation in the retail food industry.

We also observe that the labor force employed by food firms has shorter tenure, less education in terms of years in school and is younger on average, as compared to those hired by non-food firms.

The nature of the work can be described in terms of the tasks employees have to execute. Tasks vary of course in content, which is in terms of what employees have to do in their specific jobs. Tasks also vary in attributes, such as how difficult it is to execute them, how much they vary, how uncertain their outcomes are, what kinds of skills (low or high, firm-specific or general, etc.) are needed to execute the tasks appropriately, how easy it is for an observer to analyze the issues faced by the person who actually carries out the tasks, how the tasks of one individual are related to the tasks of other employees, and so on. For the purpose of understanding work organization we concentrate on task attributes rather than content, and we focus on just the core employees.[5] One might plausibly argue that respondents report task attributes with some benchmark in mind rather than an absolute scale, and that the benchmark they have in mind varies either randomly across respondents, or is related to something in their own industry. For better or worse, we did not provide respondents with a benchmark or comparison jobs or occupations (except for mentioning the four examples of groups of core employees, noted in footnote 5).

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[4] Note that there are only 23 food wholesale firms in our sample, hence all figures presented in tables in section, as well as associated commentary, should be interpreted accordingly.

[5] The survey defined for respondents "core employees" as the largest group of non-supervisory, non-managerial employees who are directly involved in making the product or providing the service, such as assembly-line workers at an auto manufacturing factory, computer programmers in a software company, or sales representatives in an insurance company. This definition was adopted directly from Osterman (1994). The respondents were asked to name the occupational title of these employees. In food stores, the titles most commonly given were grocery clerk,

However, upon analysis of responses it turns out that respondents' assessment of task attributes is reasonable, in the following sense. First, there is high correlation among similar items (e.g., complexity and routineness of tasks). Second, the degree of complexity and of other task attributes varies consistently across industries at the two and three SIC-digit levels. Hence we are confident that measures of tasks attributes are meaningful.[6]

We are focusing on task complexity, variability, and interdependence, as well as on the types of skills entailed by these tasks. These are likely to affect the organization of the workplace in the following way. First, information transmission across different levels of a hierarchical organization is costly and difficult, particularly when tasks at the lower tiers of the hierarchy are variable and complex (March and Simon, 1993). Variability and complexity of tasks creates *uncertainty* regarding the consequences of the execution of tasks, that is, the connection between cause and effect is loose. Hence when the tasks of core employees are relatively complex and variable, decision-making may be best delegated to them. Second, making decisions about the execution of complex tasks often requires cooperation among individuals with different and complementary skills, or with complementary judgments. This suggests that complexity call for consultation among employees. In contrast, when problems are routine and predictable, tasks can be preprogrammed and formalized in ways that reduce the information load on upper echelons and reduce the need for delegation. And to the extent that delegation is necessary, it can be confined to individual employees rather than to groups such as teams. These considerations suggest that employee participation in decision-making will increase with greater complexity of

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cashier/stockier, and the like; in eating and drinking places the answers were server, waitstaff, cook/server, and such; in wholesale, the most common answer was sales, and a few processors (e.g., of vegetables).

[6] Details on the various tests mentioned in the text are available upon request.

tasks, but will not necessarily have a direct effect on financial return plans.[7]

Interdependence among tasks has two possible effects. First, it makes the measurement of individual input and output difficult. As a result, direction, supervision and monitoring from above must be replaced in part with coordination and mutual monitoring among employees (Appelbaum and Batt, 1994). Second, interdependence requires rewarding financially the group of employees whose tasks are interdependent because it is difficult to reward individuals. Thus, we predict that greater task interdependence will be associated with greater likelihood to adopt plans that entail sharing of financial returns with employees, as well as employee involvement in decision-making.

Tasks of *core* employees in food firms, as illustrated in Table 2, are less complex, less variable, and have more work skill transferability. The tasks of food store workers are less interdependent than in other food and in non-food firms. The skill requirements are lower in food firms than elsewhere. The degree to which the work of food workers is affected by computers varies from a high in food stores, which is comparable to non-food firms, to low in eating and drinking places and wholesale food firms.

A different way of looking at the nature of the work is by combining task attribute into clusters that reflect different types of production technology. Following Perrow (1986), we used the information about task attributes to create four clusters. We first created a composite variable called *uncertainty* of tasks by adding the scores on task complexity and task variability (each on a

[7]We emphasize the absence of a *direct* effect. An indirect effect may exist due to the desire to complement decision-making plans with financial return plans (see Ben-Ner and Jones (1995) for a detailed discussion of this issue).

scale of 1 to 5), and divided task uncertainty into low uncertainty (score less than or equal to six) and high uncertainty (score higher than six). Similarly, an interdependence index score was divided into two groups: low (scores of 1, 2 or 3) and high (scores of 4 or 5) interdependence of tasks. We then created the four groupings (to which we may refer as technology attributes) that appear at the bottom of Table 2. It is clear on this classification that food firms, food stores, and eating and drinking places in particular, stand apart from the rest of the firms in our sample, in that a much larger proportion of them have combinations of low task uncertainty and low activity interdependence. At the other extreme, a much smaller proportion of food firms have a combination of high task uncertainty and high interdependence, especially in food stores, than in other parts of the economy.

Table 3 presents additional information about the organization of work and human resource practices in the sample food firms. The table is divided into three parts. The first part deals with individual plans, the second with types of plans with work systems, and the third part presents counts of plans of different types. Turning to the first part, we classify plans into three categories. The first category of plans deals with the allocation of decision-making rights to employees, and the second with the allocation of financial returns to employees. Decision-making and financial returns are the two keystones of the ownership of firms, as well as the keystones of the organizational structure (the hierarchy and incentives mechanisms) of any organization. Thus, along with many writers in organization theory, we classify the primary human resources practices into those associated with decision-making and with financial returns (see Ben-Ner and Jones, 1995 and their references). In addition, we classify other human resources practices as 'supporting,' in the sense that their main function is to enhance the ability of individual employees, groups of employees, or the entire organization, to employ effectively decision-making and financial returns oriented practices.

Consider first decision-making participation plans (or practices or programs -- we use these terms almost interchangeably, although the meaning may vary slightly according to context). Food firms have lower adoption of quality circles and work teams but have higher adoption of quality of work life programs. However, the percentage of wholesale food firms with joint labor-management committees and employee representation on boards is higher as compared to other food firms and non-food firms. For financial participation practices, food stores and eating and drinking places have lower adoption of individual incentives, gain sharing, cash and deferred profit-sharing, and much lower rates of stock purchase plans and ESOPs[8]. Food firms have similar adoption rates of some supporting practices such as training and job redesign. However, a higher proportion of eating and drinking places proclaims a policy of employment security, job rotation and skill-based pay.

The human resources practices discussed above may be further classified according to the level of analysis: whether they focus on individual employees, groups of employees (teams, units and departments), or the firm level. The distinction between the group and firm levels is somewhat ambiguous in small firms, and in consideration of the relatively small sample size as well as the comparatively small size of most sample firms (to be discussed later), we combine groups and firms into a single level of analysis. We thus split practices into *individual-oriented* and *collective or group-oriented* (to include the firm level) plans and create new variables based on reliance of at least one plan in each of the categories of decision-making, financial returns, and supporting practices. For example, the variable "decision-making participation – collectively" receives the value one if the firm has *at least one* of the group-level practices included in the "individual plans" part of Table 3 (note that the plans are tagged whether they are oriented to individual employees or groups of employees), and the value zero if the firm has none of these plans.[9] This classification presumes that there is considerable substitutability among similarly classified plans along the key dimensions on which they were chosen (level, and focus). Familiarity with actual practice, and low correlation coefficients among similarly classified plans together suggest that this classification is a justifiable tool.

Overall, food firms have lower adoption of all participation practices, both individual and group-oriented, and many can be characterized as having 'traditional' human resource systems, those that are based on fixed wages, little if any employee involvement, and few supporting practices. Note that our information about each of these plans is confined to the existence or absence of certain plans, but not their depth, coverage, or extent.[10]

Indeed, we can combine the just-discussed types of *individual* practices into work or human resources *systems*. We construct systems on the basis of "leading" practices, those that grant rights to participation by employees in decision-making, and those that involve employees in

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[8] Stock purchase plans and ESOPs are less common in private firms, which constitute the bulk of food firms in our sample.

[9] Individual-oriented decision-making practices are not included in the discussion of the longitudinal evolution because this variable was constructed from items about which we have information only for the year of the survey. Further discussion of this issue is presented in the empirical analysis section.

[10] Whereas in this paper we rely only on dichotomous data, other work in this project uses interval variables (derived from Likert scales) on the extent of employee participation in various areas of decision-making, also obtained from the survey, and the coverage of profit-sharing plans and employee stock ownership plans obtained from federal tax information (Ben-Ner et al., forthcoming). However, the main results from the two alternative methods do not differ substantially.

financial returns. We further distinguish between rights that are enjoyed by employees individually and rights that are enjoyed by employees as members of groups. As noted earlier, the proper exercise of these rights usually requires some supporting practices, such as relevant training, sharing of appropriate information, investments by employees in their skills, assurances by the employer that the employment is secure and that acquisition by employees of firm-specific skills will not disadvantage them, and so on. However, adding supporting practices would greatly increase the number of systems relative to the size of the sample. Hence we were unable to add supporting programs as an additional dimension of human resource systems.

Human resource systems may be classified both according to the type of involvement, and to the organizational level at which that involvement occurs. First, decision-making and financial return rights can be effectively exercised only if they support each other. For example, decision-making is most responsibly practiced when its consequences affect the financial wellbeing of the decision-makers via their participation in financial returns. And employees' involvement with a firm's financial returns generates a desirable effect on employee behavior if the size of employee returns is positively affected by appropriate decision-making rights apportioned to them. This is true both at the individual level and the collective level. Hence, combinations that do not have both *individual* decision-making and financial returns rights, or both *collective* decision-making and financial returns rights, may be unbalanced.[11] Second, a system may emphasize employee involvement in decision-making or financial returns at the level of the individual, the group, or both individual and group.

[11] A detailed discussion of these points may be found in Ben-Ner and Jones (1995).

Using these two criteria (individual-collective distinction, and dichotomous variables for decision-making and for financial involvement by employees) we obtain 16 possible systems. But there is no compelling theoretical justification for such a breakdown in the retail food industry. This, and the fact that the number of observations in our sample is relatively small, forced us to reduce the number of systems to seven.[12] Of the seven systems, one (Trad-sys) may be termed "traditional" (following Appelbaum and Batt, 1994, Cappelli, 1997, and others), as it delegates no decision-making or financial returns rights to employees either individually or collectively. At the opposite end lies the "innovative" system (Inno-sys), which provides employees with both types of rights at both levels. In between these opposites there are balanced and unbalanced individual-oriented or group-oriented systems (Ind-sys and IndU-sys, or Grp-sys and GrpU-sys, respectively). A system is termed here as unbalanced if it contains only one type of right at a certain level (individual or group) but not the other. Finally, there are other mixed (inconsistent) and unbalanced systems (OthU-sys). Imbalance is used here in the negative sense because either decision-making is not supported by appropriate financial returns that act as an incentive to make the right decisions, or employees have financial returns but do not have the discretion afforded by decision-making rights to pursue their interests.

More than one-fifth of food stores and eating and drinking places (and nearly one-third of food wholesale firms) have traditional systems, as compared to only one-tenth of non-food firms. And only a minuscule proportion of food stores and eating and drinking places have innovative

[12] The literature on work/human resources systems is replete with (more or less arbitrary) corner cutting imposed by sample sizes, the actual distribution of combinations of plans in samples, as well as by theoretical considerations.

systems, whereas one-tenth of non-food firms have.[13] Food stores and eating and drinking places have somewhat more individual-imbalanced systems (IndU-sys) than other firms do. A final observation is that wholesale firms look more like non-food firms than retail food firms do.

b) The evolution of workplace organization and human resource practices, 1980-1996

It is a commonplace observation that the organization of work has changed substantially, and human resources management practices have been altered significantly, since the 1980s. Our data allow us to look at the changes in individual plans as well as in groupings of practices over the period 1980-1996.[14] Indeed, the data suggest a fairly dramatic change in the degree of employee involvement in both decision-making and firm financial returns, and in various practices that often provide support for effective implementation of employee involvement in these two areas.

Figures 1-1 and 1-2 show changes in the use of various decision-making involvement plans for food and non-food firms from 1980 to 1996. These diagrams show that the adoption of all types of decision-making involvement plans increased over this period for both food and non-food firms. At the beginning of the period, a higher proportion of food firms had each of these decision-making involvement plans (quality circles excepted) than non-food firms. However, by the end of this period food firms lagged behind other firms in most decision-making involvement

[13] Without divulging the identity of these handful of firms (one food store, two drinking and eating places, and two food wholesale firms), we comment that these are "high-end" expensive establishments.

[14] Because the definition of individual decision-making relies on variables that are available only for the year of the survey, we are unable to construct time series for this variable, or for the seven work systems as defined in the previous section.

practices, despite the substantial increase in the reliance on these practices in the 1990s. But the increases were much more dramatic for non-food firms over this recent period.

Changes in the prevalence of various financial involvement practices in food and non-food firms from 1980 to 1996 are shown in Figures 2-1 and 2-2. With the exception of deferred profit-sharing use, which remained constant for food firms, usage of all financial involvement plans increased for both food and non-food firms over this period. Non-food firms started the period with higher usage of these practices (except for group bonus use), and ended the period with higher usage of all financial involvement practices. ESOPs grew most from 1985-1990 for all firms but non-food firms experienced higher rates of growth for most of these plans in the 1990s. Increases in the use of individual incentives was the most striking change for both food and non-food firms.

Regarding changes in the use of various supporting practices during the period 1980-1996, food firms began the period with much higher use of all supporting programs, but by the end of the period were much closer to non-food firm usage (the charts describing the evolution of the uses of these practices over time are not included for reasons of space). While food and non-food firms experienced relatively constant rates of growth in most supporting practice in general, non-food firms had higher rates of growth than food firms. The most dramatic change was in the increase in non-food firm adoption of team-building and statistical analysis training in the 1990s.

Overall, both food and non-food firms have been expanding employee involvement since 1980, but non-food firms have been doing so at a faster rate. Our sample suggests that food firms began the period with more group-oriented decision-making and supporting practices and less financial involvement of any kind. By 1996 food firms have narrowed the gap on the use of individual-oriented financial involvement practices, but the gap has widened with respect to group-oriented financial involvement practices. Food firms end the period with higher usage only of group-oriented supporting human resource practices. Both food and non-food firms were similar, however, in that they experienced much higher rates of growth in use of group-oriented decision-making practices and individual-oriented financial involvement practices in the 1990s. So although there are similar trends among food and non-food firms, food firms seem to be changing less rapidly than non-food firms with respect to their adoption of employee involvement practices.

5. The Determinants of the Incidence of HR Practices and Systems in the Retail Food Industry

Why do different firms adopt different human resource practices and systems even within narrowly defined industries such as food stores, or eating and drinking places? Is this a result of random choices made by management on the basis of different understanding of essentially the same circumstances, or is it a result of differences in the circumstances of firms?

a) The variables

To answer these questions we embark on an empirical investigation that relies on alternative specifications of the dependent variables, human resource practices and systems (Table

4), and of independent variables and various firm-level contingencies (Table 5).[15] We need to explore alternative specifications because, even within a well-defined theoretical framework, it is not obvious what is the most appropriate empirical counterpart of theoretical constructs. The simple correlations in Tables 6, 7, and 8 indicate that: (a) while some independent variables are correlated, the level is not such that one should worry about collinearity, and (b) there is indication of a relationship between some dependent variables and independent variables, which calls for further investigation. We focus our effort on a cross-section analysis because we do not have time-variant information on our principal independent variables, the task characteristics.

Table 4 contains definitions of alternative specifications of the dependent variables. We focus on three types of measures. First, we seek to explain the incidence of individual types of practices (decision-making, financial returns, and supporting) at the individual and group levels. Second, we attempt to explain the number (count) of plans of each type, irrespective of level. Third, we estimate the determinants of human resource systems.

The independent variables (defined in Table 5) fall into four categories. First, there are controls for the three food industry groups (with food wholesale as the omitted category). Second, there are variables that capture firm size, firm age, and firm unionization status. Third, some variables measure individual task characteristics (COMPLEXITY, VARIABILITY, and INTERDEPENDENCE) or groupings of tasks as technology attributes (LOW TECH, HIGH-LOW TECH, LOW-HIGH TECH and HIGH TECH) in regressions where the dependent

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[15] Not all of our independent variables can be viewed as entirely exogenous, or even wholly determined separately from the dependent variables. In related work we tried instrumental variables estimation to deal with some of the endogeneity and simultaneity problems, and the results were essentially the same as in estimation without instrumentation. In any event, we caution the reader to interpret the results, as we try to do, in view of these issues.

variables are work systems. Fourth, the level of skills required and their transferability are also included in regressions. We run regressions with the above variables and with and without the use of the variable that indicates the degree to which computer-based technology influences the work of core employees (COMPUTER IMPACT).

b) A conceptual framework for analyzing the determinants of the organization of work

This subsection motivates briefly the choice of empirical strategy and helps in interpreting empirical findings. It presents a framework for analysis rather than a tight theory of the choice of the organization of work in firms and a set of associated hypotheses.[16] The management of a firm selects the human resource practices that make up the organization of work in order to attain organizational goals on the basis of two types of considerations. First, it selects practices that deal with technical-administrative problems that arise in any organization, such as incomplete information and imperfect decision-making that result from limitations of human rationality (bounded rationality) and the 'hardware' and 'software' they create. Second, management seeks to implement practices that deal with agency problems in the organization, namely practices that align interests of individual employees and groups of employees to support organizational goals.

The practices may be selected in isolation, but rational management recognizes interdependencies and complementarities among various practices. Hence the choice of practices and combinations of practices depends on management's understanding of underlying relations among practices, and on information it has about factors (such as technology, product-niche choice, and their manifestation in employees' task characteristics) that affect their effectiveness.

[16] Further related theoretical discussion may be found in Ben-Ner, Montias and Neuberger (1994), Ben-Ner and Jones (1995), Han (1995), Liu (1998), Park (1997), and Ben-Ner et al. (forthcoming), where references to additional literature can also be found.

The understanding and information in question may in turn be related to the size of firm (larger firms, for example, may be able to invest more in acquiring knowledge and information than do smaller firms) and other institutional factors.

The technology of production affects the choice of human resource practices through its impact on the nature of tasks core employees must undertake and the attributes of these employees' skills. Focusing first on task characteristics discussed in the previous section, we note that task complexity may make it difficult for supervisors to observe the usefulness of individual employees' efforts, and to make decisions that their subordinates have only to implement. Second, task complexity may also make it difficult for individual employees to make decisions alone. Consequently, greater task complexity may entail delegation of decision-making authority to individual employees, and/or to groups of employees for collective decision-making. It may also call for individual employee acquisition of skills needed to cope with complex tasks. Hence task complexity is likely to be positively associated with greater individual autonomy in decision-making and with group decision-making, as well as with practices that support them. If task complexity extends not only to lack of observability of individual effort but also to imperfect observability of individual outcomes, then it will be associated with primarily group rather than individual-oriented financial returns participation practices.

When tasks are more diversified and variable, employees have to equip themselves with more skills to fulfill their jobs and to deal with unpredictable situations. Hence employees need more decision-making authority than otherwise, as well as appropriate training to advance their knowledge, skills and abilities.

Task complexity and variability together determine what was referred-to earlier as task uncertainty. Greater uncertainty entails a larger number of different items or elements that must be dealt with simultaneously, a greater variability of the items or elements upon which work is performed, or a lower possibility of predicting their behavior in advance, or all of these situations. Hence, following the arguments presented above, task uncertainty is likely to be associated with more individual autonomy, and reliance on group practices.

Task interdependence refers to the extent to which an individual's tasks are linked with the tasks of other individuals. An integrated production system, such as a lean production system, will increase interdependency between tasks. A lean production system that minimizes production buffers via just-in-time inventory policies contains a large amount of interdependence between workers or working units. These lean production systems are fragile as well as lean, thus, even a small problem is able to disrupt the whole production system. To overcome the fragility and reach economic efficiency, group-oriented decision-making participation (in the form of team-based work units) becomes an attractive choice (Appelbaum and Batt, 1994). When task interdependence increases, it is more difficult to measure an individual's contribution to organizational goals. This may cause avoidance of individual incentive programs (because superiors can not obtain appropriate information about employees' individual performance) and militate instead in favor of group incentives.

The foregoing discussion strongly suggests that human resource practices are not selected individually but in tandem, for they may be effective together because they respond to the same factors, and because they complement each other. This also means that in some circumstances, certain practices will contravene each other and will not be efficiently combined together. Hence it is not possible to state that a particular collection of human resource practices – what we have called here human resource or work *system* – will be best irrespective of contingencies. On the contrary, for example, in certain cases individual-oriented decision-making may drastically lower the value of group-oriented decision-making, but in other cases they may complement each other. While we have not spelled out the entire gamut of possible linkages and associated hypotheses, we believe that we have provided the conceptual ground for deriving them.

To conclude this discussion, it important to state that traditional systems, individual-oriented systems, group-oriented systems, mixed systems, and innovative systems are each optimal relative to a set of contingencies. The foregoing discussion suggests the following matching of systems to technology:

Traditional systems (Trad-sys) with **low uncertainty-low interdependence technology**

Individual-oriented systems (Ind-sys and IndU-sys) with **high uncertainty-low interdependence technology**

Group-oriented systems (Grp-sys and GrpU-sys) with **low uncertainty-high interdependence technology**

Innovative systems (Inno-sys) with **high uncertainty-high interdependence technology**

This matching might be a little too restrictive because some uncertainty may be best dealt with through involvement of many employees in collective or consultative decision-making processes, thus calling for a possible match between group-oriented systems and high uncertainty-low interdependence technology. This possibility will also be explored empirically.

c) Empirical results

Tables 9 and 10 present logistic regressions of determinants of the six *types of practices*, individual and group involvement in decision-making, in financial returns, and support for food firms. For each type of practices a separate regression was run. In terms of overall significance of the regressions (considering both the pseudo-R^2 and χ^2-values), group decision-making and support practices and individual support practices are the three types of human resources practices best explained by the independent variables in this sample.

No statistically significant differences can be detected among the three food sub-industries. Firm size and age have essentially no effect on the type of practices listed in the table, with the minor exception of the positive effect of age on group decision-making. Unionization is weakly associated with less firm reliance on group-based financial return plans and less reliance on individual support programs.

Among task characteristics, the role of complexity in increasing reliance on group decision-making practices stands out, and so does its effect on the use of group support practices. Task variability contributes little to understanding the empirical variation in different types of practices. Interdependence of tasks (which is positively correlated with both variability and complexity, see Table 6) affects weakly and positively *individual* decision-making and financial returns involvement. Greater transferability of skills to other firms appears to be conducive to group-oriented supporting practices. The requirement for greater skills is positively associated with more individual support practices, and with group decision-making. Finally, the stronger is the effect of computer-based technology on the work of core employees, the greater is the likelihood that a firm will delegate decision-making to individuals and will provide group and individual incentives. In regressions that included interaction terms between the computer technology variable and task attributes (not reported here) we found that the interaction of the computer variable with task interdependence increases the likelihood that a firm will adopt group-based decision-making plans.

We ran similar regressions for the larger and much more diverse sample of non-food firms. While it is beyond the scope of this paper to present those regressions, it is worth commenting on them briefly in order to put the findings about food firms in broader perspective. In general, the findings are similar, not only in the signs of the parameter estimate but often even in their magnitude, but the statistical significance is usually greater in the non-food sample. For example, the statistically insignificant estimates on unionization's effect on decision-making practices at the group level become significant in the non-food sample. One interesting difference is that complexity loses significance in the non-food sample but the computer technology variable gains significance (with a positive sign) in the group decision-making regressions. This suggests a possible link between complexity and computer-based technology.

Table 11 presents Poisson regressions on the *counts* of decision-making involvement plans, financial returns participation plans, and supporting plans, without distinction between individual and group levels. As in the previous specification, the lest-well determined regression concerns financial return participation. Generally, the variables that matter in the formulation that distinguishes between the individual and group levels matter in a similar way in the formulation that ignores this distinction but only counts how many plans there are in each type of practice. The most noteworthy findings in this table are the strong effect of complexity on the counts of both decision-making and supporting practices, and the positive effect of interdependence on the count of financial return practices. In addition, we find that older food firms tend to have more decision-making practices, and financial return plans are relatively preferable in food stores than elsewhere. In the non-food sample the findings are similar, with unionization gaining significance in the decision-making regression, and several other variables being significant at the 5-10% level (but again, with similar magnitudes as in the food regressions).

Table 12 focuses on separate regressions on the seven systems defined earlier for food firms. The logistic regressions in this table have a certain presentational appeal, but otherwise they are quite artificial representation of the choice problem in firms. After all, firms probably do not select one system against not having that system, but consider (if at all) one system against each of the others (this choice problem is modeled through the multinomial logistic regression presented in Table 13). Nonetheless, these individual regressions are instructive and they tell a story that conforms to our theoretical hypotheses and can be summarized as follows.

The likelihood of a firm having a traditional human resources system (Trad-sys) is significantly reduced by greater task complexity; but task complexity enhances the probability of a firm's having a group-oriented system (Grp-sys). In terms of matching of systems to technology attributes, we find that LOW-HIGH TECH and HIGH TECH reduce the probability of a firm's relying on the traditional system, and LOW-HIGH TECH and HIGH TECH strongly enhance reliance on the innovative system (Inno-sys). The findings highlighted above confirm the theoretical proposition put forth in the previous subsection.[17] Again, similar results obtain in regressions in the non-food sample.

Table 13 presents the results of multinomial logistic model for the food firms. The model takes the traditional HR system, Trad-sys, as the comparison group.[18] Again, two versions are estimated in order to examine the significance of entering task characteristics individually vs. creating groupings that represent technology attributes towards the choice of a particular HR system by a food firm.

The exponentiated value of a coefficient is the relative risk (chance) ratio for a firm to adopt a certain HR system (e.g., the group-oriented HR system, Grp-sys) relative to the base category (the traditional HR system, Trad-sys), given a one-unit change in a particular

[17] Estimates on HIGH-LOW TECH could not be obtained because of the few observations with this technology attributes. However, it is important to note that HIGH-LOW TECH perfectly predicts Ind-sys!
[18] The results are invariable to the choice of the comparison group.

independent variable.[19] For example, the relative risk of having a group-oriented HR system as compared with having a traditional HR system, given a one-unit increase in task complexity (COMPLEXITY), increases by *exp(1.17) = 3.23*.

Table 13 suggests that the characteristics of tasks carried out by core employees, especially task complexity and variability, are the main predictors for having a particular HR system within a food firm. Relative to the choice of adopting none of the employee involvement plans (i.e., having the traditional system), the chance of having an individual-oriented HR system significantly increases by 5.15 when tasks are performed with high uncertainty and high interdependence (i.e., HIGH TECH) in the regression that excludes the control for the computer technology. And under similar conditions, namely, when the HIGH TECH is present, the relative chance increases by 1.71 for the group-oriented HR system, and by a huge significant number of $1.5*10^9$ for the innovative HR system, respectively. From the third column (with respect to Inno-sys), we note that food stores and eating and drinking places are less likely to have an innovative HR system, relative to wholesale food firms. Across the board, we also notice that greater degrees of influence by computer-based technology on core employees tend to enhance the probability of having various employee involvement HR systems, but not always in a statistically significant manner. Needless to say, due to the small sample size (we have only 9 Ind-sys firms and 6 Inno-sys firms) the multinomial logistic regression results are merely indicative. In terms of matching systems with technology attributes we find that LOW-HIGH TECH predicts moderately

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[19] Let the ratio $\frac{\Pr(Indsys=1)}{\Pr(Tradsys=1)} = e^{X\beta^{(Indsys)}}$ be the relative risk (chance, or probability) of transiting from Trad-sys to Ind-sys. The relative risk for a one-unit change in x_i is then $exp(\beta_i^{(Ind\text{-}sys)})$.

well Grp-sys and Inno-sys, and HIGH TECH predicts moderately well Inno-sys. The effects of technology attributes on other systems do not lend themselves to an equally straightforward interpretation. The key results obtained for food firms are reproduced also for non-food firms.

6. Conclusions

Retail food firms have a different work environment than firms in other industries: tasks are less complex, skill requirements are lower, and the organization of work relies significantly less on employee participation in decision-making and in financial returns. Although in the early 1980s differences in the organization of work in food firms versus firms in other industries were relatively minor, changes during the 1980s and 1990s were more rapid in other parts of the economy than in the retail food industry, leaving food firms closer to the traditional hierarchical and centralized model of work organization.

Nevertheless, there is heterogeneity of human resource practices and systems within the retail food industry. Our cross-sectional analysis reveals that the most consistent predictor of differences in the organization of work is the complexity of tasks, which is conducive to greater reliance on employee group decision-making. Size of the firm, which is usually hypothesized to weaken collective (group) incentives through the free-rider mechanism, plays no significant role in our sample. We have argued theoretically, and found some empirical support to buttress the theoretical claim, that firms tend to match their human resources *systems* to the attributes of their *technology* (defined in terms of task uncertainty and task interdependence). The findings may be interpreted to suggest that firms *tend* to select systems of work rather than individual practices, and consider attributes of technology rather than individual and separate task characteristics.

However, much more is left for both theoretical development and empirical testing in order to support or refute these propositions.

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Figure 1-1 The Evolution of Employee Participation in Decision-making in Food Firms

(Percent of Firms Have Individual Practices)

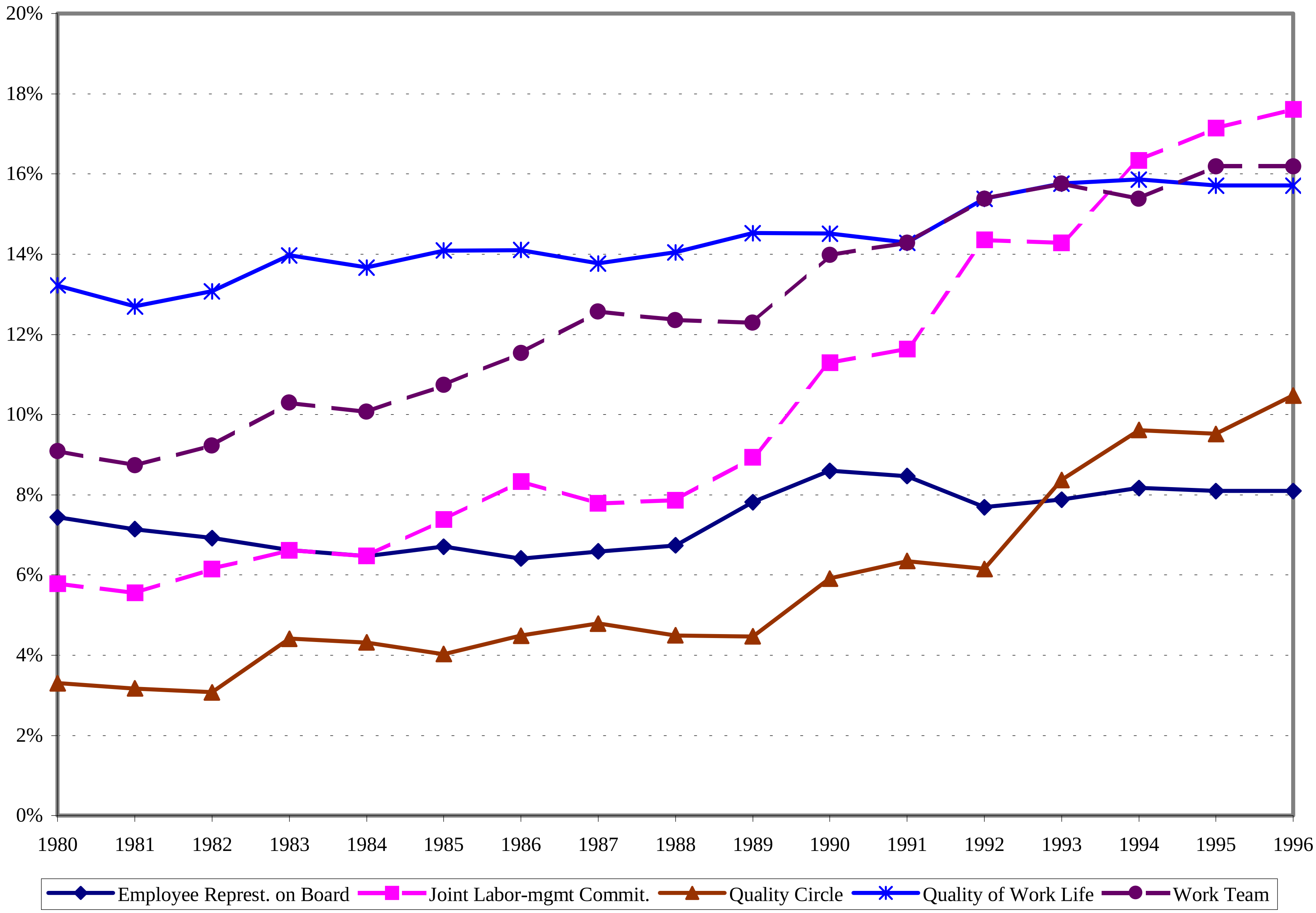

Figure 1-2 The Evolution of Employee Participation in Decision-making in Non-food Firms

(Percent of Firms Having Individual Prectices)

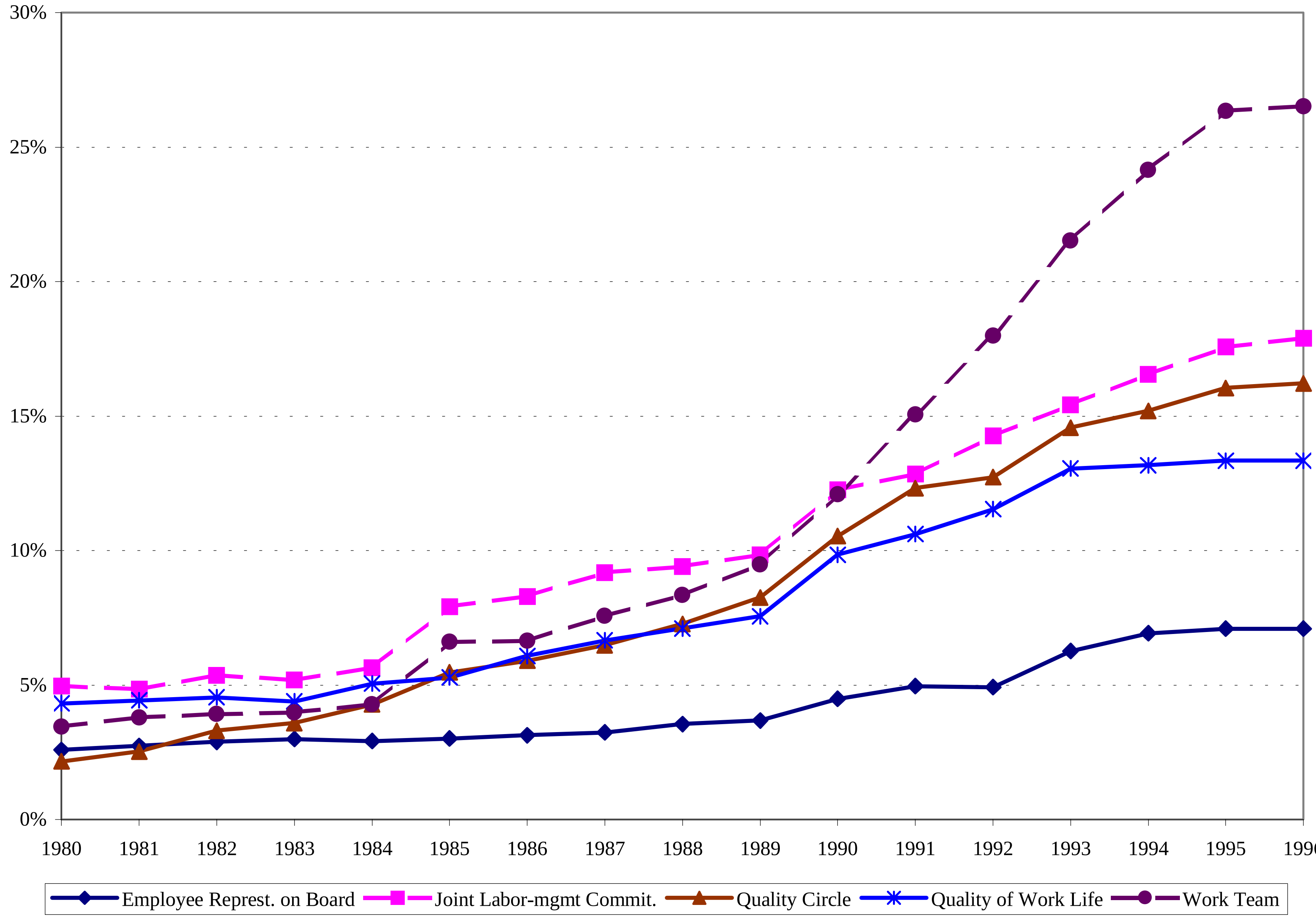

Figure 2-1 The Evolution of Employee Participation in Financial Returns in Food Firms

(Percent of Firms Having Individual Practices)

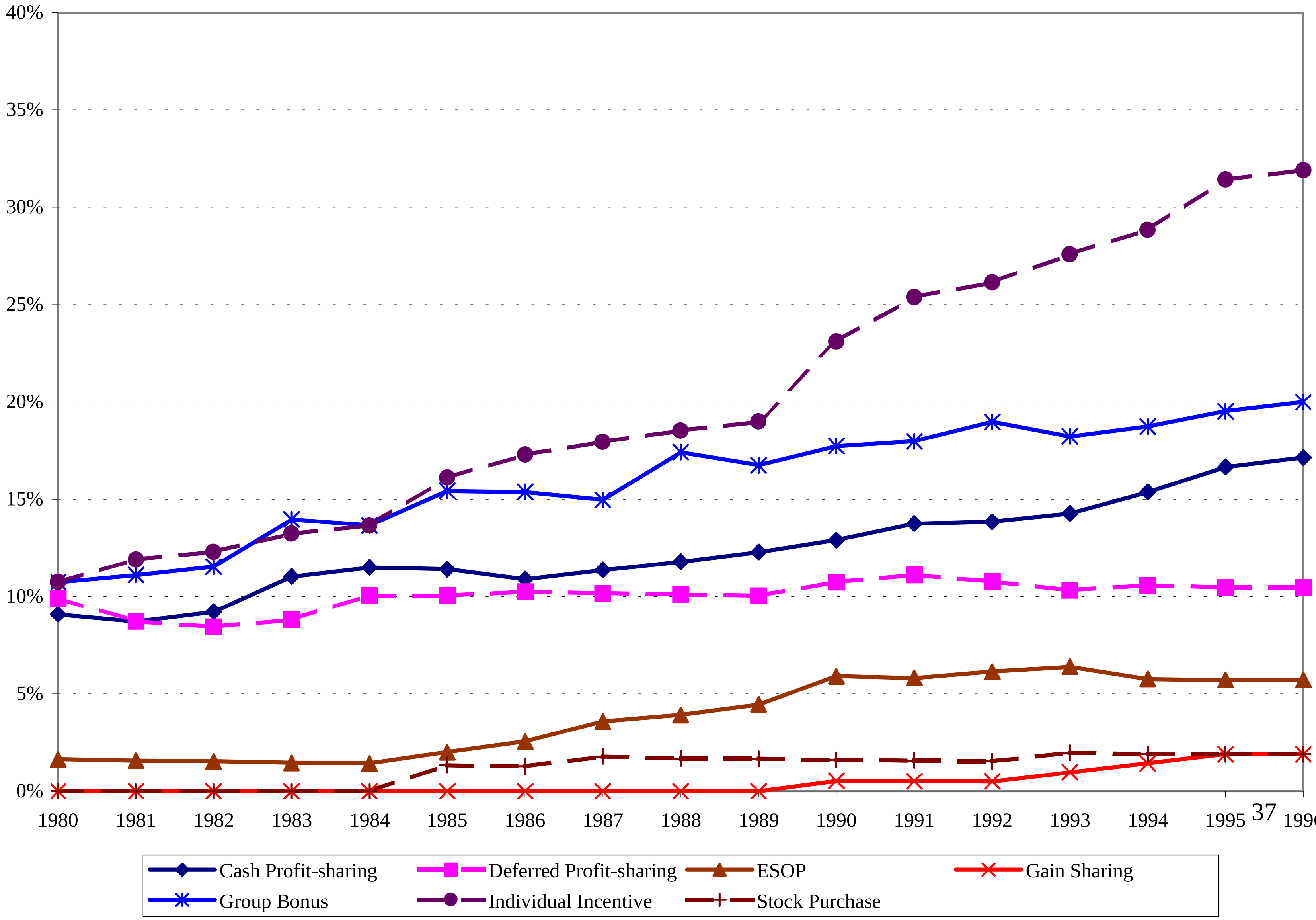

Figure 2-2 The Evolution of Employee Participation in Financial Returns in Non-food Firms

(Percent of Firms Having Individual Practices)

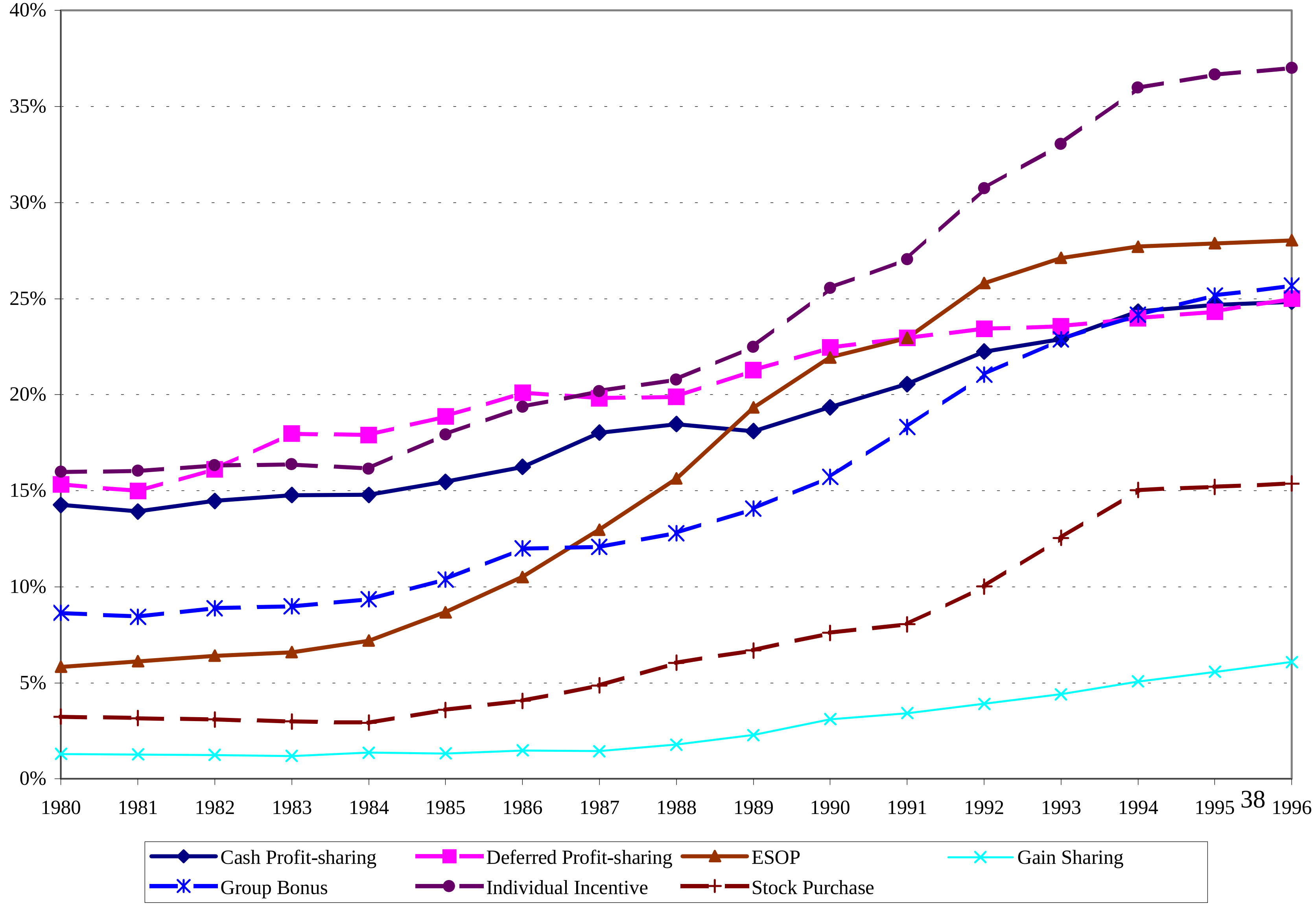

Figure 3-1 The Evolution of Employee Participation in Supporting Practices in Food Firms

(Percent of Firms Having Individual Practices)

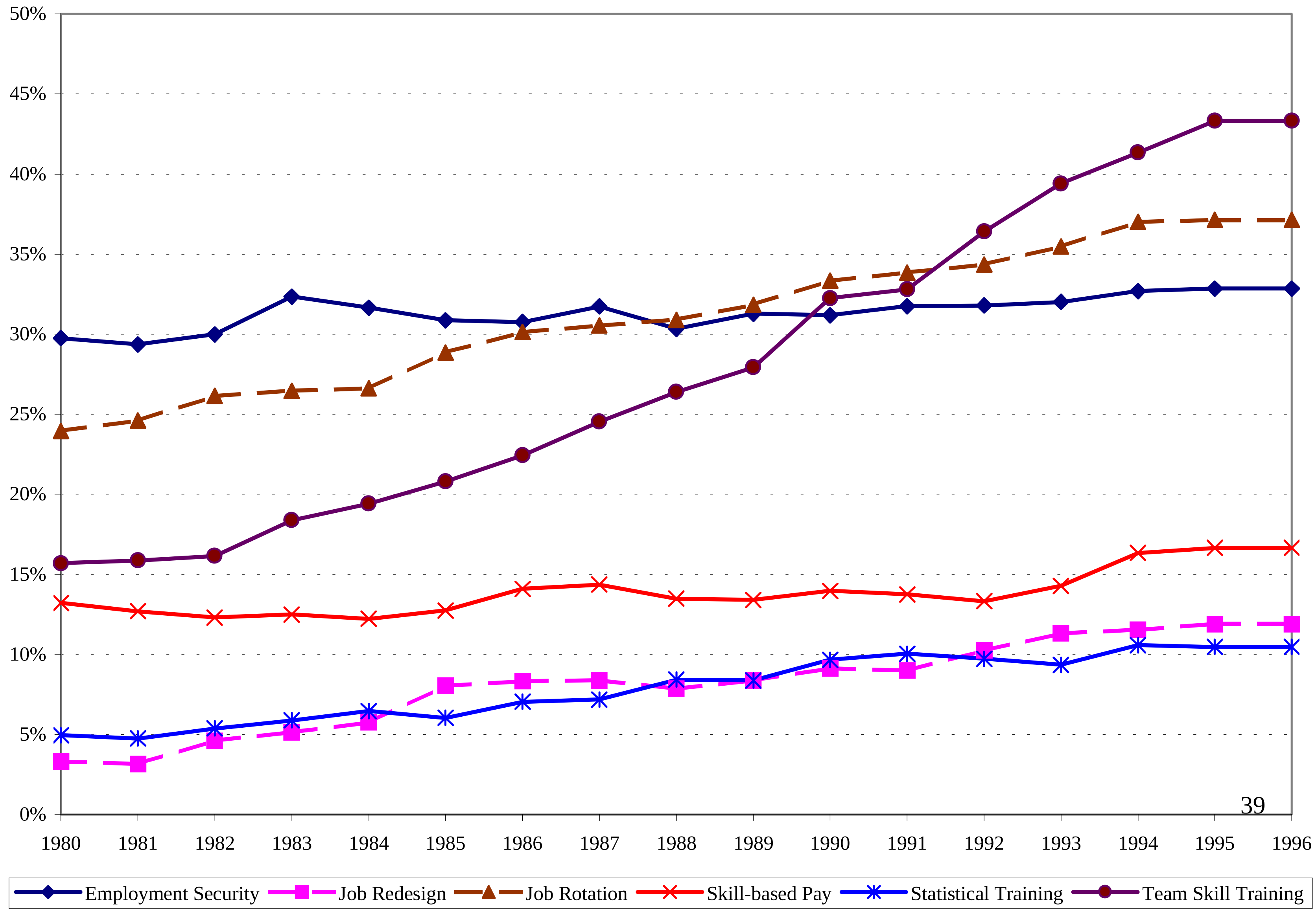

Figure 3-2 The Evolution of Employee Participation in Supporting Pratices in Non-food Firms

(Percent of Firms Having Individual Practices)

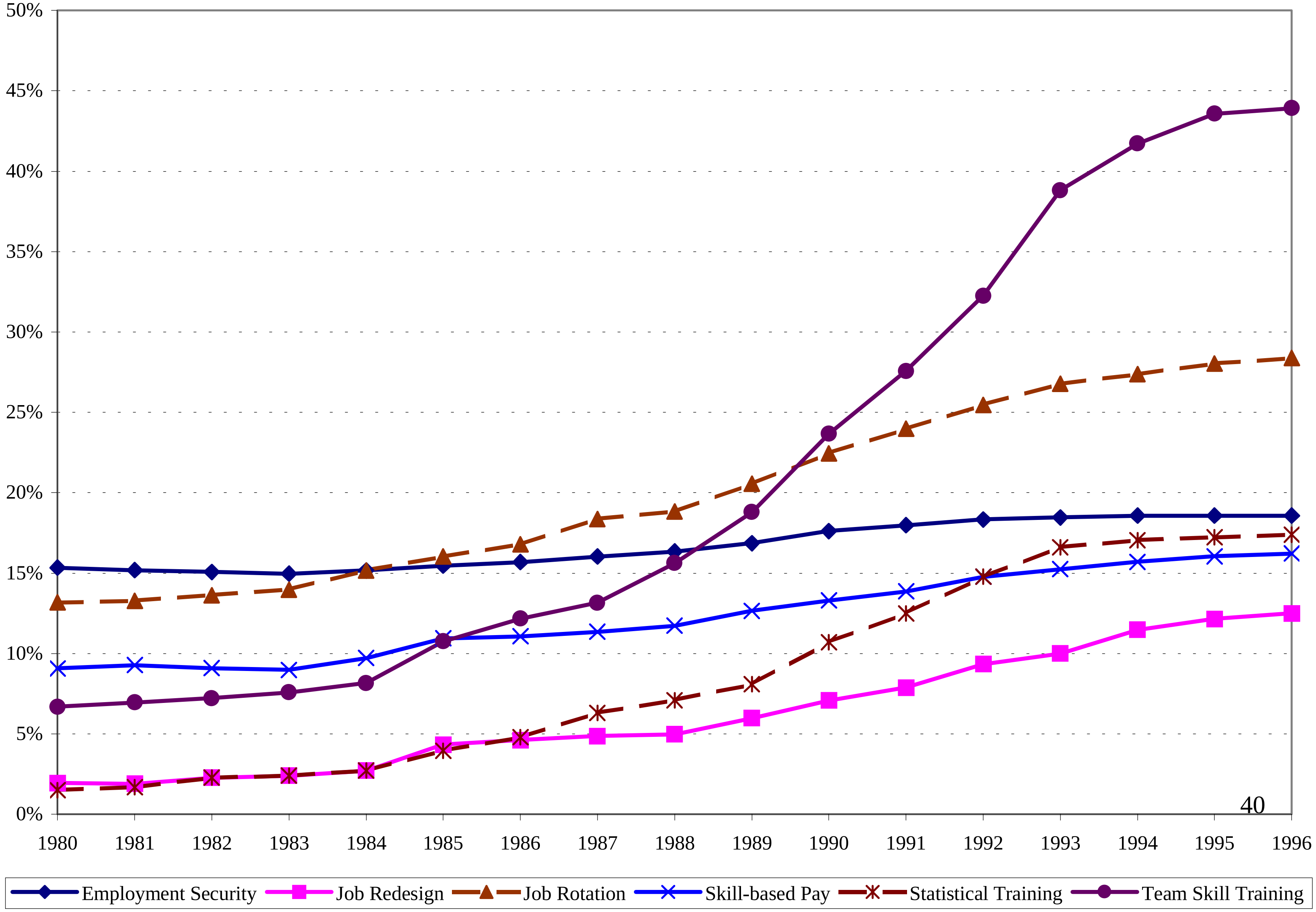

Table 1 Sample Composition

Category	Number of Companies	
Food Firms	**211**	
Food stores		78
Eating and drinking places		110
Wholesale food firms (Groceries and related products)		23
Non-food firms	**595**	
Manufacturing firms		329
Commerce firms		111
Service firms		154
Total	**806**	

Table 2 Organization and Task Characteristics in Sample Firms
Means and Standard Deviation of Variables

Variable	Food stores	Eating & drinking places	Wholesale food firms	Non-food firms
General information				
Firm size (number of employees)	576	140**	190**	917
	(3439)	(197)	(527)	(7751)
Firm age	29.9***	19.9***	38.0	39.5
	(22.0)	(17.0)	(36.9)	(29.1)
Union status (proportion of unionized firms)	30.8%**	5.5%***	17.4%	20.0%
Public status (proportion of public firms)	2.6%***	4.7%***	8.7%**	30.0%
Tenure (year)	6.0**	3.6***	6.0	7.3
	(4.2)	(3.6)	(4.2)	(4.3)
Employee age (year)	30.0***	26.9***	34.5	36.0
	(5.4)	(6.2)	(4.8)	(5.2)
Employee education (year)	12.5***	12.9***	12.9*	13.5
	(0.8)	(1.5)	(1.4)	(1.8)
Task characteristics				
Task complexity (1-5 scale)	2.42***	2.51***	2.45***	3.12
	(0.83)	(0.82)	(0.96)	(1.01)
Task variability (1-5 scale)	2.93***	3.03***	3.23	3.31
	(0.72)	(0.88)	(0.69)	(0.91)
Work skills transferability (1-5 scale)	3.49	3.73	3.73	3.62
	(1.10)	(1.18)	(0.70)	(0.99)
Activity interdependence (1-5 scale)	3.22***	3.69	3.77	3.66
	(1.03)	(1.08)	(0.69)	(0.88)
Work skills requirements (1-5 scale)	2.35***	2.56***	2.32***	3.05
	(0.67)	(0.83)	(0.84)	(1.10)
Computer-based technology influence (1-5 scale)	3.05	2.30***	2.35**	2.99
	(1.15)	(1.12)	(1.17)	(1.25)
Technology typology				
Low uncertainty, low interdependence	48.72%***	39.09%***	26.09%	22.02%
High uncertainty, low interdependence	3.85%***	2.73%***	0.00%**	15.13%
Low uncertainty, high interdependence	28.21%	36.36%*	43.48%	28.40%
High uncertainty, high interdependence	11.54%***	17.27%***	26.09%	29.41%

Notes:
1. Standard deviation is reported in parentheses for continuous variables.
2. Two-sample t-test (for continuous and task variables) and proportion test (for dummy variables) are indicated in food firm columns with * < 10%, ** < 5% and *** < 1%, with non-food firms as base category.

Table 3 Organization of Work and HR Practices in Sample Firms

Variable	Food stores	Eating & drinking places	Wholesale food firms	Non-food firms
Individual plans	***Percent of firms with plans or systems***			
Decision-making				
Quality circle++	7.7*	11.1	9.1	15.2
Quality of work life++	9.0	20.4**	18.2	13.2
Work team++	16.7	15.7*	9.1	24.2
Joint labor-management committee++	15.4	14.8	27.3	16.6
Employee representative on the board++	6.4	7.4	18.2**	6.9
Financial returns				
Individual incentive+	25.6*	29.6	36.4	36.0
Group bonus++	12.8**	19.4	36.4	24.2
Gain sharing++	0.0**	1.9	4.5	5.1
Stock purchase++	0.0***	2.8***	4.5	15.0
Cash profit-sharing++	20.5	11.1***	18.2	24.3
Deferred profit-sharing++	14.1*	5.6***	22.7	24.0
Employee stock ownership plan++	3.8***	5.6***	13.6	27.7
Supporting				
Training in statistical analysis+	11.5	11.1	4.5	17.1
Skill-based pay+	5.1**	25.9***	9.1	15.7
Job rotation++	23.1	47.2***	36.4	27.4
Job redesign++	10.3	12.0	13.6	11.5
Training in team building skills++	39.7	43.5	36.4	41.7
Employment security+	33.3***	35.2***	18.2	18.6
Type of plans & work systems				
Decision-making participation – individually	23.1***	30.0***	39.1	44.4
Decision-making participation – collectively	39.7	43.6	39.1	46.7
Financial returns participation – individually	25.6*	29.1	34.8	35.8
Financial returns participation – collectively	44.9***	34.5***	56.5	70.3
Supporting plans - individual oriented	43.6	47.3*	26.1	38.5
Supporting plans - group oriented	80.8	76.4**	69.6**	84.9
Traditional HR system – Trad-sys	21.8***	20.9***	30.4***	9.4
Individual-oriented HR system – Ind-sys	2.6	4.5	8.7	6.6
Group-oriented HR system – Grp-sys	21.8	20.0	21.7	26.4
Innovative HR system – Inno-sys	1.3***	1.8***	13.0	10.3
Individual-unbalanced HR system – IndU-sys	16.7**	20.9***	8.7	8.7
Group-unbalanced HR system – GrpU-sys	21.8	16.4	8.7	17.5
Other unbalanced HR system – OthU-sys	14.1	15.5	8.7	21.2
Counts of plans	***Average number of plans per firm***			
Number of decision-making plans – dmcount	0.8***	1.0*	1.2	1.2
Number of financial returns plans – frcount	0.8***	0.8***	1.4	1.6
Number of supporting plans – sucount	1.9	2.3	1.7	2.1

Note: "+" denotes plans that are oriented towards individual employees;
"++" denotes plans that are oriented towards groups of employees.
Two-sample t-test (for continuous variables) and proportion test (for dummy variables) are indicated in food firm columns with * < 10%, ** < 5% and *** < 1%, with non-food firms as base category.

Table 4 Variable Definition - Dependent Variables

Variable name	***Variable definition***
Decision-individual (di)	Dummy for the presence of decision-making participation - individual level *[core employees have large control over how their work is done, or rely less on established procedures and practices, and have their work less guided, directed, monitored, or supervised by supervisors and managers]*
Financial-individual (fi)	Dummy for the presence of individual incentive plan
Support-individual (si)	Dummy for the presence of at least one supporting plan - individual level *[training in statistical analysis, skill-based pay]*
Decision-group (dg)	Dummy for the presence of at least one decision-making participation plan - group oriented *[quality circles, self-managing work teams, quality of work life, joint labor-management committees, employee representative on the board of directors]*
Financial-group (fg)	Dummy for the presence of at least one financial returns participation plan - group oriented *[group bonus, gain sharing, cash profit sharing, deferred profit sharing, stock purchase plan, employee stock ownership plan (ESOP)]*
Support-group (sg)	Dummy for the presence of at least one supporting plan - group oriented *[training in team building skills, job rotation, job redesign, information sharing, employment security]*
dmcount	Number of decision-making participation plans, at all levels
frcount	Number of financial returns participation plans, at all levels
sucount	Number of supporting plans, at all levels
Trad-sys	Dummy for the presence of traditional HR system *[Trad-sys=1 if di=0 and fi=0 and dg=0 and fg=0, 0 otherwise]*
Ind-sys	Dummy for the presence of the individual-oriented HR system *[Ind-sys=1 if di=1 and fi=1 and (dg=0 or fg=0), 0 otherwise]*
Grp-sys	Dummy for the presence of the group-oriented HR system *[Grp-sys=1 if (di=0 or fi=0) and dg=1 and fg=1, 0 otherwise]*
Inno-sys	Dummy for the presence of the innovative HR system *[Inno-sys=1 if di=1 and fi=1 and dg=1 and fg=1, 0 otherwise]*
IndU-sys	Dummy for the presence of the individual-unbalanced HR system *[IndU-sys=1 if ((di=1 and fi=0) or (di=0 and fi=1)) and dg=0 and fg=0, 0 otherwise]*
GrpU-sys	Dummy for the presence of the group-unbalanced HR system *[GrpU-sys=1 if di=0 and fi=0 and ((dg=1 and fg=0) or (dg=0 and fg=1)), 0 otherwise]*
OthU-sys	Dummy for the presence of other unbalanced HR systems *[OthU-sys=1 if (di=1 and fi=0 and dg=1 and fg=0) or (di=1 and fi=0 and dg=0 and fg=1) or (di=0 and fi=1 and dg=1 and fg=0) or (di=0 and fi=1 and dg=0 and fg=1), 0 otherwise]*

Table 5 Variable Definition - Independent Variables

Variable name	***Variable definition***
Wholesale	Dummy for the wholesale trade food firms, *three-digit SIC 514*
Groceries	Dummy for the food stores, *two-digit SIC 54*
Eateries	Dummy for the eating and drinking places, *two-digit SIC 58*
Size	Firm size *(number of employees)*
Firm age	Firm age *(years since establishment)*
Unionization	Dummy for the presence of a unionized firm
Complexity	Task complexity *(1-5 scale)*
Variability	Task variability *(1-5 scale)*
Transferability	Work skills transferability *(1-5 scale)*
Interdependence	Activity interdependence *(1-5 scale)*
Skill level	Highly work skills requirements *(1-5 scale)*
Computer impact	Computer-based technology influence *(1-5 scale)*
Low tech	1 if tasks performed with low uncertainty, low interdependence, 0 otherwise
High-low tech	1 if tasks performed with high uncertainty, low interdependence, 0 otherwise
Low-high tech	1 if tasks performed with low uncertainty, high interdependence, 0 otherwise
High tech	1 if tasks performed with high uncertainty, high interdependence, 0 otherwise

Table 6 Correlation Matrix of Independent Variables

	1 Size (# of employees)	2 Firm age	3 Unioni-zation	4 Task complexity (1-5)	5 Task variability (1-5)	6 Activity interdependence (1-5)	7 Work Skills transferability (1-5)	8 Required skill level (1-5)	9 Computer impact (1-5)	10 low tech	11 high-low tech	12 low-high tech
2	**0.15****											
3	**-0.01**	**0.17****										
4	**0.04**	**0.06**	**-0.04**									
5	**-0.00**	**0.02**	**0.04**	**0.31*****								
6	**-0.10**	**-0.02**	**0.08**	**0.22*****	**0.30*****							
7	**0.04**	**0.05**	**0.01**	**0.21*****	**0.16****	**0.31*****						
8	**0.04**	**0.02**	**0.03**	**0.32*****	**0.22*****	**0.08**	**0.11**					
9	**0.09**	**0.05**	**0.09**	**0.17****	**0.07**	**0.03**	**0.13***	**-0.02**				
10	**0.08**	**0.02**	**-0.18*****	**-0.29*****	**-0.33*****	**-0.80*****	**-0.27*****	**-0.08**	**-0.14****			
11	**-0.02**	**-0.11***	**0.00**	**0.18****	**0.14****	**-0.14****	**0.11**	**0.05**	**0.16****	**-0.14****		
12	**-0.04**	**-0.03**	**0.09**	**-0.17****	**-0.15****	**0.54*****	**0.14****	**-0.12***	**0.02**	**-0.60*****	**-0.12***	
high tech	**-0.03**	**0.05**	**0.05**	**0.51*****	**0.58*****	**0.41*****	**0.11**	**0.23*****	**0.05**	**-0.37*****	**-0.08**	**-0.32*****

Note: * : $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

Computer impact	Computer-based technology influence *(1-5 scale)*
Low tech	1 if tasks performed with low uncertainty, low interdependence, 0 otherwise
High-low tech	1 if tasks performed with high uncertainty, low interdependence, 0 otherwise
Low-high tech	1 if tasks performed with low uncertainty, high interdependence, 0 otherwise
High tech	1 if tasks performed with high uncertainty, high interdependence, 0 otherwise

Table 7 Correlation Matrix of Dependent Variables

Dummy Variables (unless otherwise indicated)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Dummy for some other unbalanced HR system
1 Decision making participation at the individual level	0.02	-0.05	-0.01	-0.04	-0.05	-0.01	0.01	0.03	**-0.34**	**0.33**	-0.09	**0.27**	**0.33**	**-0.29**	**0.13**
2 Decision making participation at the group level		**0.19**	**0.28**	**0.29**	**0.30**	**0.81**	**0.29**	**0.45**	**-0.45**	**0.11**	**0.61**	**0.20**	**-0.40**	0.06	0.04
3 Individual incentive plan			0.08	**0.13**	**0.16**	**0.21**	**0.59**	**0.12**	**-0.34**	**0.33**	0.01	**0.27**	**0.11**	**-0.29**	**0.25**
4 Group incentive plan				**0.14**	**0.17**	**0.30**	**0.74**	**0.24**	**-0.44**	**-0.13**	**0.62**	**0.21**	**-0.39**	0.10	0.10
5 At least one individual oriented supporting plan					**0.24**	**0.32**	**0.13**	**0.50**	**-0.12**	**0.15**	**0.26**	0.04	**-0.15**	-0.03	-0.07
6 At least one group oriented supporting plan						**0.26**	**0.19**	**0.62**	**-0.19**	-0.02	**0.21**	0.08	**-0.13**	-0.04	**0.12**
7 Number of decision making participation plans (all levels)							**0.33**	**0.49**	**-0.36**	0.03	**0.55**	**0.25**	**-0.32**	0.00	0.01
8 Number of financial returns participation plans (all levels)								**0.24**	**-0.48**	0.09	**0.44**	**0.32**	**-0.22**	**-0.13**	**0.23**
9 Number of supporting plans (all levels)									**-0.24**	0.00	**0.38**	0.07	**-0.18**	-0.03	0.04
10 Traditional HR system										-0.11	**-0.27**	-0.09	**-0.25**	**-0.25**	**-0.22**
11 Individual-oriented HR system											-0.11	-0.04	-0.10	-0.10	-0.09
12 Group-oriented HR system												-0.09	**-0.24**	**-0.24**	**-0.21**
13 Innovative HR system													-0.08	-0.08	-0.07
14 Individual unbalanced HR system														**-0.22**	**-0.19**
15 Group-unbalanced HR system															**-0.19**

Bold indicates a marginal significance level of less than 10%

Correlations greater than or equal to 0.14 in absolute value have a marginal significance level less than 5%

Correlations greater than or equal to 0.18 in absolute value have a marginal significance level less than 1%

Table 8 Correlation Matrix of Independent vs. Dependent Variables

	Dummy Variables (unless otherwise indicated)	Number of employees	Firm age	Unionization	Complexity (1-5 scale)	Variability (1-5 scale)	Interdependence (1-5 scale)	Transferability (1-5 scale)	Skill level (1-5 scale)	Computer impact	Low tech	High-low tech	Low-high tech	High tech
1	Decision making participation at the individual level	-0.04	-0.03	-0.02	0.15**	0.11	0.19***	0.06	0.13*	0.09	-0.21***	0.02	0.01	0.15**
2	Decision making participation at the group level	0.08	0.20***	0.07	0.27***	0.03	0.11	0.12*	0.22***	0.05	-0.10	-0.14**	0.08	0.15**
3	Individual incentive plan	-0.05	0.04	0.01	0.09	0.16**	0.18**	0.08	0.03	0.11	-0.17**	-0.04	0.08	0.18***
4	Group incentive plan	0.09	0.14**	-0.05	0.08	-0.07	0.02	0.08	0.02	0.15**	0.01	-0.08	0.07	-0.05
5	At least one individual oriented supporting plan	-0.05	0.00	-0.19***	0.12*	0.02	-0.02	0.04	0.25***	-0.12*	0.07	-0.10	-0.08	0.08
6	At least one group oriented supporting plan	0.04	0.01	0.11	0.21***	0.17**	0.09	0.19***	0.18***	0.10	-0.07	-0.07	0.03	0.18**
7	Number of decision making participation plans (all levels)	0.02	0.17**	0.02	0.23***	0.08	0.12	0.08	0.17**	0.02	-0.12*	-0.11	0.08	0.16**
8	Number of financial returns participation plans (all levels)	0.02	0.11	-0.03	0.09	0.08	0.17**	0.10	0.01	0.17**	-0.14**	-0.07	0.14**	0.10
9	Number of supporting plans (all levels)	-0.05	-0.05	0.01	0.20***	0.14**	0.12*	0.17**	0.17**	0.06	-0.09	-0.03	0.05	0.13*
10	Traditional HR system	-0.04	-0.01	-0.02	-0.22***	-0.05	-0.19***	-0.12*	-0.08	-0.18**	0.18**	0.05	-0.15**	-0.08
11	Individual-oriented HR system	-0.02	0.00	-0.03	0.05	0.06	0.05	-0.04	0.12*	0.01	-0.03	-0.04	-0.05	0.16**
12	Group-oriented HR system	0.15**	0.19***	-0.00	0.16**	-0.07	-0.00	0.05	0.09	0.09	0.04	-0.09	0.02	-0.00
13	Innovative HR system	-0.02	0.08	0.08	-0.01	0.12	0.10	0.05	0.07	0.05	-0.14**	-0.03	0.06	0.08
14	Individual unbalanced HR system	-0.03	-0.15**	0.03	-0.03	0.09	0.08	-0.02	-0.09	0.08	-0.09	0.14**	0.00	-0.00
15	Group-unbalanced HR system	-0.04	0.00	-0.03	-0.04	-0.10	-0.06	-0.04	-0.06	-0.05	0.09	-0.00	0.04	-0.13*
16	Other unbalanced HR system	-0.03	-0.09	0.01	0.13*	0.08	0.13*	0.16**	0.04	0.06	-0.18**	-0.07	0.11	0.12*

Significance levels are expressed with * as $p < 0.10$, ** as $p < 0.05$, and *** as $p < 0.01$.

Computer impact	Computer-based technology influence (1-5 scale)
Low tech	1 if tasks performed with low uncertainty, low interdependence, 0 otherwise
High-low tech	1 if tasks performed with high uncertainty, low interdependence, 0 otherwise
Low-high tech	1 if tasks performed with low uncertainty, high interdependence, 0 otherwise
High tech	1 if tasks performed with high uncertainty, high interdependence, 0 otherwise

Table 9 Determinants of Individual-Oriented Plan Types: Logistic Model

	Dummy for individual level decision making		Dummy for individual incentive plan		Dummy for at least 1 individual level supporting practice	
	I	***II***	***I***	***II***	***I***	***II***
eateries dummy	**-0.56**	**-0.55**	**-0.13**	**-0.05**	**0.62**	**1.11**
	(0.59)	(0.54)	(0.58)	(0.53)	(0.72)	(0.71)
groceries dummy	**-0.84**	**-0.50**	**-0.41**	**-0.20**	**-0.24**	**0.11**
	(0.64)	(0.56)	(0.62)	(0.55)	(0.79)	(0.76)
# of employees	**-0.00**	**-0.00**	**-0.00**	**-0.00**	**-0.00**	**-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
unionization dummy	**-0.36**	**-0.56**	**0.01**	**-0.01**	**-1.61***	**-1.44***
	(0.55)	(0.54)	(0.50)	(0.50)	(0.84)	(0.82)
firm age	**-0.00**	**-0.00**	**0.01**	**0.01**	**0.01**	**0.01**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
complexity	**0.13**	**0.21**	**0.06**	**0.08**	**0.39**	**0.23**
	(0.24)	(0.23)	(0.22)	(0.22)	(0.26)	(0.25)
variability	**0.09**	**0.06**	**0.29**	**0.30**	**-0.07**	**-0.04**
	(0.24)	(0.23)	(0.23)	(0.22)	(0.26)	(0.25)
interdependence	**0.31**	**0.38***	**0.31***	**0.30**	**-0.18**	**-0.23**
	(0.20)	(0.20)	(0.19)	(0.19)	(0.20)	(0.20)
transferability	**-0.10**	**-0.02**	**-0.00**	**0.07**	**0.03**	**0.05**
	(0.17)	(0.16)	(0.16)	(0.16)	(0.17)	(0.17)
skill level	**0.42***	**0.28**	**-0.11**	**-0.11**	**0.63****	**0.62****
	(0.26)	(0.24)	(0.25)	(0.23)	(0.26)	(0.25)
computer impact	**0.28***		**0.25**		**-0.22**	
	(0.16)		(0.16)		(0.17)	
constant	**-3.45**	**-3.11**	**-3.26**	**-2.98**	**-2.71**	**-3.14**
	(1.20)	(1.14)	(1.15)	(1.10)	(1.27)	(1.26)
Number of obs.	185	195	185	195	185	195
Pseudo R2	0.07	0.06	0.06	0.05	0.15	0.14
Prob. > chi2	0.18	0.21	0.32	0.25	0.00	0.00
Log-likelihood	-98.3	-106.4	-105.4	-112.4	-90.6	-94.9

Note: *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$; standard errors are reported in parentheses.

Variable name	***Variable definition***
Complexity	Task complexity *(1-5 scale)*
Variability	Task variability *(1-5 scale)*
Interdependence	Activity interdependence *(1-5 scale)*
Transferability	Work skills transferability *(1-5 scale)*
Skill level	Highly work skills requirements *(1-5 scale)*
Computer impact	Computer-based technology influence *(1-5 scale)*

Table 10 Determinants of Group-Oriented Plan Types: Logistic Model

	Dummy for at least 1 group level decision- making		Dummy for at least 1 group level incentive plan		Dummy for at least 1 group level supporting practice	
	I	***II***	***I***	***II***	***I***	***II***
eateries dummy	**0.29**	**0.41**	**-0.69**	**-0.74**	**0.75**	**0.42**
	(0.62)	(0.56)	(0.56)	(0.51)	(0.66)	(0.65)
groceries dummy	**-0.09**	**0.08**	**-0.36**	**-0.25**	**0.96**	**0.68**
	(0.64)	(0.58)	(0.59)	(0.52)	(0.73)	(0.70)
# of employees	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
unionization dummy	**0.75**	**0.55**	**-0.68**	**-0.78***	**1.38**	**1.13**
	(0.51)	(0.48)	(0.49)	(0.47)	(0.87)	(0.85)
firm age	**0.02***	**0.02****	**0.01**	**0.01**	**-0.01**	**-0.00**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
complexity	**0.72*****	**0.62*****	**0.20**	**0.20**	**0.62***	**0.57***
	(0.24)	(0.22)	(0.22)	(0.21)	(0.32)	(0.31)
variability	**-0.36**	**-0.32**	**-0.38***	**-0.34**	**0.30**	**0.33**
	(0.23)	(0.22)	(0.22)	(0.21)	(0.28)	(0.27)
interdependence	**0.20**	**0.18**	**0.11**	**0.13**	**-0.04**	**-0.01**
	(0.18)	(0.17)	(0.17)	(0.17)	(0.23)	(0.22)
transferability	**0.08**	**0.08**	**0.08**	**0.13**	**0.44****	**0.40****
	(0.16)	(0.15)	(0.15)	(0.15)	(0.19)	(0.19)
skill level	**0.44***	**0.44***	**0.17**	**0.06**	**0.42**	**0.38**
	(0.24)	(0.23)	(0.23)	(0.21)	(0.30)	(0.30)
computer impact	**-0.01**		**0.25***		**0.04**	
	(0.15)		(0.14)		(0.19)	
constant	**-3.83**	**-3.67**	**-1.24**	**-0.58**	**-3.73**	**-3.40**
	(1.17)	(1.10)	(1.05)	(0.99)	(1.40)	(1.36)
Number of obs.	185	195	185	195	185	195
Pseudo R2	0.14	0.12	0.07	0.05	0.16	0.15
Prob. > chi2	0.00	0.00	0.12	0.18	0.00	0.00
Log-likelihood	-108.7	-117.5	-116.5	-125.8	-72.7	-75.8

Note: *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$; standard errors are reported in parentheses.

Variable name	***Variable definition***
Complexity	Task complexity *(1-5 scale)*
Variability	Task variability *(1-5 scale)*
Interdependence	Activity interdependence *(1-5 scale)*
Transferability	Work skills transferability *(1-5 scale)*
Skill level	Highly work skills requirements *(1-5 scale)*
Computer impact	Computer-based technology influence *(1-5 scale)*

Table 11 Determinants of Numbers of Plans: Poisson Regression Model

	number of decision-making practices, all level		number of financial return practices, all level		number of supporting practices, all level	
	I	*II*	*I*	*II*	*I*	*II*
eateries dummy	**0.8752**	**1.0273**	**0.6536**	**0.6179****	**1.1290**	**1.1592**
	(0.2780)	(0.3002)	(0.1729)	(0.1434)	(0.2296)	(0.2159)
groceries dummy	**0.6836**	**0.8239**	**0.6149***	**0.6610***	**1.1126**	**1.1305**
	(0.2275)	(0.2484)	(0.1727)	(0.1598)	(0.2363)	(0.2165)
# of employees	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**	**1.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
unionization dummy	**1.1468**	**1.0820**	**0.9085**	**0.7696**	**1.0846**	**1.0696**
	(0.2928)	(0.2732)	(0.2257)	(0.1877)	(0.1705)	(0.1655)
firm age	**1.0098****	**1.0085****	**1.0032**	**1.0030**	**0.9984**	**0.9978**
	(0.0042)	(0.0037)	(0.0041)	(0.0034)	(0.0028)	(0.0025)
complexity	**1.4101*****	**1.3637*****	**1.0546**	**1.0635**	**1.1609****	**1.1368***
	(0.1668)	(0.1600)	(0.1161)	(0.1107)	(0.0825)	(0.0780)
variability	**0.9442**	**0.9323**	**0.9849**	**0.9995**	**1.0267**	**1.0429**
	(0.1159)	(0.1105)	(0.1103)	(0.1039)	(0.0736)	(0.0727)
interdependence	**1.0970**	**1.0827**	**1.1537**	**1.1839***	**1.0281**	**1.0249**
	(0.1133)	(0.1081)	(0.1082)	(0.1065)	(0.0599)	(0.0585)
transferability	**1.0101**	**1.0060**	**1.0076**	**1.0403**	**1.0931***	**1.0941***
	(0.0890)	(0.0865)	(0.0816)	(0.0803)	(0.0572)	(0.0559)
skill level	**1.2128**	**1.1761**	**1.0065**	**0.9645**	**1.1012**	**1.0796**
	(0.1541)	(0.1420)	(0.1200)	(0.1048)	(0.0840)	(0.0785)
computer impact	**1.0149**		**1.1903****		**0.9961**	
	(0.0844)		(0.0900)		(0.0486)	
Number of obs.	183	193	183	193	185	195
Pseudo R2	0.0653	0.0561	0.0317	0.0299	0.0309	0.0292
Prob. > chi2	0.0037	0.0053	0.2637	0.1753	0.0461	0.0317
Log-likelihood	-197.665	-210.637	-205.803	-226.625	-312.766	-328.291

Note: *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.
Coefficients are transferred into exp(b); and the transferred standard errors are reported in parentheses.

Variable name	***Variable definition***
Complexity	Task complexity *(1-5 scale)*
Variability	Task variability *(1-5 scale)*
Interdependence	Activity interdependence *(1-5 scale)*
Transferability	Work skills transferability *(1-5 scale)*
Skill level	Highly work skills requirements *(1-5 scale)*
Computer impact	Computer-based technology influence *(1-5 scale)*

Table 12 Determinants of HR Systems: Logistic Model

	Traditional HR system		Individual-oriented HR system		Group-oriented HR system		Innovative HR system		Individual-unbalanced HR system		Group unbalanced HR system		Other unbalanced HR system	
	I	*II*	*I*	*II*	*I*	*II*	*I*	*II*	*I*	*II*	*I*	*II*	*I*	*II*
eateries	-0.73	-0.81	-1.38	-0.81	-0.04	0.20	-2.51	-2.16*	0.82	0.82	1.14	0.66	0.96	1.31
dummy	(0.62)	(0.58)	(1.00)	(0.99)	(0.74)	(0.62)	(1.54)	(1.22)	(0.83)	(0.82)	(1.09)	(0.82)	(1.09)	(1.09)
groceries	-0.69	-1.18**	-1.54	-0.96	-0.46	0.14			0.39	0.57	1.94*	1.25	1.20	1.71
dummy	(0.65)	(0.60)	(1.12)	(1.12)	(0.77)	(0.64)			(0.87)	(0.85)	(1.10)	(0.83)	(1.12)	(1.12)
number of	-0.00	-0.00	-0.01	-0.01	0.002**	0.00	-0.002	-0.00	-0.00	0.00	-0.001	-0.00	-0.001	-0.00
employees	(0.00)	(0.00)	(0.01)	(0.01)	(0.001)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.001)	(0.00)	(0.002)	(0.00)
firm age	-0.30	0.30	-0.43	-0.14	0.24	-0.15	1.00	0.50	0.64	0.57	-0.36	-0.29	-0.09	-0.51
	(0.62)	(0.57)	(1.22)	(1.16)	(0.59)	(0.54)	(1.78)	(1.49)	(0.61)	(0.61)	(0.63)	(061)	(0.69)	(0.69)
unionization	0.00	0.00	0.01	-0.00	0.01	0.01*	0.01	0.01	-0.03**	-0.02*	0.01	0.00	-0.01	-0.01
dummy	(0.01	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
complexity	-0.64**		0.07		0.75***		-1.19		-0.07		-0.03		0.20	
(1-5 scale)	(0.28)		(0.50)		(0.28)		(0.96)		(0.27)		(0.28)		(0.29)	
variability	0.28		0.12		-0.47*		0.52		0.41		-0.35		0.04	
(1-5 scale)	(0.27)		(0.52)		(0.28)		(0.90)		(0.27)		(0.27)		(0.29)	
interdependence	-0.46**		0.18		-0.06		0.97		0.10		0.08		0.26	
(1-5 scale)	(0.21)		(0.43)		(0.21)		(0.97)		(0.22)		(0.21)		(0.25)	
transferability	-0.08	-0.20	-0.26	-0.18	-0.05	0.08	0.14	0.32	-0.14	-0.14	0.07	0.03	0.39	0.43*
(1-5 scale)	(0.17)	(0.17)	(0.32)	(0.31)	(0.19)	(0.17)	(0.76)	(0.70)	(0.19)	(0.18)	(0.19)	(0.18)	(0.24)	(0.24)
skill level	-0.06	-0.19	0.98*	0.68	0.16	0.29	1.33	0.61	-0.52	-0.53*	-0.05	-0.05	-0.01	0.03
(1-5 scale)	(0.26)	(0.25)	(0.56)	(0.53)	(0.28)	(0.24)	(0.86)	(0.67)	(0.32)	(0.28)	(0.29)	(0.26)	(0.33)	(0.29)
computer	-0.33*		0.19		0.17		0.70		0.23		-0.25		0.08	
impact	(0.18)		(0.31)		(0.18)		(0.68)		(0.19)		(0.19)		(0.20)	
high-low tech		0.43								1.83*		-0.39		
		(0.94)								(0.93)		(1.17)		
low-high tech		-1.37***		-0.11		0.04		17.67***		0.25		0.14		1.19**
		(0.47)		(0.97)		(0.42)		(3.01)		(0.48)		(0.44)		(0.56)
high tech		-1.03*		0.97		-0.34		17.49***		0.56		-1.31		1.33**
		(0.58)		(0.88)		(0.55)		(3.17)		(0.60)		(0.80)		(0.63)
constant	2.93	1.19	-4.29	-2.61	-2.78	-2.82	-10.82	-21.8	-2.04	-0.38	-1.54	-2.09	-5.69	-5.20
	(1.27)	(0.98)	(2.30)	(1.83)	(1.33)	(1.03)	(5.73)	(3.17)	(1.41)	(1.15)	(1.53)	(1.18)	(1.74)	(1.53)
Observations	185	195	185	189	185	189	116	121	185	195	185	195	185	189
Pseudo R2	0.13	0.08	0.15	0.14	0.12	0.05	0.34	0.29	0.09	0.08	0.06	0.06	0.07	0.11
Prob. > chi2	0.01	0.07	0.48	0.33	0.01	0.34	0.29	0.15	0.18	0.16	0.48	0.39	0.47	0.03
Log-likelihood	-85.4	-93.1	-30.7	-31.1	-83.4	-96.3	-11.4	-14.9	-77.7	-81.5	-82.9	-86.5	-69.8	-70.3

Significance levels are expressed with * as $p < 0.10$, ** as $p < 0.05$, and *** as $p < 0.01$.

Computer impact	Computer-based technology influence (1-5 scale)
Low tech	1 if tasks performed with low uncertainty, low interdependence, 0 otherwise
High-low tech	1 if tasks performed with high uncertainty, low interdependence, 0 otherwise
Low-high tech	1 if tasks performed with low uncertainty, high interdependence, 0 otherwise
High tech	1 if tasks performed with high uncertainty, high interdependence, 0 otherwise

Table 13 Determinants of HR Systems: Multinomial Logistic Model

	Individual-oriented HR system		Group-oriented HR system		Innovative HR system		Individual-unbalanced HR system		Group unbalanced HR system		Other unbalanced HR system	
	I	***II***	***I***	***II***	***I***	***II***	***I***	***II***	***I***	***II***	***I***	***II***
eateries dummy	**0.44**	**0.78**	**1.70**	**2.07**	**0.15**	**0.24**	**3.15**	**3.71**	**4.65**	**3.34**	**4.14**	**6.02**
	(0.49)	(0.84)	(1.47)	(1.51)	(0.25)	(0.32)	(2.96)	(3.38)	(5.41)	(3.06)	(4.92)	(7.09)
groceries dummy	**0.33**	**0.93**	**1.13**	**2.56**	**4.29e-16**	**2.81e-17**	**2.15**	**4.16**	**8.44***	**7.05****	**4.62**	**11.13****
	(0.41)	(1.11)	(1.03)	(1.93)	(8.22e-9)	(3.49e-9)	(2.14)	(3.98)	(9.999)	(6.59)	(5.64)	(13.55)
number of employees	**0.99**	**0.99**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
firm age	**0.88**	**0.69**	**1.59**	**0.70**	**3.52**	**1.13**	**2.01**	**1.25**	**0.94**	**0.64**	**1.23**	**0.51**
	(1.16)	(0.86)	(1.24)	(0.49)	(6.66)	(1.76)	(1.62)	(0.95)	(0.75)	(0.49)	(1.07)	(0.44)
unionization dummy	**1.01**	**1.00**	**1.01**	**1.01**	**1.01**	**1.01**	**0.97**	**0.98**	**1.00**	**1.00**	**0.99**	**0.99**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
complexity (1-5 scale)	**1.74**		**3.23*****		**0.56**		**1.59**		**1.67**		**2.09***	
	(0.98)		(1.18)		(0.55)		(0.57)		(0.60)		(0.80)	
variability (1-5 scale)	**0.90**		**0.53***		**1.36**		**1.16**		**0.60**		**0.83**	
	(0.52)		(0.19)		(1.27)		(0.40)		(0.20)		(0.31)	
interdependence (1-5 scale)	**1.70**		**1.39**		**3.75**		**1.56**		**1.51**		**1.83****	
	(0.78)		(0.37)		(3.70)		(0.43)		(0.40)		(0.55)	
transferability (1-5 scale)	**0.82**	**1.01**	**1.03**	**1.25**	**1.16**	**1.64**	**0.96**	**1.06**	**1.13**	**1.21**	**1.51**	**1.72****
	(0.29)	(0.34)	(0.24)	(0.26)	(0.40)	(1.18)	(0.22)	(0.23)	(0.25)	(0.26)	(0.42)	(0.47)
skill level (1-5 scale)	**3.02***	**2.33**	**1.22**	**1.48**	**3.99**	**2.26**	**0.69**	**0.76**	**1.02**	**1.10**	**1.03**	**1.20**
	(1.88)	(1.33)	(0.43)	(0.45)	(3.68)	(1.59)	(0.26)	(0.26)	(0.36)	(0.36)	(0.41)	(0.43)
computer impact	**1.60**		**1.50***		**2.77**		**1.59****		**1.05**		**1.41**	
	(0.55)		(0.35)		(1.94)		(0.37)		(0.24)		(0.36)	
high-low tech		**5.77e-18**		**3.94e-18**		**5.18e-9**		**2.44**		**0.50**		**4.23e-18**
		(4.56e-9)		(1.49e-9)		(4.86)		(2.55)		(0.66)		(1.95e-9)
low-high tech		**2.64**		**3.10****		**2.3e+9*****		**3.56****		**3.38****		**8.51*****
		(2.76)		(1.74)		(7.25e+9)		(2.17)		(1.97)		(5.82)
high tech		**5.15***		**1.71**		**1.5e+9*****		**3.28**		**0.69**		**6.38****
		(5.06)		(1.22)		(4.98e+9)		(2.47)		(0.65)		(5.06)
			Version I						***Version II***			
Observations			185						195			
Pseudo R2			0.143						0.127			
Prob. > chi2			0.013						0.009			
Log-likelihood			-282.6						-304.2			

Note: The comparison group is NSYS1, i.e., the traditional HR system. Coefficients are transferred into exp(b);and the transferred standard errors are reported in parentheses. Significance levels are expressed with * as p < 0.10, ** as p < 0.05, and *** as p < 0.01.

Computer impact	Computer-based technology influence (1-5 scale)
Low tech	1 if tasks performed with low uncertainty, low interdependence, 0 otherwise
High-low tech	1 if tasks performed with high uncertainty, low interdependence, 0 otherwise
Low-high tech	1 if tasks performed with low uncertainty, high interdependence, 0 otherwise
High tech	1 if tasks performed with high uncertainty, high interdependence, 0 otherwise