The impact of organizational culture on the job satisfaction of knowledge workers

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Abstract

Purpose – The objective of the paper is twofold: first, to test a framework of the relationship between satisfaction of knowledge workers and organizational culture, developed in a previous theoretical study, within a specific industry, specifically, the pharmaceutical one; second, to investigate which of the constructs that constitute such a framework are the most important in the above mentioned industry.

Design/methodology/approach – In order to achieve the above mentioned objectives, the authors adopted multiple case study based research. The case studies were carried out with a series of semi-structured interviews, with all the knowledge workers operating in the R&D business functions of each company, over a two-month period during May and June 2009.

Findings – The main result of the research is the validation of the research framework by knowledge workers operating in the pharmaceutical industry. It emerged that a bureaucratic organizational culture has a negative influence on knowledge workers' job satisfaction, while innovative or supportive organizational culture have a positive impact. Moreover, the study makes it possible to understand which aspects of their job satisfaction are more influenced by the organizational culture.

Practical implications – Results indicate to managers the essential features of an organizational culture that positively influence job satisfaction, and in particular to introduce in the industries (like the pharmaceutical one) where R&D is the key activity, carrier ladders and forms of participation for the knowledge workers. Moreover, they help managers in detecting the things to be improved in the organization in order to improve the job satisfaction of their knowledge workers.

Originality/value – Since only few studies have investigated the link between the organizational culture on knowledge workers' satisfaction, in general and within a specific industry in particular, the paper adds elements of discussion to the debate about the evaluation of the impact of organizational culture on job satisfaction of knowledge workers.

Keywords Knowledge workers, Job satisfaction, Organizational culture, Pharmaceuticals industry, Knowledge sharing, Motivation (psychology)

Paper type Research paper

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1. Introduction

Today, companies operate in a very competitive global environment, and given the rapid changes occurring in the market place, they have to do everything possible to become and remain competitive. In such a competitive environment, managers have to

concern with employees' satisfaction as a key factor for organizational effectiveness and efficiency, as well as for the successful implementation of the corporate strategy. Job satisfaction has received significant attention in studies of the work place: this concepts refers to the positive emotional response of an employee to his or her job and to his or her work performed individually or as a part of a group.

Previous works recognise, in addition to employee's satisfaction, the value of knowledge for the competitiveness of any organization (De Geus, 1997; Drucker, 1964, 1998). Along with the increasing focus on knowledge, is the growing perceived importance of those who work with knowledge, the so called knowledge workers (henceforth, KWs). A particular kind of KWs are the R&D employees, that is scientists, engineers' and other technical employees' skills and talents that are involved in consultancy based on their specialist research and development work for new products, services or processes. Different studies on this matter stressed that a scant attention to KWs' needs may cause organizational inefficiencies, stating as a consequence that, in order to become more successful, the main challenge for any company's R&D professionals management is to meet the objectives of their organization (in terms of effectiveness, productivity and profitability) with the needs of technical employees for satisfaction (Drucker, 1999). Moreover, when knowledge is the most important firm-specific intangible asset, any organization should have to maximise the use of their KWs' skills (Van Yperen and Hagedoom, 2003; Zander and Kogut, 1995). Despite these evidences, human resource management literature paid still little attention to the multifaceted context of KWs' satisfaction determinants.

Recently, to provide support to the above arguments, Bigliardi *et al.* (2009) developed a model of relationships between KWs' satisfaction and the organizational culture, based on the still little attention paid to this specific job satisfaction's antecedent. Specifically, the study provides evidence on the fact that the achievement of some of the input elements of the organizational culture can lead to increased KWs' job satisfaction.

On the basis of these premises, the objective of the research project sketched out in these notes is twofold: first, to test the framework of relationship between satisfaction of KWs and organizational culture, developed in the previous theoretical study from the same authors, within a specific industry, specifically, the pharmaceutical one; second, to investigate which of the constructs that constitute such a framework are the most important in the above mentioned industry. The reason for choosing this context, that will be described in a detailed way in the following of the paper, is related to two essential factors: first of all, because of its importance at a national and international level in terms of employees (Italy is the third nation in Europe, after Germany and France, and fifth at a world level in terms of number of employees), as well as its productivity (1.7 billion of products per year) (Rapporto Blossom Associati-Assobiotech, 2008). Second, due to the importance of R&D activities within this industry: the pharmaceutical industry is recognised to be high KWs intensity (Volocom Technology, 2005). In fact, R&D units' employees may be classified, on the basis of the literature review above reported, as KWs.

The rest of the paper is structured as follows: section 2 reports the literature review on the main arguments of the paper, that is job satisfaction and organizational culture, with particular reference to KWs. It follows section 3 where the context investigated (i.e. the Italian pharmaceutical industry) is described and the importance of KWs

within this particular industry is underlined. Section 4 describes the methodology adopted, and specifically it first describes the operationalization of the constructs, then the main steps of the research methodology. The results from the five case studies are described in section five, after a brief description of each company. Finally, conclusions and the main limitations of the study are reported in section six, followed by the main research implications.

2. Literature review

The concept of job satisfaction has been broadly studied in literature, due to the fact that many experts, managers as well as researchers, believe its trends can affect and influence work productivity, employee turnover and employee retention. Satisfaction has been classified into three main classes: intrinsic, extrinsic, and total (Weiss *et al.*, 1967). According to Rose (2001), an employee is intrinsically satisfied if he receives no apparent reward except the activity itself, while extrinsic satisfaction is defined as the opposite concept (that is, an employee is extrinsically satisfied if he receives monetary compensation or other material rewards to modify his behavior). As a consequence of the importance of this concept, it emerges that also the main antecedents of job satisfaction have not to be ignored. Among them, it is possible to cite pay (Clark *et al.*, 1996; Easterlin, 2001), organizational commitment (Agho *et al.*, 1993; Currivan, 1999), performance (Locke, 1976), organizational climate (Lund, 2003). Only a few studies have investigated the link between job satisfaction and organizational culture as its antecedent. Among them, the previous work from the same authors of this paper, that will be adopted as research framework in the follow (Bigliardi *et al.*, 2009).

Job satisfaction manifests itself in different ways in different people: specifically, it will be high or low depending on a number of factors (e.g. working conditions, how well a person's needs and wishes are met through work, the individual personality and so on). In particular, researchers agree that it is not a simple matter if reported to KWs. The term "KW" was introduced by Peter Drucker (1959), defining who works primarily with information or who develops and uses knowledge in his working environment. In this study, we define a KW as "any worker possessing specialist knowledge or know-how who is involved in consultancy based on their specialist knowledge or know-how, or research and development work for new products, services or processes". Hauschild *et al.* (2001), in their study, stressed that most of the key knowledge of an organization is incorporated in the minds of its employees. KWs, through their creativity, experience and knowledge, create a network into the organization to complete their working role. Their daily job can be unpredictable, not repetitive and multidisciplinary. The main difference between KWs and the other employees was broadly debated in literature and can be summarized as follows. First, KWs' career structures are different in comparison to the traditional models of occupation (Lee *et al.*, 1999). In particular, their careers use to develop through self-learning and the improvement of their culture, rather than through internal career or staff development programs. Consequently, their ability to learn is fundamental to achieve and maintain their competitive advantage. Second, according to Drucker (1998) the KWs are more motivated by the intrinsic challenges of the job, rather than those extrinsic as financial rewards. Both Shaffer (1987) and Boutwell (1997) observed that KWs often used to change employers, and stated that the organizations that can

provide a suitable environment for personal growth (for example the learning organizations) in order to reduce this propensity to move.

The idea of organizational culture was identified as one of the main aspects of the organizational behavior, useful to understand how organizations work (Kristof, 1996) and how well a workers fits into a particular organization (O'Reilly, 1989). A positive organizational culture strengthens the fundamental beliefs and the behavior that a leader appreciate, weakening values and actions that the leader does not consider right for the company. On the contrary, negative culture becomes toxic, poisons the life of the organization and hampers the growth potential (Kaufman, 2002). Literature on organizational cultures proposes different types of culture. Martin (1992) proposed three perspectives: integration, differentiation and fragmentation. Similarly, Wallach (1983) suggested three types of organizational culture: bureaucratic, supportive and innovative. Organizational culture is formulated and influenced by different variables. The first obvious variable is the leader of the organization, that impacts with his values on organizational culture. The second important variable is the influence of each member of the organization. These variables are called "internal cultural variables" (Schein, 1992). Finally there are the external variables. Although it is not easy to understand the impact of external variables, these are fundamental for a good comprehension of organizational culture (Schein, 1992). There was a long debate about the methods that can be used to measure organizational culture, both qualitative and quantitative (Cooke and Rousseau, 1988; Schein, 1992). As a consequence, different scales have been proposed in literature to measure this construct.

3. The context investigated

As above mentioned, we focused on R&D units' employees on the basis of the previous definitions proposed by the literature on the matter. Specifically, we analyzed researchers operating in the Italian pharmaceutical industry, because it is widely recognized the relevance of R&D, and of knowledge work as a consequence, within these companies. In terms of innovation, the peculiarities of the these enterprises is to discover new, surer and effective medicinal, assuming all the risk related to these activities. These companies operate within a system where other actors, such as research centers, universities, hospitals, strictly collaborate among them, and where innovation is considered essential in order to survive. The pharmaceutical industry is around the world one of the first sector for intensity of R&D, covering a fundamental role in the national economic growth and characterized for high level of investment in high tech and high quality products, processes and human resources (Volocom Technology, 2005).

The Italian market of pharmaceuticals is determined by products supplied by large Italian and foreign multinationals. The foreign multinationals have their own distribution networks with specialised sale outlets for marketing products at the level of pharmacies, hospitals, health insurance companies etc. The Italian pharmaceutical industries have similar distribution networks for the purpose of expanding their sales.

The sector manufactures products that worth 17.6 billion Euros and the average annual growth rate is around 5-6 per cent. Most major international pharmaceutical companies (Roche, GSK, Pfizer, Novartis, Bayer, Sanofi-Aventis, Lilly etc.) have a hold in Italy and they control about 65 per cent of the total pharmaceutical trade in Italy. Italy is the third nation in Europe and fifth at a world level in terms of number of

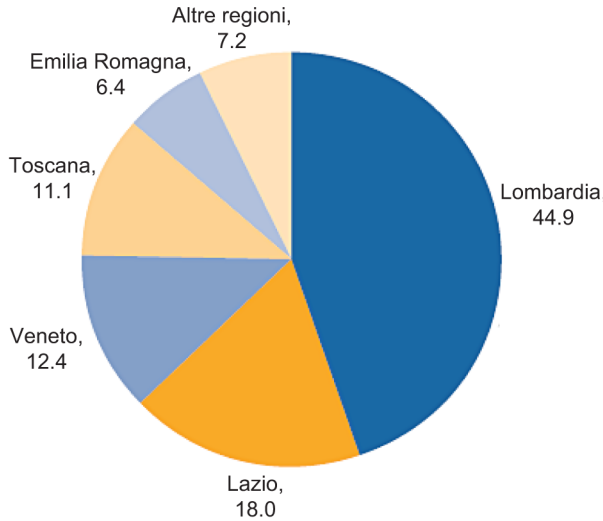
employees (Rapporto Blossom Associati-Assobiotech, 2008). The industry imports bulk drugs and pharmaceutical products that worth 10.2 billion Euros. Around 62 per cent of the total import which enters Italy comes from Germany, Switzerland, France, UK and Belgium. Italy exports bulk drugs and pharmaceutical products the worth of which is 10.1 billion Euros. About 60 per cent of the total Italian export is mainly sent to Belgium, Germany, UK, Switzerland and USA. Italy has spent in 2008 11.5 billion Euros in this sector: 2.3 out of the total has been invested in R&D activities. It is composed by 69,500 employees among the most qualified in the industrial panorama (about 61 per cent graduates) and 6,230 researchers; the regional distribution of R&D employees is reported in the following Figure 1.

In Figure 2 is depicted the regional distribution of investment in R&D activities of the year 2008.

As shown in the previous figures, the Emilia Romagna region, where the five companies interviewed are located, is the fifth in order of importance as for both the number of R&D employees (400 employees corresponding to the 6.4 per cent out of the total) and the amount of investments in R&D (120 million Euros, corresponding to the 10 per cent out of the total).

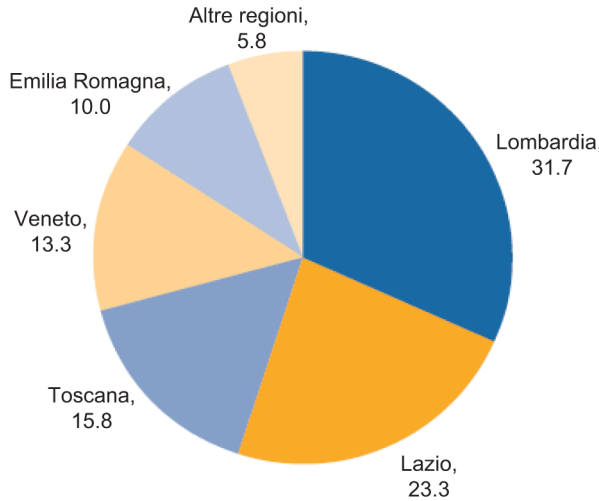
4. Methodology

In order to achieve the above mentioned objectives, we adopted the model developed in the previous work by Bigliardi *et al.* (2009), and specifically we tested it on five companies, operating in the Italian pharmaceutical industry, along with as many exploratory case studies (Yin, 1984). The case studies in our work had the primary aim of validating the model developed, by providing empirical evidence of "theoretical assumptions" (Creswell, 1994). The Delphi technique (Linstone and Turoff, 1975) is a structured process which allows experts to deal systematically with complex or



Source: http://www.farmindustria.it/pubblico/prereg02.pdf

Figure 1.
Regional distribution of R&D employees in the Italian pharmaceutical industry



Source: http://www.farmindustria.it/pubblico/prereg02.pdf

Figure 2. Regional distribution of R&D investments in the Italian pharmaceutical industry

ill-defined tasks, by means of controlled feedback and statistical response, and is recognized as an appropriate research tool where exploration of ideas and production of suitable information for decision making are required, and its adoption is particularly indicated in case of complex, interdisciplinary problems involving several new concepts (Meredith *et al.*, 1989).

4.1 Constructs' operationalization

The research framework is depicted in Figure 3. For the two constructs of the framework, that is organizational culture and job satisfaction, it was chosen in the previous study the scale from Wallach (1983) and Weiss *et al.* (1967) respectively.

In order to assess culture in any organization, the Organizational Culture Index (OCI) proposed by Wallach (1983) succeeds in describing well organizational culture in KWs' reality and in measuring its impact on their satisfaction. Wallach (1983) classified organizational culture as below:

- The bureaucratic culture, characterized by hierarchies, clear authority lines, organized and systematic work. A bureaucratic organization is recognized in literature as not suitable to attract and retain creative and ambitious people,

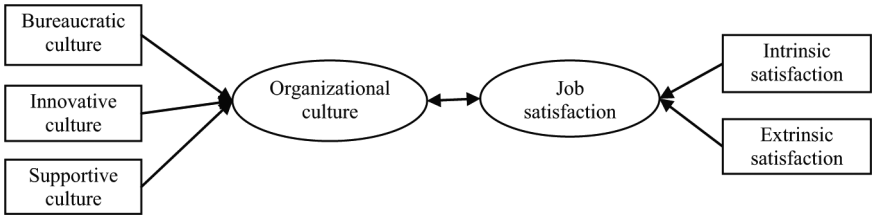


Figure 3. The research framework to be tested

because there are explicit rules and regulations that may inhibit the new ideas generation and limit the employees in the use of various sources of knowledge for the development of new products and services.

- The innovative culture, exciting and dynamic, it provides a place for creative work, full of challenges and risks in the meantime.
- The supportive culture, characterized by confidence, encouragement, collaboration and oriented to relations. It promotes an open and harmonious workplace.

The OCI proposes 24 items (or questions), eight for each dimension. Each item expresses, through a brief definition, a characteristic typical of one of the three cultural forms.

As far as the job satisfaction construct is concerned, the scale by Weiss *et al.* (1967) was adopted. The short version of Minnesota Satisfaction Questionnaire (MSQ) measures the job satisfaction of an employee, providing more specific information about the job's aspect that a person considers more rewarding and contains 20 items, classified into intrinsic and extrinsic satisfaction.

4.2 The research methodology

The research methodology adopted was a combination of literature analysis, Delphi technique and case study-based research. The phases of literature review and Delphi approximately took from January to April 2009. On the basis of the model previously developed, a panel of experts was set up to validate the scales proposed within the specific industry. The panel included:

- Four academics, chosen among people whose research studies mainly focus on knowledge management and R&D topics, that due to their expertise in such areas, have lend support to the panel of experts during the decision making process.
- A total of 20 members from ten companies operating in the pharmaceutical industry, selected both among people directly operating in the R&D units, and people covering the role of human resources managers. They were asked to validate the framework based on their "in field" experience in the selected industry.

Academics initially proposed the scales, and the relative items, proposed for the two main constructs and reported in the previous paragraph, in order to test their suitability in the context investigated; scales and items were structured into an appropriate questionnaire to be sent to the panel members. Hence, a two-round Delphi was carried out: in the first round, the questionnaire was submitted to panel members, that were asked to express their agreement with regard to the suitability of implementation in the industry. Hence, a second questionnaire was organized, incorporating the additional information and clarification proposed by the panelists, and submitted to the panel members during the second round of Delphi. A general agreement was reached at the end of the second round. Then, the panel was involved in a final roundtable discussion, to confirm the agreements on the results of the second questionnaire and to confirm that this tool may allow us, through the items selected, to

frame the cultures that characterize an organization and the aspects that mainly influence a KW's satisfaction. The final list of items included in the questionnaire are:

Organizational culture (OC)

(1) Risk taking.
(2) Collaborative.
(3) Hierarchical.
(4) Procedural.
(5) Relationships-oriented.
(6) Results-oriented.
(7) Creative.
(8) Encouraging.
(9) Sociable.
(10) Structured.
(11) Pressurized.
(12) Ordered.
(13) Stimulating.
(14) Regulated.
(15) Personal freedom.
(16) Equitable.
(17) Safe.
(18) Challenging.
(19) Enterprising.
(20) Established.
(21) Cautious.
(22) Trusting.
(23) Driving.
(24) Power-oriented.

Job satisfaction (JS)

(1) Being able to keep busy all the time.
(2) The chance to work alone on the job.
(3) The chance to do different thing from time to time.
(4) The chance to be somebody in the community.
(5) The way my boss handles his/her workers.
(6) The competence of my supervisor in making decisions.
(7) Being able to do thing that don't go against my conscience.
(8) The way my job provides for steady employment.
(9) The chance to do something for other people.

(10) The chance to do people what to do.
(11) The chance to do something that makes use of my abilities.
(12) The way company policies are put into practice.
(13) My pay and the amount of work I do.
(14) The chances for advancement on this job.
(15) The freedom to use my own judgment.
(16) The chance to try my own methods of doing the job.
(17) The working conditions.
(18) The way my co-workers get along with each other.
(19) The praise I get for doing a good job.
(20) The feeling of accomplishment I get from the job.

The five case studies were then carried out with a series of semi-structured interviews, with all the KWs operating in the in R&D business functions of each company, over a two months period during May and June 2009. Interviews lasted between one and two hours, and were taped and transcribed. A separated interview has been undertaken with the human resources manager of each company to explore the structure and characteristics of the company. We proposed to each researcher the final questionnaire of the questionnaire ant specifically to state the correspondence to their company or their level of satisfaction within their company, for organizational culture and job satisfaction items respectively, on a five-point Likert scale (where 1 = "does not describe my company"/"perfectly describe my company" and 5 = "totally agree" / "totally satisfied").

5. The case studies

5.1 The sample

The five companies interviewed were selected among a larger sample of companies operating within the pharmaceutical industry in the Emilia Romagna region.

Table I summarizes the descriptive characteristics of the companies. As required by the same companies, in order to preserve their anonymity their name has been replaced with letters (Company A, Company B, and so on). Details of the subjects interviewed in every case study organisations are reported in the Appendix (Table AI).

5.2 Results

Company A is a knowledge-based new company founded near Modena in 1999, whose mission is to serve patients with highly developed products to achieve significant improvements for their health. It operates in the pharmaceutical industry covering an important competitive position in the region. It is a small enterprise, characterised by a functional structure, where R&D function is the bigger unit: in fact, its employees are 8, an half out of the total. All the R&D employees are graduated in scientific disciplines and are all involved, at different level, in the decision-making process of the company. As far as the construct *JS* is concerned, the eight KWs interviewed has expressed an high medium judgment about the items related to the intrinsic satisfaction (average judgement = 3.7 on the five-point Likert scale) with their job. In particular, the most relevant aspects resulted to be related with the security of their job and with the

Company name	Turnover [million €]	Number of employees	Average age of employees	Products
Company A	4.2	16	34.2	Products for respiratory and cardiovascular diseases
Company B	7.1	30	37.1	Products for orthopaedic and oncological diseases
Company C	8.0	60	36.8	Products for orthopaedic and respiratory diseases and for diagnosis
Company D	748	3,000	39	Products for respiratory, cardiovascular and rare diseases
Company E	4.5	70	32	Products for general clinical diseases

Table I. The sample analysed

possibility to use their personal attitudes (items 8 and 11 respectively). The lower importance has been assigned to the social status (item 3), the authority (item 10) and creativity (item 16). On the contrary, the extrinsic job satisfaction sub-construct received a lower importance (3.1), as expected being the subject interviewed KWs. The item that resulted to be the less important is item 14, that refers to the possibility of advancement within the company. As for the *OC* construct, the three profiles (that is, bureaucratic, innovative and supportive) resulted to be equally present within the company (almost 33 per cent for each profile). Specifically, the bureaucratic culture resulted to be the responsible for the low judgement assumed by some of the intrinsic job satisfaction aspects (creativity in particular), as well as for the low level of satisfaction with respect to the possibility of advancement within the company. On the contrary, the supportive culture resulted to be positively related to the utilization of personal ability and the way job provides for steady employment.

Company B established in 1980 near Modena, with the aim of expanding the study and employment of non-ionizing physical energy in the medical field. Its main research projects are targeted on the creation of innovative and effective solutions for diagnosis and treatment, with particular reference to the orthopaedic and oncology diseases. Since its foundation, it is characterized by extensive international collaboration that has enabled the creation of products with high scientific and technological content. It is a small enterprise with a functional structure where the R&D unit is composed by only one researcher. As a consequence, the data collected refer to only one KW with a job tenure of seven years. The KW declared to be highly satisfied as for the intrinsic aspects (average judgement = 4.5): in particular, he assigned the higher judgement to 7 out of the 12 items belonging to the sub-construct intrinsic *JS*. To be noted that only the item 8 "security" received a low judgement on the five-point scale. Contrarily to what expected for a KW, he assigned an high judgement also to the items related to the extrinsic *JS* (average judgement = 4.3), and in particular he resulted to be very satisfied with regard to "supervision/human relations" and "supervision/technical" aspects (items 5 and 6 respectively). As for the *OC* construct, the innovative and supportive culture resulted to be the more relevant ones and equally present within the company (35 per cent). The supportive culture in particular resulted to be positively related to the human relations with other employees and with supervisor.

Also Company C was founded near Modena in 1980. It is a CE certified company based specialized in design, manufacturing and sale of products for orthopaedic and respiratory diseases and for diagnosis, characterised by an organizational structure divisional on the basis of the products realised. It is a medium company (60 employees and a turnover of 8.0 million Euros), where R&D function employees only 5 researchers out of the total. Notwithstanding, R&D activities are of fundamental importance for the company as demonstrated from the high level of investment in this area. The five KWs resulted to be satisfied as respect to intrinsic *JS* aspects (4.1 average judgement), especially for the "moral values" "responsibility" and the "achievement" obtained in their daily works. "Authority" (item 10) and "security" (item 8) received the lower judgement. As for the extrinsic *JS* aspects, the average value assumed by this sub-construct (3.7) reflects a quite high level of satisfaction also referred to extrinsic values (in particular, "supervision" and "recognition"). The supportive culture resulted to be the predominant within the organization (38 per cent), followed by the innovative culture (32 per cent) and the bureaucratic (30 per cent). The predominance of the supportive culture reflects the importance of human relations and of the recognition of the work realized, as well as on the familiar and friendly climate that characterise the company. The innovative culture resulted instead to be related to the creativity of the KWs interviewed.

Company D is an international established company founded in 1970 in Parma. Over the years, it reached a leader position within the industry it belongs to. Out of the 3,000 employees, distributed along the different Italian and foreign location of the Company, 300 are employed within the R&D unit. The location of Parma employees totally 78 people, of which 26 are the researchers that have been interviewed. The *JS* construct assumed a 4.1 average value: the higher values were assigned to items 1, 8, 15 and 7, while the lower ones have been assigned to items 2, 4 and 10. A lower value was assigned to the intrinsic *JS* sub-construct (3.4), where the "compensation" (item 13) assumed the lower value and "supervision/technical" items (5 and 6 respectively) the higher. To be underlined the fact the only one KWs assigned low values to all the items referred to the *JS* in the complex: this fact is probably due to the fact that he has been recently assumed by the company. As for the *OC* construct, the bureaucratic profile resulted to be the lower in order of importance (32 per cent), while the supportive and innovative profile are quite equally distributed (34 per cent). The aspects that characterize the supportive culture resulted to be positively related to the intrinsic satisfaction aspects.

Finally, Company E was founded in 1998 near Florence, and in the years it developed other location in Italy as well as in Europe. It is a medium enterprise characterised by a divisional structure, and employees 16 researcher. These KWs showed a quite high level of intrinsic *JS*, corresponding to an average value of 4.5: among all the items belonging to this sub-construct, "authority" received the lower value while "variety", "ability utilization" and "activity" received the higher ones. As correctly expected for KWs, the extrinsic *JS* sub-construct assumed a lower importance (3.8), where the item "compensation" resulted to be the less important one. As for the *OC* culture, the innovative supportive profile resulted to be the most relevant (almost 48 per cent) thus confirming the low formalization and the almost absence of procedures and rules that generally characterise a bureaucratic culture (for Company E, it resulted present for less than 20 per cent). The innovative aspect of the culture concurs in determining the high values assigned to items such as "independence",

"ability utilization" and "variety". Finally, the bureaucratic profile is to be linked to the certification adopted by the company during its development.

In conclusion, at a company level it is possible to summarize the results obtained by the case studies conducted as in Table II, where the average values assumed by each sub-construct are reported.

6. Conclusions and research implications

This paper presents the results of a research project on organizational cultures in the Italian pharmaceutical industry, and specifically on the impact of organizational cultures on KWs' job satisfaction. Data came from in-depth interviews of KWs (i.e. R&D units' employees) of a selected sample of companies operating in the above mentioned sector. In this study, we were guided by two main research questions:

(1) Is the framework proposed in our previous work suitable for the KWs operating in the pharmaceutical industry?

(2) Among the dimensions of organizational culture, which is the most/least relevant for the specific industry?

The preliminary two-Delphi round confirmed the suitability of the framework for the pharmaceutical industry. Moreover, the scale proposed in the framework revealed to be effective in measuring the job satisfaction of KWs. The MSQ was successfully tested and applied in knowledge work's environment, confirming the results from previous studies (Chen, 2002; Feng, 1997). Our study also confirmed that for a KW the intrinsic aspects are more important, as stressed in literature. Also the OCI scale adopted to measure the organizational culture resulted to be an effective measure: in all the organizations analysed, in fact, the interviews highlighted the co-presence of the three profiles of organizational culture hypothesised (that is bureaucratic, innovative and supportive).

As expected, the organizations analysed do not fit perfectly into a single culture, but, in each company, we found a combination of all three organizational cultures, at different levels. Specifically, by observing Table II, it is possible to note that as the supportive culture grows in importance, also the level of intrinsic satisfaction assumes higher level, thus confirming what expected on the basis of the literature review previously reported. Moreover, it emerged that a bureaucratic organizational culture has a negative influence on KWs' job satisfaction, while the innovative culture has a positive impact.

Since only few studies have investigated this link, in general and within the specific industry in particular, the paper adds elements of discussion to the debate about the evaluation of the impact of organizational culture on job satisfaction of KWs. We recognize, however, a limitation referred to the research methodology adopted, which grounds on a limited sample of case studies. Yin (1984) justifies the use of a single case

	Company A	Company B	Company C	Company D	Company E
Intrinsic JS	3.7	4.3	4.1	4.1	4.5
Extrinsic JS	3.1	4.3	3.7	3.4	3.8
Bureaucratic culture (%)	33	30	30	32	18
Innovative culture (%)	33	35	38	34	34
Supportive culture (%)	34	35	32	34	48

Table II. The results from the case studies

study where a rare or unique event is explored, to probe the how and why questions in greater detail. Five companies was a small enough number to allow studying each company in depth, qualitatively, as a separate case study. But it was not large enough to permit a statistical analysis of comparative quantitative data across all cases. This limitation could be overcome by considering in the analysis the whole sample of companies belonging to the Italian pharmaceutical industry. Furthermore, the application of data from just one particular industry clearly reduces the number of observations, but has the advantage that firms are relatively homogeneous (Kraft, 1990).

The results of the present study may have a number of implications for managers operating in the pharmaceutical industry. First of all, they may indicate to managers which are the essential features of an organizational culture that positively influence job satisfaction, and in particular to introduce in the industries where R&D is the key activity (like the pharmaceutical one), carrier ladders and forms of participation for the KWs. Moreover, the results from the study may help managers in detecting the things to be improved in the organization in order to improve the job satisfaction of their KWs.

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Appendix

Table AI. Characteristics of the KWs interviewed in every case study organisation

	Company A	Company B	Company C	Company D	Company E
Number of KWs interviewed	8	1	5	26	16
Position/role in the organisation	One head of R&D unit, seven researchers employed in the R&D function	Researcher employed in the R&D unit with a technical role	One head of R&D unit, four researchers employed in the R&D unit with a technical role	One head of the R&D unit, one head of the R&D laboratory, one R&D project manager officer, one senior scientist R&D, two senior scientists, four R&D project manager, 16 researchers employed in the R&D unit	One head of R&D unit, one senior project manager, one junior project manager, one quality assurance manager, 12 researchers employed in the R&D unit
Average tenure in the company	Seven years	Seven years	Four years	15.4 years	4.5 years
Average age	34 years	NA	30.2 years	44.5 years	36.3 years
Gender	6 males 2 females	Male	5 males	18 males 9 females	8 males 8 females

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