



Università degli Studi di Ferrara

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Quaderni del Dipartimento

n.22/2002

September 2002

**ORGANISATIONAL INNOVATIONS, HUMAN RESOURCES
AND INDUSTRIAL RELATIONS**

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SEPTEMBER 2002

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An enquire on the food sector in Emilia-Romagna *

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Abstract

The paper presents the main results of the research on "Organisational innovations, human resources and industrial relations for the food sector in Emilia-Romagna" realised by the research team of the University of Ferrara and IRES (Economic and Social Research Institute) of Emilia-Romagna. The aim of the research is the analysis of industrial relations, industrial organisation and pay for performance systems, as well as the connections between the three topics. The research wants to deliver a tool for analysis and discussion on organisational changes occurring in firms and on the degree of involvement of worker representative committees in these changes.

* The paper results from the research carried out in cooperation with IRES-Emilia-Romagna and FLAI-CGIL-ER (Emilia-Romagna trade union for the food industry and agriculture). We thank Davide Antonioli, Annaflavia Bianchi, Giovanni Camatti, Loris Lugli, Maurizio Dondi, Giordano Giovannini, and the officers of regional trade unions who contributed to the interviews. The research has been carried out within the project *Infrastructures, competitiveness and levels of government: knowledge and development of the new economy* (PRIN 2001-2002), research unit of University of Ferrara.

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1. Introduction

In recent years, in the debate both of economic arena and the trade unions institutions, we witnessed an increased awareness about the role of organisational change within the firms in as crucial factor for firm competitiveness in national and international markets. Various authors¹ pointed out that those changes are connected to the transition from a complex, rigid and hierarchic enterprise to a flatter organisation, where interactions between firm divisions and top management become stronger. Such a new typology of organisation, also named learning organisation, is more reactive to external changes and able to anticipate and influence changes in the market where it operates. It adopts policies directed to the enrichment and development of competencies owned by its personnel.

The increased awareness of the importance of organisational changes has contributed to emphasise the role of human resource management (HRM hereafter) and of labour as a factor of production in general. At the firm level, management of internal labour markets, selection procedures for personnel, hiring and lay-off policies, career advancement policies, role of training and development of workers' competencies, incentives and workers' evaluation, all these items are outlined by theoretical and empirical economic research, together with management discipline. The adoption of these practices is also considered relevant for the fulfilment of better economic performances. Some authors even tend to identify a functional relationship between HRM practices and firm economic performances.

The whole set of changes in the organisational models led to rethink on firm typologies and the role of personnel in the organisation.

The multifaceted literature concerning HRM constitutes a yardstick in this research agenda. The policies of worker involvement in decisional processes of the firm represent a crucial tool to accomplish the sharing of the firm's objectives by the workers. Such policies imply a more direct relationship between management and workers, a greater autonomy of employees in their work activity and in production problem solving, a greater flexibility in the roles played and in the accomplishment of tasks. The importance of bottom-up - rather than top-down - channels of information diffusion is stressed as well. Furthermore, the increased operative autonomy is accompanied by evaluation systems, incentives, and monetary and non-monetary rewards (bonuses and economic incentives, pay for performance, career advancement, training) directed to favour superior performances, and also to constitute a monitoring and control tool for the management on workers' results.

Worker involvement is put in place mainly in the field of decisional processes for *operative tasks*. Workers' initiatives are excluded in organisational and strategic management. Furthermore, a direct relationship between management and workers, which usually is unidirectional, is often preferred to *decentralisation of decisions* and to the *interaction with worker representatives*. The last two fields of intervention are enclosed instead in an approach which emphasises the role of *industrial relations* within the enterprise, hence an open dialogue between social actors: employees, their representatives, management, and shareholders. More specifically, employee representatives have a double role: on the one hand they defend and guarantee the rights of the weaker side in the bargaining - i.e. the workers - on the other hand they need to contribute to a non-antagonistic organisational climate, which is considered to favour organisational innovations and higher firm performances. The exclusive involvement of workers in objectives and procedures designed by the management is substituted by a participatory model where workers with the involvement of trade unions

¹ See Foss-Laursen (2000), Ham-Kleimer (2002), Laursen-Mahnke (2000), Leoni-Cristini-Mazzoni-Labory (2000), Wilkinson (2000).

share organisational and even strategic objectives. Industrial relations enjoy a quality gain, whereby shared objectives and co-determined procedures ask for a culture of participation. Conflict is left behind and substituted by the development of new competencies for all the actors involved, though each of them retains different roles within the organisation.

The two models defend different, though not contrasting visions of the role of personnel within the organisation and of the confrontation between the actors. The first is *management oriented* as it emphasises the direct relationship between the firm top management and employees. Worker involvement is realised essentially at the operative level. The second is more open toward discussion and bargaining with unions, hence it is *industrial relations oriented*. Employee participation needs to be addressed to a range of objectives shared by management, workers and unions and be accomplished on the basis of co-determined procedures. Discussion between social actors is extended to organisational and strategic problems of the firm.

The main questions underlying our research can be summarised as follows.

First, in the area of industrial relations, can the emergence of direct relationships between management and employees be identified as a way to *complement* or *substitute* more traditional relationships between management and union and between unions and workers? Furthermore, what is the relevance of the confrontation between unions and firm top management for decisional processes at operative, organisational and strategic level?

Secondly, what is the degree of organisational innovation at the firm level and the spread of HRM practices? Is the adoption of new organisational models worked out exclusively through managerial initiatives or does it involve employees and the representatives as well? What are the relations between the intensity of organisational innovation and the quality of industrial relations?

Thirdly, if we take into consideration individual and collective incentive systems, distinguishing between unilateral managerial initiative and bargaining, what are the prevailing ones? Is there a polarisation of the two models, the first aiming at realising organisation and production efficiency, the second following a pure bargaining approach? Are the two models mutually exclusive, or complementary?

Finally, what are the effects of the organisational models on firm performances? In other words, which are the relations between quality of industrial relations, organisational innovation and economic performances of the enterprises?

2. Database and sampling procedures

The database is built on the list of firms with bargaining activity created by IRES Emilia-Romagna. We identified the local productive units (establishments) owned by those enterprises where worker committees (union members to a great extent²) exist. Union members were submitted a questionnaire divided into four sections: a) structural data concerning firms/local productive units and employee representatives; b) industrial relations; c) flexibility and organisational models; d) pay systems.

The criteria used to identify firms and local productive units to be enclosed in the sample are the following ones:

- 1) the sample is representative of the population with respect to firm size in terms of number of employees, branch of operation within the food industry, geographical localisation of the firm;

² Worker committees (“RSU: Rappresentanze Sindacali Unitarie”) are composed by union members at least in the proportion of two thirds of the total number of worker representatives.

- 2) firms with at least 50 employees have the priority, because of the nature of the questionnaire focused on organisational innovation and industrial relations³. In addition, we focused mainly on firms with 50-499 employees (medium-size firms), which are predominant in the food sector in Emilia-Romagna;
- 3) a significant number of firms which adopted the national contract for agriculture workers was included;
- 4) the potential availability of worker representatives able to support our initiative has been considered⁴.

By adopting the above mentioned criteria, we selected 101 enterprises and 123 local productive units. In the case of some firms, we selected more than one productive unit taking into account the amount and territorial distribution of establishments for production, transformation and storage of food products⁵.

We gathered 84 questionnaires filled by one or more union delegates for each production establishment located in Emilia-Romagna. The number of individual firms involved is 71⁶.

The questionnaires were filled in the period September 20th to November 15th 2001 in specific meetings with union delegates of the 84 productive units, at the presence of the researchers and without interactions with union officers. Some quantitative information concerning the firm and the specific establishment were gathered by union delegates directly at the management department of the firm or establishment.

For firms and local productive units enclosed in the sample, the response rate is therefore equal to 70% and 68% respectively. The filled questionnaires cover 37% of the universe of firms with decentralised bargaining, and 19% of the total enterprises registered by ISTAT⁷ in 1996.

The main features of the database and the distribution of firms and local establishments can be illustrated (see table 1) by referring to five relevant dimensions:

1. *firm size* in terms of number of employees;
2. *trade union geographical unit* referring to the legal headquarter of the firm;
3. *branch* of the food industry;
4. *firm ownership structure*;
5. *national labour contract* (CCNL) applied in the firm⁸.

For all the five dimensions, the distortions of the sample of gathered questionnaires with respect to the total sample and the universe of firms is limited. We remark the over-representation of firms with 50-499 employees. In addition, we register the under-representation for some geographical areas (Imola, Ravenna and Bologna) compensated by a limited over-representation for some other areas (Parma and Reggio Emilia). As for the ownership structure, industrial and co-operative groups are over-represented, while private

³ In firms with less than 50 workers both industrial relations and organisational models do not present a degree of complexity sufficient to justify the planned analysis. In the greatest part of firm with less than 50 workers, and in almost all firms with less than 20 workers, worker committees do not exist.

⁴ Potential availability means the presence of union members in charge of their position from a number of years sufficient to guarantee adequate knowledge about the organisation of the firm and the contracts signed between union and the firm. Cases of strong worker representatives turnover could have hindered a correct filling of the questionnaire.

⁵ We did not consider the number of storage rooms that firms may have in Emilia-Romagna.

⁶ For 2 firms we interviewed the delegates of 4 productive units, and for 6 firms of 2 productive units. In addition, for one firm, due to a change in the ownership, we interviewed twice the same productive unit.

⁷ The Italian national agency for statistics.

⁸ In the Italian system of industrial relations, the most basic elements of the labour contract (mainly wage levels, working time and other working conditions) are regulated by national contracts ("CCNL: contratto collettivo nazionale di lavoro") between national sectoral unions and national sectoral employers associations.

and co-operative firms are under-represented; as a consequence, we notice also an over-representation of firms with national labour contract for co-operatives.

3. Results of the research

The paper aims at contributing to spell out some answers to the questions posed in section 1, with reference to the food sector in Emilia-Romagna.

Here we present the main results emerging from the analysis in the areas of industrial relations, organisational models and their changes, human resource management, and finally firm economic performances. In the following pages we deal with each single aspect separately.

3.1. General results

1) In the area of industrial relation, the *direct relationship* between management and employees appears to be a *complement*, rather than a *substitute*, for an *indirect relationship* between management and union delegates. Furthermore, also the relationships between employees and worker representatives turns out to be intensified in firms where we find a robust direct and indirect interaction between employees and management. However, the personnel and unions involvement in the firm's decisional processes by the management seems to be widespread only at the operative and micro-organisational level, while it is found to be weak at the macro-organisational level and almost absent at the strategic one. Participatory schemes remain difficult to implement at a substantial level and they rarely assume features favourable to the sharing of long run goals between workers and management. At the same time, it is often configured as an unidirectional process whereby the management takes an almost exclusive initiative.

2) At the organisational level, innovation and the diffusion of human resource management practices (e.g.: teamwork, job rotation, total quality management, quality circles, just-in-time) turn out to be significant, though they are characterised by strong heterogeneity across firms. We find an organisational model and an organisation of labour characterised by a pretty strong rigidity in the configuration of plants and means of production, and at the same time by a strong operative flexibility of labour. The strategy of firms seems to be innovation in the direction of a still stronger flexibility of labour services. With the even partial application of what is suggested by the HRM literature, the firm management tends to retain many prerogatives at the organisational level. At the same time, the practices aiming at the involvement of employees, with bi-directional features, result to be limited. Innovation appears to be still stronger as far as quality and product design are concerned. The latter two aspects are acquiring strategic momentum in the food sector. Even in these fields, firm management does govern and control the adoption of new organisational models, retains their prerogatives at the organisational and strategic level, finally involves employees exclusively at the operative level.

The interaction between unions and firm management results to be more extensive. We find pretty strong flows of information, consultative and bargaining practices on various aspects of labour organisation. At any rate, involvement is much weaker at the strategic level as well as the innovation in quality and product design is concerned. Notwithstanding these limits in managerial initiatives and in a proactive role of unions, we find a positive association between intensity of organisational changes and the quality of industrial relations: in the firms where positive and constructive industrial relations (information, formal and informal

consultation and bargaining) prevail, the activity of organisational innovation turns out to be stronger. The active intervention of unions seems not to hinder innovation in organisational models. On the contrary, non-conflicting industrial relations seem to favour change and competitive performance.

3) Taking into consideration the various individual and collective incentive systems suggested by the HRM literature, first of all we find that the former are widespread in the production units analysed. These individual incentive systems involve not only managerial employees and white collars, but also specialised blue collars. The practice of employees' formal evaluation and the distribution of individual bonuses and incentives remain prerogatives of the management. Usually they are not bargained with unions. Bonuses and economic incentives are discretionally granted by the top management. The utilisation of other kinds of incentives such as training and career advancement is quite different. In this case, we find traces of unions involvement. The systems of collective incentives have a still different imprinting. In this field we find a strong role for industrial relations and contractual agreements between unions and firms. Flexible wages, which are present in almost all local production units, rest completely within a contractual pattern between the social parties. They seem to act towards conflict reduction, rather than to play a role of incentive tool for worker participation in the decision process of the firm. On the contrary, we find various critical elements characterising wage flexibility, both at the stage of its management, and at the stage of union delegates' assessment about its effects and about possible future developments in the design of collective incentive systems. The ideas of wage flexibility expressed by the social parties turn out to be pretty different. They are not easily reconcilable within a common pattern of shared objectives. We will clarify in the following pages the extent to which the two systems (*individual incentives* and *collective incentives*) tend to polarise. The former follows the logic highlighted by the HRM literature and it is directed toward the pursuit of organisational and production efficiency, keeping in action many managerial prerogatives. The latter responds to the logic of bargaining. Few complementary elements between the two systems were found.

4) The relationship between organisational innovation, industrial relations, and firm performances is complex, as it is testified by the specialised literature. The causal analysis among the three aspects constitutes a problem even when suitable datasets⁹ are available. The research does not allow to capture causal relationships (determinants and effects), but it is possible to explore associations and statistical linkages. On this basis we can formulate interpretative hypotheses.

First of all, we underline that the quality of industrial relation is positively associated with the intensity of organisational innovation. Secondly, a higher competitive performance and productivity is found in firms where the activities directed toward worker involvement, usually on the initiative of firm management, are more intense. Industrial relations seem to acquire a crucial role: on the one hand, they limit an unidirectional management of human resources by the firm top managers; on the other hand, they do not seem to hinder the attainment of better economic performances. Industrial relations which favour unions involvement in the decision process through formal bargaining on various forms of labour flexibility and organisational innovation result in improved economic performances. There seems to be three elements that find an equilibrium in the analysed productive units: intensity of organisational innovation, where the management of human resources does not exclude a relevant role for worker representatives, the quality of industrial relations and the performances of firms. The results of such an equilibrium seem to be positive: better

⁹ Panel data or time series for the most important variables, and data for firm performances.

performances are strictly associated with the intensity of organisational innovation, and the latter element is supported by a good quality of industrial relations.

3.2. Industrial relations

As far as industrial relations are concerned, our data show an intense ongoing relationship between the actors, i.e. the firm management, worker representatives (RSU), the employees themselves and territorial unions.

The main practice of *worker representatives involvement by the firm management* is constituted by *information flows*. We find various themes that are object of a more substantive relationship, which comprise formal and informal consultation and bargaining. As it may have been easily expected, practices of consultation and negotiation are mainly found on themes which are traditionally a prerogative of unions' intervention. For example wage level, labour contracts, labour organisation, working time, production, on the job health and safety. The interaction between management and worker representatives becomes weaker when macro-organisational and strategic themes are considered. In these fields (limited) information is often the only kind of interaction. The interaction fades away on strategic themes such as economic and financial performances, markets prospects, and product innovation. Even on some crucial aspects for the food sector such as alimentary safety and quality of products and services, worker representatives involvement is scarce.

The relation between *unions* and *employees* is quite open. Here as well, scarce is the attention devoted to macro-organisation and strategic themes. Some cases of conflict towards the representatives were found and analysed. However the conflict is usually informal and not organised. The themes on which we found large confrontation between employees and representatives are the same on which the conflict emerged, outlining its relevance in the sphere of industrial relations. In addition, the same themes are field of confrontation between the management and union representatives. Thus, a strong and significant complementarity in themes and confrontation modes between management and unions, on one side, and employees and unions, on the other side, emerges.

A separate evaluation needs to be carried out with reference to the relationship between *worker representatives* and *union officers* at local and national level. While with the union institutions at the local level, the worker representatives have bi-directional exchange, at the national one the confrontation seems weak and often is just reduced to a set of constraints. This result is partially justified, as the representatives operate only at the firm level, even if we should remember that a significant number of establishments are referring to national companies.

The relationship between *top management* and *employees* is characterised by a limited and mainly hierarchic involvement, at most based on information flows. The cases in which we found a bi-directional interaction (not only *top-down*, but also *bottom-up*) are rare. An example is constituted by the organisation of meetings for the presentation of workers' proposals in problem solving in the production process. In addition, employees tend to go and discuss their problems directly with the management when they are not solved through different channels. The relationship between managers and employees tends to be mutually exclusive with respect to the relationship between employees and their representatives. This is the case mainly for white collars. In the case of blue collars, the situation is quite different. Managers tend to involve unions and their representatives even when there is some kind of direct interaction. In general, the direct interaction between employees and managers is confined to traditional themes, often operative in character, rarely organisational, never strategic.

Though the relationship between management and employees is mainly uni-directional, the analysis shows that worker involvement by the managers is higher in firms where a more intense interaction between the management and worker representatives exists. This result is confirmed also for employees' propensity to discuss contractual problems directly with the management. We can conclude that a direct interaction between the management and employees is not *substitute* with respect to the one between the management and worker representatives. Direct participation seems to be *complementary* with respect to indirect participation: in local productive units where we find more of the former, we find more of the latter as well.

3.3. Organisational models and HRM

In the field of organisational models, the research outlines an important role for both human resource management practices and innovations in organisational models. They are mainly introduced by managerial initiatives and are governed informing and consulting employees and their representatives.

Table 2 describes various practices adopted in the local productive units. Each practice finds a place in the following tables: (a) the varying degree of management accomplished by the managers, with employee direct involvement either (a.1) in the presence or (a.2) in the absence of decisional decentralisation; (b) the lack of or the insufficient amount of initiatives taken by the management; (c) the role taken by worker representatives. We consider three areas of enquire: (1) direct relationship between management and employees; (2) organisational models for labour and production, together with HRM practices; (3) incentive pay schemes.

The main results concerning production organisation describe production processes characterised by high rigidity. They may constitute a heritage of old models of production organisation, which may be substituted by new models more similar to modern conceptions of the firm, such as networks with a flat, thin, and weak hierarchical configuration, near to the typology of the learning organisation or to the conception of the firm described by the evolutionary literature (Penrose, 1958; Nelson-Winter, 1982; Hodgson, 1988, 1999, Leoni-Cristini-Mazzoni-Labory, 1999; Montresor, 2001). The rigidity of production processes and the high hierarchical intensity is counterbalanced by a strong flexibility in labour utilisation. HRM practices, in terms of numerical, working time, organisational, and functional flexibility constitute the field where the management accomplishes the most important organisational adjustments, involving worker representatives with information and consultation, to a lesser extent with bargaining.

A first important field of enquire in the study of HRM policies is the management of *internal labour markets*.

The *hiring policy* is characterised by a relevant degree of flexibility with short term contracts, mainly for blue collars with low specialisation, and less for those with high specialisation. A completely different situation is found in the case of white collars that are usually hired with long term contracts. Skilled white collars are hired when the firm needs new competencies. Numerical flexibility due to the variation in the demand for the products or to technological innovation plays no role in this case, contrary to what we observe in the case of blue collars. White collars in lower positions, for example clerks, are found in an intermediate position with respect to the former two. They are not hired in order to increase numeric flexibility, as their number does not increase with product demand. However, they are not even hired because of functional or organisational flexibility; when hiring new clerks the firm is not looking for new competencies. The reason instead must be found in the replacement of retired or resigning workers.

The prevailing feature of *internal mobility* is the advancement in career on the basis of individual characteristics of workers, rather than on pre-defined (standardised) patterns connected to tenure or bargaining activity. This is true for all hierarchical ladders. Career advancement constitutes an important field of intervention for unions, which intermediate between demands for career advancement by workers and the management promotion policy.

Lay-offs appear to be strongly influenced by industrial relations and by current labour laws. We found a small number of lay-offs connected to the obsolescence of workers' skills and to the necessity to acquire new competencies on the market. They are usually connected either to structural adjustments caused by the introduction of new technologies, or to the financial crisis of the firm. Lay-offs are often implemented not renewing short-term contracts, or by means of social assistance schemes. An important role is played by the bargaining activity within the firm.

With reference to *training policy* of the firm, we identify some critical aspects with respect to the involvement of the employees and of their representatives. On the one hand, training activity is almost generally found in the establishments for the employees rather than for the newly hired workers. However, this activity is very often simply side by side work, in particular for blue collars; while the training content is much wider and heterogeneous for specialized white collars. The involvement of representatives is very limited, only present in few cases with information flows, while consultation and bargaining activity is almost absent.

An other area of organisational change analysed in the research is innovation and management of *working time*. Generally, working time innovations with respect to the rules provided by the national labour contracts are introduced by decision of the management, after a consultation with representatives. Frequently, when innovation is introduced by initiative of the management, the aim is to adjust labour performances to the plant rigidity in order to reach their full utilisation. In this case, consultation and bargaining with trade unions have been a way for innovating while reducing the conflicts with workers. However, the research shows that management and worker representatives have different conceptions about working time flexibility: on the one side, the firm tends to maintain a higher control in production organisation, on the other one, unions try to maintain a satisfactory relationship with the employees.

The analysis of the relationships between labour flexibility and *organisational and technological change* led to the exploration of the main features of well-known organisational practices concerning the management of human resources: job rotation, quality circles, the presence of teamwork, just in time, and total quality management. Beyond these specific practices, we also explored other innovative patterns in the organisation of labour and production, their intensity and the degree of unions involvement in such patterns.

The main results of the analysis highlight that the rate of adoption of the various organisational practices shows great variation across firms. At any rate, we find a strong complementarity between the various organisational innovations, which are often adopted at the same time by several enterprises, so appearing in cluster and not isolated. In addition we found a complementarity between innovation in organisation, technology, human resource management, working time, and payment systems.

The introduction of organisational and technological changes is primarily the results of managerial initiative, with a limited intervention by worker representatives and unions that acquire a more prominent role in the field of labour organisation, for example as far as job rotation is concerned. In the same area we find an important role for joint (management and worker representatives) commissions and employees' proposals. As for organisational and strategic changes, such as new conceptions of the firm products and their quality, unions ability to actively intervene is greatly reduced.

Even in presence of a predominant role of the management, the participatory initiatives toward employees and their representatives are mainly constituted by information flows, and additionally by relevant practices of consultation and bargaining.

Overall, the confrontation between management and worker representatives concerning organisational innovation is found to be wide and non-conflicting. It is likely to have a positive role, favourable to the adoption of new organisational practices, and complementary with respect to managerial initiatives.

Finally, the higher intensity of organisational innovation and quality control seems to correspond to positive effects perceived by representatives, in particular with respect to job safety and stability and the development of competencies expressed by the employees. More critical is the evaluation expressed by the representatives on the innovation linked to the new product conceptions; maybe this is justified by the low degree of their involvement in this area.

The comparison between *organisational innovation* and *industrial relations* makes us conclude that there is a general positive association between the intensity of organisational innovation and an open attitude towards the trilateral relationship between the management, worker representatives and employees. Our research clearly highlights that an open attitude of the management toward the constructive discussion on organisational themes with employees and their representatives does not constitute an obstacle for organisational innovation. Quite the opposite, tighter interactions is associated with stronger innovative capability of the firm. The same is found for the various forms of flexibility bargained with trade unions: flexibility on compensation, working time, functioning of internal labour market, hiring and firing.

A final interesting result concerning the organisation of the firm is that the intensity of organisational innovation is positively associated with a lower hierarchical intensity. Innovation seems to be favoured by a flatter organisation, with increased horizontal interaction between the functions of the firm.

3.4. Incentives and flexible labour compensations

In the area of organisational innovation connected to human resource management an important role is played by flexible labour compensations. Those were introduced by a national agreement dated 1993, which concerns both income policies linking nominal wage increases to planned inflation and a reform of the national system of industrial relations. Wage flexibility was introduced with the aim of increasing the degree of flexibility in the labour system as a whole. The attempt to connect the remuneration of labour to productivity and to the economic performances of firms should have been joined with an increase in the degree of worker involvement in the activity of the firm, mainly at the operative and organisational level. Positive effects were expected both on employment stability and on labour productivity and firm competitiveness. The role of unions was reformed too. Worker representatives committees were institutionalised at the firm level, giving them a consultative and bargaining role.

Our research highlights an important role for worker representatives in the specific area of wage flexibility and pay for performance systems. Unions' role is crucial in the bargaining process concerning collective incentives, while it is scarce as far as monetary individual incentives or other kinds of individual incentives are concerned.

Individual incentives are strongly connected to the practices that characterise the management of internal labour markets. We are referring in the first place to the *formal evaluation of worker performance*, which is carried out by means of formalised and ex-ante defined procedures. It is one of the most relevant HRM practices, pointed out by the specialised literature. It is present in 60% of the local productive units we considered in our

study. Worker representatives point out the predominant role of hierarchy, though union do have a relevant role in the definition of suitable procedures for formal workers' evaluations. The objectives of formal evaluation are most often the assessment of the results reached by individual workers. The aim is the definition of career advancement and the alignment of tasks to the competencies expressed by individual and groups of workers. Hence, the objectives of formal evaluation go beyond the mere distribution of monetary rewards and wage increases.

We can express similar relieves as long as *individual economic incentives* and *bonuses* are concerned. They are mainly distributed by the management in a discretionary way.

Collective incentive schemes accomplish the realisation of wage flexibility by means of rewarding schemes bargained between the management and worker representatives. The analysis of motivations backing the adoption of wage flexibility indicates that unions asked for its introduction mainly as a consequence of the agreement reached in 1993. Firm management have instead accepted collective wage flexibility mainly because it was asked by unions, but also due to fiscal benefits connected to the introduction of the new scheme. Unions seem to look for long-term objectives, such as the development of workers' competencies, besides an increase in worker involvement and participation. Managerial objectives seem to be more short-term and oriented mainly to production costs reduction. We also found that both unions and management expected positive economic performances of the firm at the time of the introduction, leaving some room for productivity and revenue distribution in the near future. Overall, the most important function played at the micro level by wage flexibility is likely to be the reduction of conflicts between unions and management. However, the system adopted still presents some critical aspects which make the performance related pay a weak tool both for reaching a higher firm efficiency and for increasing worker involvement. This aspect stems out of an in depth examinations of the motivation backing the introduction of wage flexibility (Pini, 2002).

The relationship between economic performances and the modalities characterising wage flexibility are weak and lead to non-univocal conclusions. Various elements suggest that a genuine application of the 1993 agreement would lead to economic results that are positively associated with the presence of wage flexibility¹⁰. Apart from some clear signals, most statistical relations between the variables concerning wage flexibility and performances are not significant or ambiguous. We do not find univocal linkages between the effects of wage flexibility as they are perceived by worker representatives and firm performances. Significant associations between the distributed quota of the variable part of wages and firm performances are absent too¹¹.

In addition, the analysis concerning the relations between organisational innovation and pay for performance schemes show many critical aspects. Although firms with a higher intensity of organisational innovation show better performances after the introduction of flexible wages, the specific characteristics of the compensation flexible scheme are not significantly linked to organisational innovation itself. Among these characteristics, we notice

¹⁰ For example, the absence of a guaranteed level of flexible wage ("premio di risultato") is strongly associated with positive performances. This sign may indicate that when wages are really flexible and connected to worker and firm performances, than they may have a positive impact on workers' productivity and involvement in the activity of the firm. Furthermore, changes in the indicators used to calculate the flexible part of wages are connected to positive performances too. Finally, the provision of "una tantum" linked to flexible wage is positively associated to better performance. The last two results may mean that an active management of the mechanisms of wage flexibility lead to positive results.

¹¹ The distributed quota is the variable wage that firms actually pay out to their employees. The potential quota is the maximum possible amount reached by the variable wage when all targets are fully met.

the share of flexible wage, the indicators used to connect flexible wage to economic performances.

Overall we can conclude that the modalities characterising flexible wages, their design and management, show critical features. Contradictory results and weak statistical relations emerged when we explored the linkages between flexible wages, organisational change, and firm performances.

3.5. Organisational change, industrial relations, and firm performances

The foregoing analysis of the relationships between wage flexibility, organisational models and performances leads us to highlight the more general results of our research. They concern the linkages between *organisational change*, including human resource management practices, *industrial relations and firm performances*.

HRM practices and organisational innovation topics acquired theoretical and empirical relevance in recent years. Their spread is to be found in managerial studies rather than in economic disciplines. Because of the great interest rose by this approach also in the most recent literature on industrial relations¹² it deserved this specific section and a separate analysis.

The study of HRM practices is usually referred to managerial initiatives taken to involve workers in the ongoing activity of the firm, mainly at the operative level, more rarely at the organisational and strategic level. Generally speaking, such kind of involvement does not enclose an active role of unions and worker representatives, at least as long as issues which are usually considered part of the managerial field of intervention are concerned. In some contexts, HRM practices are accepted to enclose unions involvement at the consultative level, though it is incompatible with bargaining between the firm management and worker representatives over problems pertaining the firm organisation and its strategic choices.

If we take into consideration the overall relationship between organisational innovation, industrial relations and firm performances, the results of the research show that the quality of industrial relations is positively associated with the intensity of organisational innovation. At the same time, industrial relations aimed at involving worker representatives in the firm's decisional processes are associated with superior performances. Our results highlight that these firms in which we found higher competitiveness and productivity are the same firms where we found activities directed towards worker involvement, though the management retains a leading role. A crucial role for industrial relations emerges too. One the one hand, unions tend to set a limit for the unidirectional management of human resources by the firm top managers, on the other hand, they do not seem to constitute an obstacle for the attainment of superior economic performances.

There appear to be three elements, which do find a virtuous equilibrium in the analysed local productive units: intensity of organisational change, where we include a style of human resource management that does not exclude an active role for worker representatives, the quality of industrial relations, finally firm performances.

Using the same scheme adopted in table 2, table 3 presents HRM practices and those aspects of industrial relations which are positively associated with superior performances¹³.

With reference to the *relations between management and employees*, a significant linkage between firm performances and the direct involvement of employees emerges. This evidence is mainly found for (written) information given by management to employees, information

¹² The reader can refer, for example, to Baglioni, 2001.

¹³ In italic we indicated practices which are positively correlated with superior performances, though they are quite rarely found in the analysed firms.

and consultation of employees on relevant operative and organisational themes, finally managerial behaviour aimed at involving workers' willing to discuss directly contractual themes. Furthermore, we found a strong association between firm performances and managerial initiatives directed to increase worker involvement.

The elements of *labour organisation* which are relevant to the exploration of linkages between human resource management and firm performances are: (1) the *hierarchic structure* and the formalised *human resource management functions* within the firm; (2) *internal labour markets*: hiring and lay-off policies, internal mobility, employees' training and its contents; (3) the management of *working time*; (4) the *innovative practices of labour organisation* introduced in the firm, including the management of *teamwork*; (5) the introduction of *organisational innovations starting from 1998*.

The intensity of the *hierarchic structure* is not correlated with the indexes of performance, while we find better economic results in firms where there has been a *strengthening* of hierarchy.

The analysis of the structure and working mechanisms of *internal labour markets* relative to firm performances leads to highlight the importance of various practices, mainly connected to hiring policies. We found less relevant results as long as career advancement, its modalities (predetermined career paths, or career advancement on the basis of individual competencies) and lay-offs are concerned. As for training policies, significant results emerged: the presence of training activity - both for employees and newly hired workers - is strongly related to the best performing firms. With reference to working time management, the research shows that the degree of labour flexibility is strictly and positively linked to firm performances.

The presence or the recent introduction of *innovative organisational practices* connected to the utilisation of the labour factor is positively associated with firm performances, mainly in the case of teamwork and job rotation.

The results concerning team-work deserve some in-depth analysis. This practice is the only one for which the ratio of involved employees is positively associated with the index of performance. As long as the modalities of teamwork management are concerned, the association with performances is positive and significant when *teams do have autonomy in the decisions concerning the operations to be performed and are responsible for single products*. On the contrary, results are *negative* and *statistically significant* when single workers are responsible for operative results. If the aim is the attainment of superior economic performances, the most suitable model seems to be a decentralised one, at least at the operative and organisational level, rather than one based on the role of hierarchy.

Organisational innovation (starting from 1998) in the field of human resource management shows a general and robust positive relation with the economic results of firms. We find again a positive effect of the recent introduction of *teamwork*. The exploration of organisational innovation leads us to a further relevant result: not only organisational innovation is associated with superior performances, but also the practice of employees and unions involvement in the processes of innovation contributes to better performances.

In addition, concerning the role of industrial relations, the research shows that the formal bargaining activity on different forms of labour flexibility (numerical, working time, functional, organisational) is strictly associated with both organisational innovation and economic performances (Pini 2002).

Finally, we underline some interesting results related to *remuneration systems*. As long as individual incentives are concerned, we witness a dominant role of management. Firm performances are positively associated with incentive systems introduced by managers *without* bargaining with unions and worker representatives. However, we do not find any positive connection between performances and *formal evaluation of workers*. Similarly, the discretionary distribution of bonuses and individual incentives by the management is not

associated with positive economic results. Hence, we cannot confirm the idea that individual economic incentives and the formal assessment of employees' results lead to improved performances, as some specialised literature claims. As for *collective incentives*, the discretionary role of management is greatly reduced and the bargaining role of unions becomes crucial. However, as we already stated in section 3.4, linkages with superior performances appear to be weak and ambiguous.

4. Econometric analysis

The present paragraph illustrates the main results which emerge from the econometric analysis of the dataset stemming from the questionnaire administered to employee representatives. More specifically, the dataset is built upon a set of variables we derive from quantitative and qualitative data revealed by the survey on trade union's representatives, which has been already presented above. Four sub-sets of variables are used in the analysis: (i) a set of index variables related to the performance of firms, which are included as dependent variables in regression analysis¹⁴; (ii) a set of (index) independent variables representing factors of "industrial relations" content within firms; (iii) a set of (index) independent variables representing factors of "organisational innovation" content and (iv) a set of independent variables representing key factors linked to (innovative forms of) "performance's related pay mechanisms". Variables in sets from (i) to (iv) are mostly index variables derived from the questionnaire answer's analysis. A set of dummy variables associated to the territorial areas of Emilia-Romagna, to the number of employees and to the typology of societal structure of firms are also used as regressors. We here anticipate that their explanatory power is generally weaker with respect to that of index variables.

4.1 The dataset and the procedure

The two objectives of the applied investigation are: first, to highlight what factors included in (ii)-(iv) are potential explanatory elements of performance indexes in a cross section environment; secondly, to assess whether or not linkages exist between variables in (iii) and variables in (i), (ii), (iv), using as dependent variable a synthetic index of the main forms of organisation innovation considered in and studied by the survey.

It is worth noting that the dataset concerns cross-sectional data. Thus, the causality links between variables are to be intended as weak linkages. Lagged variables would be needed in order to fully explore what the directions of causality, when proved significant, are.

Table 4 provides a synthetic scheme of the full set of variables. The information on correlations¹⁵ is needed in order to reduce ex ante, by dropping highly correlated elements, the problem of multicollinearity. The correlation matrix does not show specific problems of highly correlated factors; this means that the initial selection of variable indexes leads to a set of independent potential explanatory variables.

¹⁴ The first column of table 4 lists the performance variables we use. As far as the performance related variables, as perceived by the union's representatives, are concerned, we first consider an average index of performance, ranging from -5 to 5, which incorporates the followings elements: competitiveness, profitability, firm productivity, team productivity, individual productivity, and product quality. For the indexes above, the performance is elicited having as benchmark the introduction of flexible compensation mechanism in the '90s (generally since 1994). Thus, a zero value means that nothing has changed on performance since then. Then, a specific analysis is performed for each sub-specific performance element. Thus, the econometric analysis is carried out for each of the dependent variables here listed. Finally, a different analysis is carried out taking as dependent variable the contingent performance of year 2000.

¹⁵ Available on request.

Since the study is a typical data-mining analysis, the most sensible technique for selecting significant explanatory elements out of the full data set is a procedure “from general to particular”, beginning with the full set of index variables selected as most relevant. Lacking a specific model as reference, index variables were chosen with the aim of drawing out the most significant indexes for industrial relations, organisational innovations, and performance related pay innovations. At each consequent step, the regressors which present non-significant coefficients (those associated to t ratios less than 1.671¹⁶) are dropped. Tables from 5 to 7 present results for the econometric analysis as far as the most robust and consistent regression¹⁷ are concerned. Table 5 deals with regressions having as dependent variables the synthetic index of innovation content, table 6 presents results for regressions which include as dependent variables two average indexes of performance, and finally table 7 shows a synthetic scheme of results achieved concerning specific performance indexes.

4.2 Analysis for organizational innovations

The analysis revolves around two blocks: first, we focus on a regression analysis where the dependent variable is an average index of organisational innovation, secondly, we study different specifications using as dependent variables indexes of firm performances. For the latter case, both average index variables (six and four indexes) and single indexes are used as dependent variables regressed over the full set of independent ones.

Table 5 below shows results for the analysis concerning the potential relationships between organisational innovation content and the set of variables representing the three realms of industrial relations, performance related pay mechanisms, and firm performances. The two regressions presented only differ with respect to the performance index used among the covariates.

All in all, the outcome is satisfactory. First, we note the high level of adjusted R², the high overall significance of regressions and the low t ratio of the constant coefficients. All those elements jointly show the robustness of the two arising regressions. As far as parameter's coefficients are concerned, the performance variable adds significance to the regression¹⁸ and presents a positive sign. Two indexes associated to the “quality” of industrial relations (in terms of “management involvement vs. unions representatives” – INVOLV 1 - and “management involvement vs. employees” – INVOLV 3- also present coefficients with positive sign, as well as the variable capturing the involvement initiatives by management vs. employee (INVOLV 4). Managerial hierarchical intensity has instead a negative sign, that is the flatter managerial structure of the firm the higher is the innovation content in the organization practices. Among the factors related to innovations in payment's mechanisms and incentives, the first important result comes out from the variable related to adopted incentives (INC-ADP), which includes not only individual payment schemes, like bonuses, but also collective payment systems negotiated between trade unions and management, and other non monetary forms of incentives, as training and promotions: the introduction of these incentives constitutes an important form of organizational innovation, showing positive sign. On the other and, the adoption of individual and discretionary bonuses for all employees - BONUSES – arises with negative sign. In additions, the coefficient signs of individual and formal systems of evaluations on worker performance, on one hand, and the evaluations of unions representatives on the effects of PRP on organizations atmosphere give ambiguous

¹⁶ 10% level of statistical significance with n=60.

¹⁷ In terms of: (i) coefficient's significance and constant's significance; (ii) F test value on regression significance; (iii) adjusted R² value; (iv) test on heteroskedasticity.

¹⁸ Specifications without performance indexes are not shown here, but they present lower levels of R², F test value and T ratios.

results: many variables are not significant – then they have been dropped at some stage -, others enter with unexpected signs¹⁹.

Summing up, we may conclude that, with respect to the analysis on the explanatory factors of organisational innovation, there are three groups of variables that appear positively associated with our synthetic index of innovation content in organization practices. First of all, the two performance covariates (Perf6 and Perf4) are associated to significant and positive coefficients, meaning that firms with better performances, and probably higher financial resources to invest, are committing themselves more extensively to organizational changes. Secondly, a good quality of industrial relations within the firm, characterised by a management policy aimed at involving both the employees and the worker representatives in organization strategies, constitutes a relevant factor for stimulating innovative organizational changes. Third, systems of negotiated and non negotiated monetary incentives represent an important area of innovation for the organization of the firm. Critical aspects emerge instead for specific incentive forms, such as monetary and individual bonuses, formal evaluations of employees, and the PRP schemes.

4.3 Analysis for firm performances

Table 6 presents the results concerning two analyses, which consider as dependent variable average indexes of firm performances. Robust and consistent regressions arise from both analyses.

The analysis carried out on Perf6 shows that four covariates are jointly significant: an index of innovation content (INNO-ORG 2), and index concerning the effects of PRP (POS-PRP), an index of flexibility/rigidity of labour utilization (LABOUR-FLEX), an index of formal employee evaluation (IND-EVAL). All of those show positive signs except the latter. This fact is confirmed also in other regressions, and it may appear as counterintuitive. Nevertheless, individual formal evaluation does not constitute a significant factor of structural change in firm organization, as it emerges from the set of estimates presented in table 5. It is also worth noting that the constant is not significant, thus the explanatory power revolves around the set of regressors. The F test value and the quite high adjusted R^2 (recalling we are in a cross section environment), further confirm robustness.

The Perf4 index is associated to a “weaker” regression for reasons which may be clearer below, and which pertain, in brief, to the different explanatory weight of specific performance indexes entering the “average” full index.

As we said above, a specific econometric analysis “from the general to the particular” is carried out by considering different indexes of performance, thus disaggregating the average index presented above. This procedure can be useful to highlight what the key factors in explaining the firm performance, as here defined, are. Table 7 sketches and compares regression results for specific indexes of performance. The significance of the specification which uses Perf6 (and Perf4, see table 4) is compared to those of sub-specific indexes.

First, we observe the low significance of regression using competitiveness and profitability as dependent variables. Both the regression robustness and coefficient’s significance is low. On the other hand, among the productivity-related indexes of performance, team productivity ranks first in terms of regression consistency. The second performance index more relevant is product quality.

¹⁹ Among the non significant regressors, the following ones are worth noting: Managerial hierarchical intensity, % of PRP on total wage (PRP ratio), % of employees with individual formal evaluations, Positive effect of PRP on firm organization atmosphere.

Overall, firm performances after the introduction of performance related pay mechanisms seems to be driven by *productivity and quality product factors rather than by profitability and competitiveness*. These results could appear quite interesting, since we are studying organizational changes in a specific sector, the food industry, where most innovations, both in production process and in those parts of the organization of the firm related to the market, are strictly linked to new product “conception” and advanced systems of quality control.

Focussing on the specific set of parameters arising as significant (table 7), we may note that (i) the index of innovation content is significant for both quality and team productivity (and it was in Perf6 regression), (ii) the share of employee subject to evaluation is negatively related to product quality, as it was for the average indexes Perf6 and Perf4; (iii) the index of positive effects of PRP is also significantly related to quality, as well as the dummy concerning “team work”; (iv) the index on labour flexibility/rigidity is instead significant as a covariate of “team productivity”, as well as gross revenue is; (v) the only parameters associated to negative and significant coefficients are the “Just in time” dummy for team productivity and “quality circles” for product quality^{20, 21}

4.4 Summary results

The quantitative analysis presented highlights the following critical elements, which gives robustness to the analysis of the entire work, and confirms some critical points, we already focussed attention on. The framework seems first characterised by a strong relevance of industrial relations, in terms of “good quality atmosphere” and “involvement of worker representatives and employees”, in stimulating organizational innovation changes. Secondly, although the direction of the effect is not evident given the longitudinal nature of data, the performance indexes and organizational innovation indexes arise as strictly and positively related across regressions. Third, and on the other hand, the set of industrial relation’s variables does not emerge as a significant explanatory element for firm performances.

Summing up, considering the food industry we have investigated, the message we may draw out says that good industrial relations matter as far as the performances of firms are concerned, nevertheless the effect is mediated by their effects on organizational innovation changes rather than being a direct stimulus on performances. The analysis also shows a “reciprocal causative effect” between firm performances and organizational innovations. This is confirmed for different performance’s specifications; panel dataset would be needed to assess causal uni-directional linkages.

5. Concluding remarks

To conclude our contribution, we begin by stressing the relevance of human resource management practices which preserve the initiative of the management at the organisational and strategic level, while we observe a notable degree of decisional decentralisation at the operative level. Such practices need to find an equilibrium with industrial relations, which are

²⁰ While Quality Circle (QC) is a method used in the past and abandoned today by the most part of the firms, substituted by other more general systems, like TQM, more problematic is the significant and unexpected negative sign for JT. This may also depend on the form of these variables, entered as dummy instead of as an index.

²¹ Finally, we may note that the regression using as dependant variable the contingent performance in year 2000 (Perf2000) is also consistent, although less than the ones using Perf6 and Perf4; among the significant parameters, we observe some of the variables already emerging from other regressions, and others such as INNO-ORG 3, PQC (both related to organizational changes linked to new product “conception” and systems of quality control), and job rotation.

mainly oriented towards information, consultation and bargaining on various operative and organisational themes. Such coexistence does not seem to develop exclusively in the sense of conflicts between the management and worker representatives, where each party retains its prerogatives: the run of firm in the case of the management and the defence of workers' rights (mainly pay levels and working conditions) in the case of unions. Worker representatives involvement and the quality of industrial relations occur in the field of collaboration and sharing of common goals, at least at the level of shared procedures. The results of such an equilibrium do not appear to be negative: good economic performances are strictly associated with the intensity of organisational change. In turn, the latter phenomenon is supported by a good quality of industrial relations. Firms which show the best performances do have such features.

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Tables

Table 1: Distribution of firms (%)

<i>Firm size by no. of employees</i>	<i>Total firms, census 1996</i>	<i>Firms with bargaining 1998-2001</i>	<i>Firms selected</i>	<i>Productive units selected</i>	<i>Firms interviewed</i>	<i>Productive units interviewed</i>
20-49	66,58	28,13	8,91	7,32	4,23	3,57
50-99	11,84	13,54	16,83	14,63	15,49	13,10
100-249	15,53	32,81	42,57	38,21	43,66	40,48
250-499	3,42	17,71	24,75	31,71	28,17	34,52
500-999	1,58	2,60	1,98	2,44	1,41	2,38
>999	1,05	5,21	4,95	5,69	7,04	5,95
Union geographical area						
BOLOGNA	15,00	10,94	11,88	12,20	8,45	7,14
CESENA	-	3,13	1,98	1,63	2,82	2,38
FERRARA	3,68	4,17	6,93	8,13	8,45	10,71
FORLI'-CESENA ^ / FORLI'*	8,68^	9,38*	7,92*	6,50*	9,86*	8,33*
IMOLA	-	1,04	0,99	0,81	0,00	0,00
MODENA	19,74	19,27	10,89	9,76	9,86	9,52
PIACENZA	5,79	2,08	2,97	4,07	1,41	2,38
PARMA	21,58	16,67	19,80	18,70	22,54	21,43
RAVENNA	10,53	13,02	15,84	15,45	9,86	11,90
REGGIO EMILIA	12,37	10,94	10,89	8,94	14,08	11,90
RIMINI	2,63	1,04	1,98	2,44	2,82	3,57
OUTSIDE REGION	-	8,33	7,92	11,38	9,86	10,71
Economic sub-sector						
Meat	32,63	31,77	31,68	28,46	28,17	27,38
Fish	1,32	1,56	0,99	0,81	1,41	1,19
Fruit and vegetables	11,84	16,15	15,84	17,89	15,49	16,67
Oil and vegetal and animal fat	2,37	1,04	1,98	1,63	2,82	2,38
Diary	8,16	8,33	5,94	5,69	7,04	7,14
Wheat and starch derivatives	3,68	4,17	1,98	2,44	2,82	3,57
Food for animals (fodder)	6,05	8,33	5,94	5,69	4,23	3,57
Other food goods	25,00	17,71	23,76	26,83	25,35	26,19
Beverages	8,95	10,94	11,88	10,57	12,68	11,90
Firm typology by societal structure						
Consortium	n.d.	4,17	3,96	3,25	4,23	3,57
Cooperative group	n.d.	6,77	10,89	17,07	14,08	19,05
Private industrial group	n.d.	17,19	25,74	30,89	30,99	34,52
Cooperative firm	n.d.	17,71	13,86	11,38	11,27	9,52
Private firm	n.d.	54,17	45,54	37,40	39,44	33,33
National labour contract						
Agriculture	n.d.	16,15	14,85	13,01	11,27	10,71
Craftmanship	n.d.	5,21	2,97	2,44	1,41	1,19
Cooperatives	n.d.	10,94	10,89	16,26	14,08	17,86
Food industry	n.d.	63,54	69,31	66,67	71,83	69,05
Small and medium size food industry	n.d.	4,17	1,98	1,63	1,41	1,19
<i>Total (no. of firms)</i>	380	192	101	123	71	84

Source: Istat, Intermediate census 1996, and Ires (2001)

Table 2 Direct worker involvement, role of the management and of worker representatives

	Human resource management			<i>Worker representatives role</i>
	<i>Direct involvement with decisional decentralisation</i>	<i>Direct involvement with unilateral managerial initiative</i>	<i>Absence or limited managerial initiative</i>	
<i>Management-employees relationships</i>	<ul style="list-style-type: none"> • Worker involvement by the management on contractual themes (white collars) 	<ul style="list-style-type: none"> • Worker involvement on organisational and operative themes • Worker involvement on problems solution in production: role of hierarchy 	<ul style="list-style-type: none"> • Information flows on organisational and strategic themes • Worker involvement on organisational and strategic themes • Formal participation in decisional firm committees • Informal participation in non-decisional firm committees 	<ul style="list-style-type: none"> • Worker involvement by the management on contractual themes (blue collars)
<i>Organisational models</i>	<ul style="list-style-type: none"> • Workers' proposals for problems solution in production, without rewards • Career advancement (role of competencies) • Teamwork (operative decentralisation) • Total quality management • Quality control for goods and services: role of workers' autonomy 	<ul style="list-style-type: none"> • Hierarchic structure and its strengthening • Personnel office • Hiring policy: search for new competencies • Career advancement (role of competencies) (white collars) • Innovations in the management of working time • Flexibility in labour utilization • Training for employees and newly hired workers • Governance of teamwork (lack of strategic and organisational decentralisation) • Organisational changes and changes in labour organisation • Quality control for goods and services: role of hierarchy 	<ul style="list-style-type: none"> • Structured functions for employees' training and human resource management • Firing policies: obsolete competencies and search for new competencies • Rewards for the results of teamwork • Introduction of structured procedures for workers' proposals to the management on organisational themes and product quality • Definition of individual and group objectives • Rewards for workers' proposals on the solution of operative problems 	<ul style="list-style-type: none"> • Dialogue with worker representatives on operative and organisational themes • Career advancement (role of competencies) (blue collars) • Innovations in the management of working time (information, consultation, bargaining) • Job rotation • Information, consultation, bargaining on organisational changes introduced by the management
<i>Incentive schemes</i>	<ul style="list-style-type: none"> • Relevant elements for transparence of formal evaluation of workers' results 	<ul style="list-style-type: none"> • Individual incentive schemes • Formal evaluation of workers and role of hierarchy for the assessment of results • Distribution of individual bonuses 	<ul style="list-style-type: none"> • Economic and non-economic rewards for workers' results and for workers' contribution to problems solution in production 	<ul style="list-style-type: none"> • Formal evaluation procedures with the involvement of worker representatives in the phase of workers' evaluation • Collective incentive schemes: flexible wages • Absence of guaranteed level of flexible wages, explicit and implicit

Table 3 Human resource management practices, industrial relations, and firm performances.

	<i>Human resource management</i>		<i>Worker representative role</i>
	<i>Direct involvement with decisional decentralisation</i>	<i>Direct involvement with unilateral managerial initiative</i>	
<i>Management-employees relationships</i>	<ul style="list-style-type: none"> • Worker involvement by the management on contractual themes (white collars) 	<ul style="list-style-type: none"> • <i>Written communications by the management to employees.</i> • Worker involvement on operative and organisational themes • Employee involvement in problems solution in production: role of hierarchy 	<ul style="list-style-type: none"> • Worker involvement by the management on contractual themes (blue collars)
<i>Organisational models</i>	<ul style="list-style-type: none"> • <i>Business functions: employees' training and human resource management</i> • Workers' proposals for the solution of problems in production, without rewards • Teamwork (operative and organisational decentralisation) • <i>Rewards for the results of teamwork (economic or career advancement).</i> • <i>Definition of individual and group objectives</i> • <i>Introduction of structured procedures for workers' proposals to the management on organisational themes and on product quality</i> • <i>Organisational change and changes in labour organisation (worker involvement)</i> • <i>Innovations in design and quality of products: role of employees</i> 	<ul style="list-style-type: none"> • Hierarchic structure and its reinforcement • Personnel office • Hiring policies: search for new competencies (top white collars) • Flexibility in labour utilization • Training for employees and newly hired workers • Organisational change and changes in labour organisation (managerial initiative) • Innovation in product design and quality: role of management • Quality control for goods and services quality: role of hierarchy 	<ul style="list-style-type: none"> • Dialogue with unions on operative and organisational themes • Presence and meetings frequency of bipartisan committees for consultation and bargaining • Informal bargaining • Consultation and bargaining over career advancement (blue collars) • Job rotation • <i>Organisational change and changes in labour organisation (unions involvement)</i> • Information, consultation, bargaining on organisational changes introduced by the management • <i>Quality control in goods and services: role of unions</i>
<i>Incentive schemes</i>		<ul style="list-style-type: none"> • Individual incentive schemes 	<ul style="list-style-type: none"> • Collective incentive schemes: procedures of wage flexibility and profit sharing • Absence of guaranteed level of flexible wages, explicit and implicit

Table 4: Variables list for firm performance

Variable	Acronym	Type
Full Performance index (six or four indexes average)(*)	Perf6 Perf4	-5, 5 -5, 5
Performance 2000	Perf2000	0, 1
Competitiveness	Comp	-5, 5
Profitability	Profit	-5, 5
Firm Productivity	Firm-Prod	-5, 5
Individual productivity	Ind-Prod	-5, 5
Team productivity	Team-Prod	-5, 5
Product quality	Quality	-5, 5
Innovation content index	Innov-index	0, 1

Note: (*) The indexes are referring to: competitiveness, profitability, productivity (firm, team, individual), product quality. The range of variation, as elicited by the questionnaire, is [-5, 5] for all indexes.

cont. Table 4: Variables list for organizational innovation, industrial relations and other variables

	Variable	Acronym	Type
1	Revenue	REV	continuous
	Industrial relations indexes		
2	Involvement: management vs. unions representatives	INVOLV 1	0, 1
3	Involvement: unions representatives vs. employees	INVOLV 2	0, 1
4	Involvement: management vs. employees	INVOLV 3	0, 1
5	Involvement: qualitative initiatives by management vs. employees	INVOLV 4	0, 5
	Organisational innovation indexes		
6	Managerial hierarchical intensity	HIER-MANAG	0, 1
7	Management divisions in human resources	HRM-DIV	0, 1
8	Plant flexibility	PLANT-FLEX	0, 1
9	Labour flexibility	LABOUR-FLEX	0, 1
10	Working time flexibility Innovation	WT-FLEX-INNO	0, 1
11	Team work	TW	Dummy
12	Quality circle	QC	Dummy
13	Just in time	JT	Dummy
14	Job rotation	JR	Dummy
15	Total quality management	TQM	Dummy
16	Organizational innovations type 1	INNO-ORG 1	0, 1
17	Organizational innovations type 2	INNO-ORG 2	0, 1
18	Organizational innovations type 3	INNO-ORG 3	0, 1
19	Product quality control	PQC	0, 1
	Performance related pay (PRP) indexes		
20	Adopted incentives	INC-ADP	0, 1
21	% employees with individual formal evaluations	IND-EVAL	0, 100
22	Individual bonuses for all employees	BONUSES	Dummy
23	No relation between PRP and firm organizational atmosphere	NO-REL-PRP	0, 1
24	Employees not interested in PRP	NO-INT-PRP	0, 1
25	Positive effect of PRP on firm organization atmosphere	POS-PRP	0, 1
26	Negative effect of PRP on firm organization atmosphere	NEG-PRP	0, 1
27	Cosmetic PRP	COS-PRP	Dummy
28	% PRP on total wage (PRP ratio)	PRP RATIO	0, 100
	Dummies		
29	Territorial areas	PROV	3 Dummies
30	Corporate structure	CORP	2 Dummies
31	No. of employee	EMPL	3 Dummies

Table 5: Analysis of Organisational Innovation Content ()*

Dependent Variable	<i>Innov-index</i>		<i>Innov-inex</i>	
Covariates (**)	<i>Coefficient</i>	<i>T ratio</i>	<i>Coefficient</i>	<i>T ratio</i>
CONS	0.411	0.77	0.0308	0.517
INVOLV1	0.357	3.236	0.351	3.267
INVOLV2	0.279	2.035	0.283	2.030
INVOLV4	0.0378	2.829	0.0376	2.784
HIER-MANAG	-0.124	-2.320	-0.113	-2.069
NO-INT-PRP	0.153	2.616	0.146	2.469
INC-ADP	0.271	2.705	0.257	2.567
BONUSES	-0.0618	-2.098	-0.0590	-2.040
Performance index	Perf6 0.175	2.099	Perf4 0.023	2.760
Adj R ²	0,406		0,429	
F test value and Probability	6,86 [0,000]		7,45 [0,000]	

Notes:

* The null hypothesis of homoskedasticity is tested via White's general test and Breusch Pagan test. It is not possible to reject the null hypothesis in both cases. White test on Heteroskedasticity. The residuals are regressed on covariates: the R² value is 0.0074. The chi-sq statistic is therefore $78 \cdot 0,0074 = 0,577$. The 95% critical value is (4 dof) 9,48. The homoskedasticity hp is not rejected by the test. The Breusch Pagan test is performed by Limdep as a routine using all parameters. Results are available upon request.

** Two dummies, when inserted into regression above, arise significant but do not overcome the 95% threshold significance value. The first is a dummy associated to the typology "single industry" within CORP (the other two forms are "industrial groups" and "cooperative firms"), the second is a dummy associated to the lower class of firms in terms of number of employees (EMPL).

Table 6: Performance indexes analysis()*

Dep variable	Perf6		Perf4 (d)	
Covariates	Coefficient	T ratio	Coefficient	T ratio
CONS	-.673	-1.578	0.0839	.267
LABOUR-FLEX	1.476	2.426	1.568	2.443
INNO-ORG2	2.112	2.202	2.664	3.231
IND-EVAL	-.0073	-2.029	-0.0685	-1.889
POS-PRP (a)	1.799	2.104		
EMPL (b)	.635	1.909	0.576	2.250
PROV (c)	.546	1.702	0.571	1.902
Adj R ²	0,263		0,213	
F test value and Probability	5.58 [0.00009]		5,18 [0,00041]	

Notes:

*The null hypothesis of homoskedasticity is tested via White's general test and Breusch Pagan test. It is not possible to reject the null hypothesis in both cases;

(a) Positive effects on the "organisational environment";

(b) The significant dummy relates to the class of firms from 500 to 999 employees (EMPL);

(c) The significant dummy is associated to the provinces of Bologna, Modena, Reggio-Emilia e Parma;

(d) This index considers a subset of performance related factors: competitiveness, profitability, Firm productivity, and product quality .

Table 7: Summary table on performance variables analysis. Average and specific indexes

PERFORMANCE (dep. va.r)	PERF6	COMP	PROFIT	FIRM- PROD	IND- PROD	TEAM- PROD	QUALITY	PERF 2000
Overall significance	*	Low	Very low	Medium	Medium	*	*	*
Significant coefficients								
REV						*		
INNO-ORG2	*					*	*	
POS-PRP	*				*		*	
LABOUR-FLEX	*			*	*	*		*
IND-EVAL	*(-)				*(-)		*(-)	
JT (d)								*
JT (d)						*(-)		
QC (d)					*(-)		*(-)	
TW (d)							*	
TQM (d)								*(-)
INVOLV1								*(-)
INNO-ORG3								*
PQC								*
PRP RATIO					*			
EMPL (d)	*							
TERRITORIAL AREAS (Bo-Mo-Pr-Re) (d)	*							

Notes:

- Significant coefficient/regression (*)
- Dummy variable (d)
- Negative coefficient (-)

Appendix A

In this appendix, we use correspondences analysis to explore the gathered data. Variables are all ordered categorically and they represent the intensity of organisational innovation, the quality of industrial relations, and firm performances. The index of performance is present in all the graphs. The absolute value of the index varies between -5 and +5. We divided the values of reported performances into four classes: between -5 and -1; between -1 and +1; between +1 and +3; finally between +3 and +5. All the other indexes representing the quality of industrial relations and the intensity of organisational innovation have an absolute value varying between 0 and 1. We divided these values into four classes: between 0 and 0.1; 0.1 and 0.25; 0.25 and 0.5; 0.5 and 1. The presence in 1998 of two human resource management practices (job rotation and team-work) is represented by "yes" and "no" in the graph.

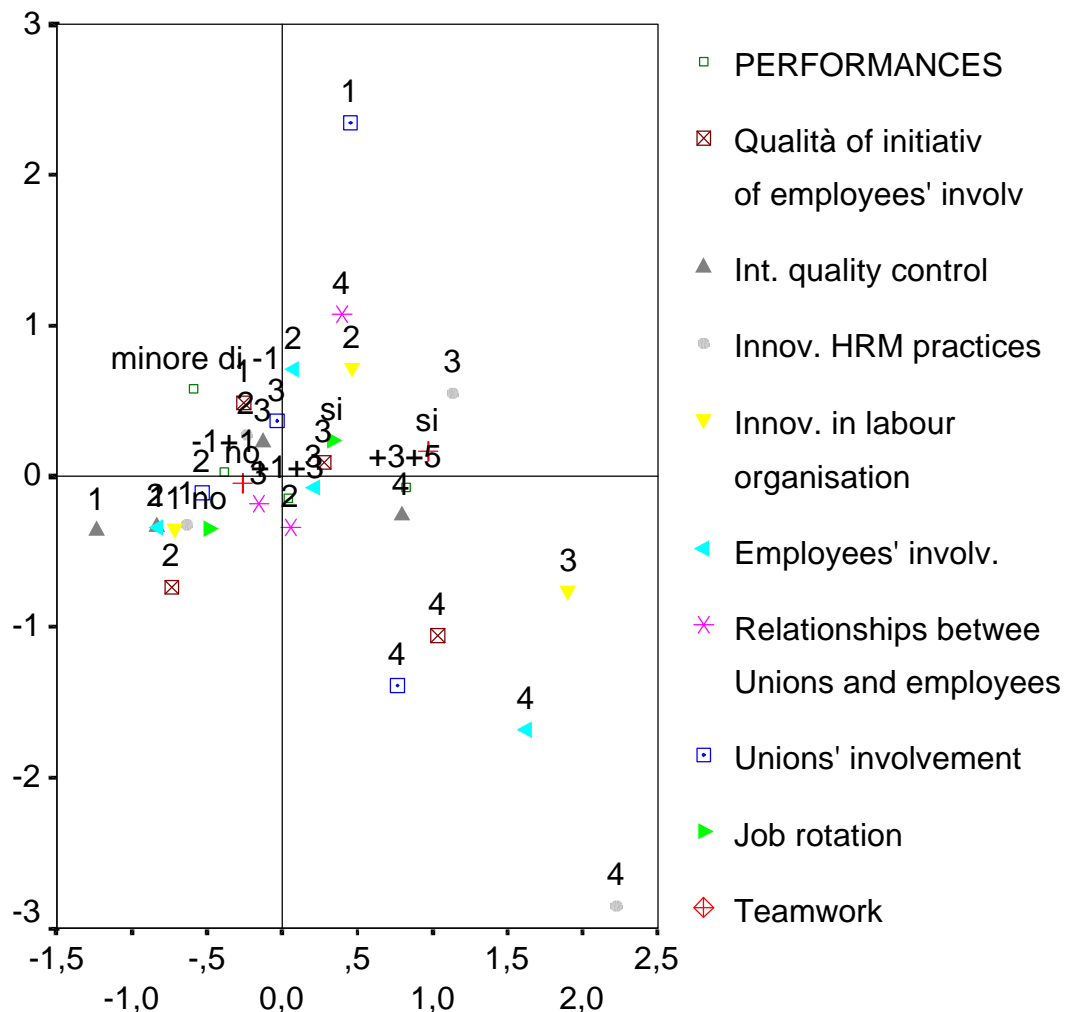
Graph A.1: Comparison between intensity of innovation in labour organisation and the quality of industrial relations

Starting from the comparison between the quality of industrial relations and the intensity of organisational innovation, we can highlight various interesting results:

- a. the indexes representing the quality of industrial relations are strictly and positively connected to each other²² (with the exception of the intensity of relationships between unions and employees);
- b. indexes representing the intensity of organisational innovation are positively connected to each other as well;
- c. the two groups of indexes representing respectively the quality of industrial relations and the intensity of organisational innovation are positively and strictly associated with each other;
- d. the presence in 1998 of some relevant human resource management practices (job rotation and team-work) is positively, though not very strongly, associated with both the quality of industrial relations and the intensity of organisational innovation.

As for performances, the good quality of industrial relations and the intensity of organisational innovation are positively associated with superior performances (+3;+5). Generally speaking, while a good quality of industrial relations is closer to medium-high performances (+1;+3), the intensity of organisational innovation is the closest to the highest level of performance (+3;+5). Among the indexes representing industrial relations, the nearest to high performance levels is the quality of managerial initiatives directed towards employee involvement in the activity of the firm and in problem solving. The presence of team-work, and, to a lesser extent, of job rotation, is close to superior performances (+3;+5).

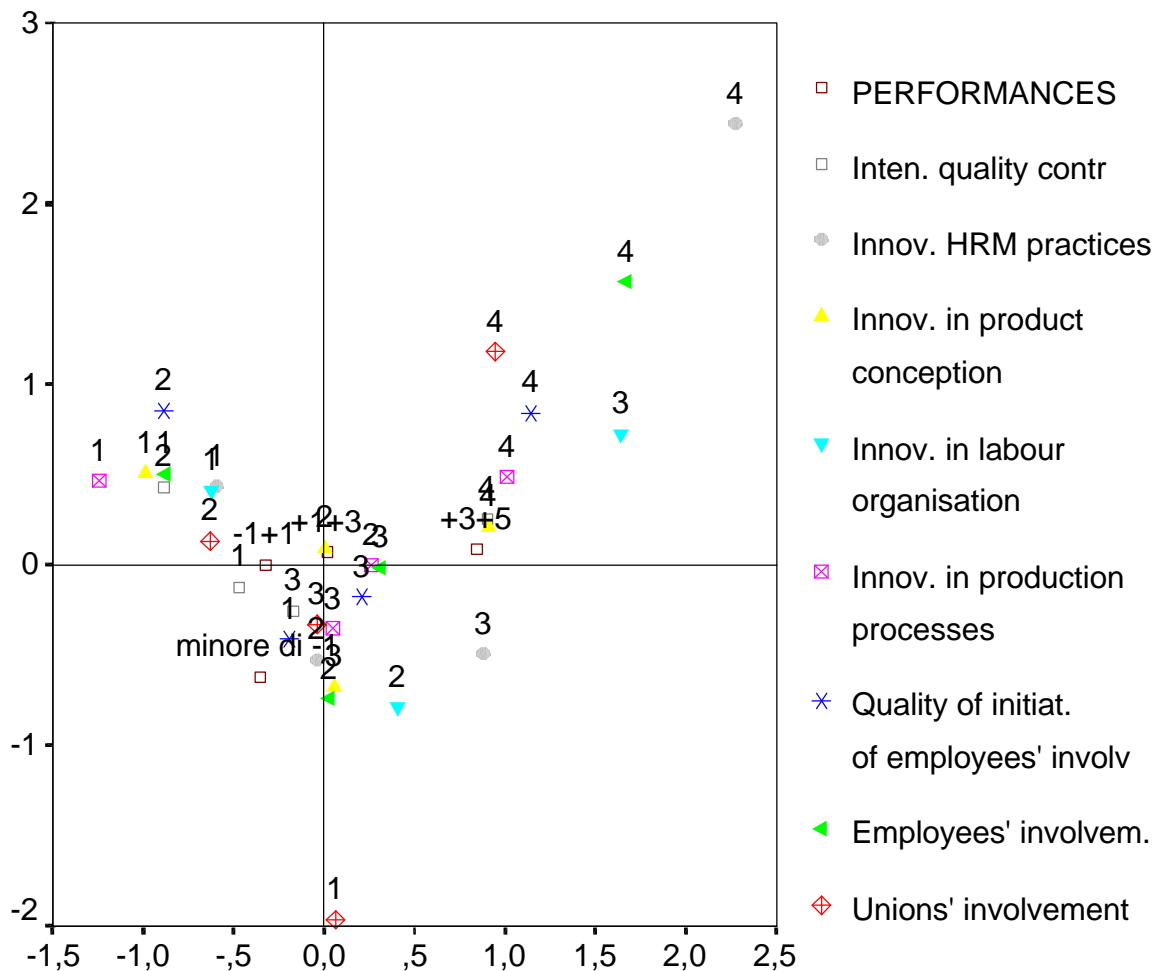
²² This means that high values (included in the categories labelled with numbers 3 and 4) of the various indexes are positively associated, hence near and separated by a small angle in the graphical output of correspondence analysis. The same is true for lower values of the indexes (labelled by numbers 1 and 2). Angles minor than 90° mean positive association, while angles greater than 90° mean negative association. An angle equal to 90° means absence of statistical association.



Graph A.2: Comparison between intensity of organisational innovation and the quality of industrial relations

The comparison between the main indexes representing industrial relations and intensity of organisational innovation confirms the results just highlighted in the case of graph A1, which concerned the innovation in labour organisation and industrial relations. Further results concerning the intensity of innovation in the organisation of production and in the conception of firm products are as follows:

- the intensity of innovation in the organisation of production and in the conception of products are strictly associated;
- high level of the indexes representing the intensity of innovation in the organisation of production and in the conception of products are strictly associated with high levels of the other indexes representing labour organisation and the quality of industrial relations;
- superior performances (+3;+5) are associated with high intensity of innovation in the organisation of production and in the conception of product and services.

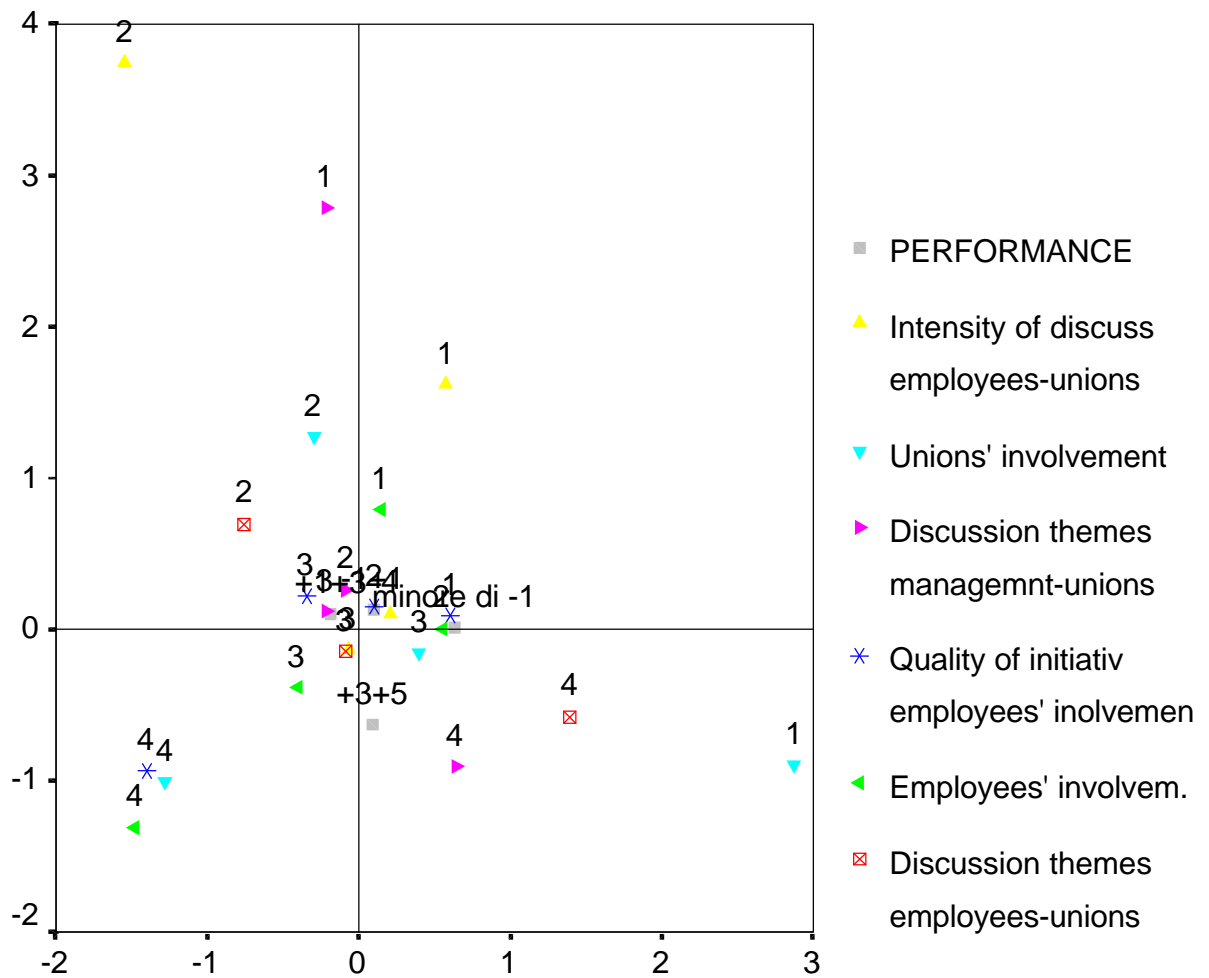


Graph A.3: Industrial relations and performances

A closer and separate exploration of the indexes representing the quality of industrial relations confirms and deepens the results we found so far. High levels of the indexes synthesising the quality of industrial relations are strictly and positively associated. This is true mainly for the level of involvement of worker representatives and employees by the management, but also for the quality of managerial initiatives aiming at involving employees in the activity of the firm and in problem solving²³.

The comparison between the index of performance and the quality of industrial relations highlights a positive, though not particularly strong connection. High level of worker representatives and employee involvement (information, consultation, and bargaining) and the quality of the managerial initiatives of involvement are associated with superior performances, but in a pretty weak way.

²³ With problems solving we mean initiatives directed to favour employees' ability to solve problems connected to the process of production.



Graph A.4: Organisational innovation and performances

We conclude the appendix with a closer inspection of the indexes representing organisational innovation. The complementary character of indexes representing organisational innovation is high in general terms and very strong in some cases. We obtain a strong association between the intensity of innovation in the organisation of production, the degree of flexibility in labour utilisation, the intensity of innovation in HRM practices, in products' conception, finally in quality control.

As for performances, high levels of intensity of innovation in the process of production, in the degree of flexibility in labour utilisation, and in HRM practices are strictly associated with superior performances (+3;+5). The intensity of innovation in the conception of products and in quality control are associated with superior performances to a lesser extend than the previous indexes.

