Work organisation in industry: Practices of use of IT in Portugal

António Moniz

UNL-FCT, IET, ITAS-FZK

November 2000

Work organisation in industry: Practices of use of IT in Portugal [1]

António Brandão Moniz
Industrial Sociology Unit, FCT-UNL
Portugal
Karlsruhe, 2-3 Nov. 2000

Context

The recent path of economical change (from '74, but mainly from '86-EEC) is defined by a slight economic growth and low unemployment levels. Recently, Portugal qualified for the European Monetary Union (EMU) in 1998 and joined with 10 other European countries in launching the Euro.

The construction of a new Information Society has, in Portugal, mainly a national orientation and a political commitment: it is based on national public policies and programs (as are the Mission for the Information Society or the National Initiative for the Information Society). But, there are differences concerning technological practices within the national territory. Some programs (promoted by public organisations) as "Digital Cities" (Portuguese Mission of Information Society) are pointed to specific regions. This program involved several projects as for Aveiro, Bragança, Alentejo, Azores, Guarda, and in Amadora (for the ethnic minorities).

According to the existing data concerning population, we observe some interesting scenarios. According to several studies,[2] the Portuguese population tends to stagnation in the next 25 years, corresponding to an annual growth average under 0,1%. Another aspect noticed is a general ageing trend for the next two decades: the decreasing of young

[1] This text was enriched with the information produced for the national report elaborated for the SOWING project in 2000. That report had the collaboration of Cláudia Teixeira Gomes, Paula Urze and Tiago Machado.

[2] Cenários Demográficos 1995-2020, Instituto Nacional de Estatística, Lisboa, 1995.

people (0-14 years) will continue, and the older people group (65 years and +) will increase from 14,7%, in 1995, to 18,1%, in 2020. This will influence the labour market and the organisational conditions, once it is also estimated a decreasing of the population at working age (15-64 years), which will pass from 67,6%, in 1995, and to 65,8%, in 2020. According to the estimations regarding the total population:

- the total labour force will register a continuous growth, which contradicts the demographic evolution. The total activity rate will be expected to increase.
- by gender, it's estimated that the rate of active man will register a continuous growth, with a variation of +0,5% over the 1995/2020 period. The rate of women activity will notice a significant growth and estimations show a variation of +4,1% until 2010.
- the number of the total labour force among young people (15-24 years) reveals a tendency to decrease in result of increasing incorporation in the formal schooling (secondary and University), articulated with the expected process of extension of the compulsory schooling.
- the activity rates of both genders will tend to approach 37,3% in women and 39,2% in man, in 2010.
- in what concerns the adults with 25-49 years old (the population segment with the highest total value), it's estimated an increment of man until 2005, followed by a decrease after this period. For women, a continuous growth is excepted in the labour force, as a consequence of its incorporation in the labour market.

The innovation in the employment behaviour is particularly clear in what concerns the sector composition of the employment changes: the persistent decrease of the industrial employment (even if within a framework of some recovery of the industrial product), a slight expansion in the employment on the tertiary sector, and an important growth of the employment in the construction and public works activities. We can identify then a considerable sector mutation concerning the industrial and the services sectors but also a growth of the atypical forms of employment.

In a qualitative perspective, the employment system is still characterised for the persistence of its structural features. Among them, the education and schooling structure

with a high weight of low level, specially comparing with the other countries of the EU, as a result of long-term deficits concerning the education of the population. Although the educational level of the young citizens is higher than that of the remaining groups, the portion of those who have a level less then 9 years of schooling remains high. This structural feature reveals that Portugal has a non-favourable qualifications structure, with adaptability potential.

These features of the employment structure are associated with the fact that several sectors are still dealing with cheap/intensive labour force. Plus, in many of enterprises the recruitment is made on the basis of low qualified workers (associated with few training opportunities).

In order too guarantee a coherent and integrated development of the employment policies, it should be privileged a global and transversal actuation in this matter, favouring an economic growth that is rich in employment, and contributing for the sustainability and promotion of the levels/quality of the employment. Of course, this program (National Employment Plan) must be aware of the new challenges that are brought up by the Information Society in what concerns the new forms of production, work and learning.

Table 1 - Synthesis table of the labour market in Portugal ('85, '90, '95, '97, in 000's and %)

PORTUGAL	1985	%	1990	%	1995	%	1997	%
1. Total Population (3+6)	10 014	100,0	9 873	100,0	9 918	100,0	9 950	100,0
2. Pop. at working age (15 - 64 year)	6 472	64,6	6 556	66,4	6 707	67,6	6 762	68,0
3. Total labour force	4 514 (100)	45,1	4 948 (100)	50,1	4 802 (100)	48,4	4 967 (100)	49,9
4. Employed people	4 057	90,0	4 658	94,1	4 417	92,0	4 589	93,4
5. Unemployed people*	385	8,5	225	4,5	342	7,1	334	6,7
6. Non-active population (1-3)	5 500	54,9	4 925	49,9	5 116	51,6	4 983	50,1

Source: ANUÁRIO DEMOGRÁFICO (INE), INQUÉRITO AO EMPREGO (INE)

* Actively seeking work and immediately available for work

As mentioned before, Portugal continues not being able to respond to the labour market needs (improvement in the education sector is critical to the catch-up process). Reality is that, regardless of the global increase of the education level of the regular employees, the predominance in the national labour market is for the qualified and semi-qualified

professionals with studies at the level of the 1st (4 years) and 2nd cycles (2 years) of basic education. This means that the large majority has 6 or less years of schooling.

Finally, there is also a deficit in what relates to technological and strategic management abilities of the enterprises. Technological and innovation skills are yet limited. The minor capacity to innovate is strongly related to general insufficiencies related to the interpretation of the markets and learning. As so, there is a strong need to invest in technological modernisation, yes, but all along with a process of strategic reflection.

In short, there is then much work to be done, involving the Public Administration, obviously, but also entrepreneurial associations (sector and regional levels), unions, scientific and technological institutions, universities and vocational training centres, in order to develop, in close co-operation, a global policy pointed to modernisation, competitiveness and internationalisation. It is true that the government is working to modernise and to stimulate the country's competitiveness in the increasingly integrated world markets. But to what extent these policies are supporting the transition towards a new Information Economy, it is yet an open question.

No co-ordinated national initiative of enterprise support exists in Portugal regarding the implementation of ICTs. However, the existing general programme for technological modernisation and industrial restructuring (PEDIP) has supported a number of projects to implement ICT in advanced stages of manufacturing management, or to improve design and quality. In addition, the National Initiative for the Information Society aims to develop a consensus regarding actions to stimulate and disseminate the use of modern information technologies within schools (Internet in School); local and central public administration; sources of information (libraries, museums, data-bases, scientific institutions); and with companies from different sectors. A number of measures under the Initiative are relevant in this context:

Measure 6.1: Monitoring Developments in Working Conditions in the Information Society.

Measure 6.3: Adapting Labour Legislation to Telework, which revises existing labour legislation to encompass telework, thus modernising the contractual framework of working life.

Measure 6.5: Entry of Older Workers or Handicapped Citizens into the Job Market, which fosters the use of ICTs to support their entry into the job-market, to ease their inclusion in the modernisation process that underlies the construction of the Information Society.

Measure 6.7: Promoting Pilot Projects in the Area of Telework: and New Forms of Work Organisation, which launched pilot studies in the area of networking and new forms of work organisation, as well as projects to improve the working conditions and to raise the efficiency of companies through ICT use.

Measure 8.4: Supporting the Fight Against Info-Exclusion under which the state gives preference in all information society programmes to the development of products and applications that contribute to the fight against info-exclusion, and particularly to access to the benefits of the new technologies for socially less favoured groups.

Government administration is also regulating for, and pioneering the use of, new organisational solutions based on information technology, through stimulating the use of electronic data transfer, disseminating the use of electronic commerce and enhancing business competitiveness in management and organisation. Through adopting ICTs in its relations with business, the state is hoping to encourage firms to adopt the new technical arrangements including EDI. This process is under way, and not fully accomplished.

One other interesting project is the National Initiative for Electronic Commerce. Here the emphasis is given to the competitiveness of Portuguese SMEs and their capacity to participate in the global market. Using ICTs, electronic commerce could be critical for improving competitiveness on the global market. It leads to the adoption of new forms of work organisation, and requires the reorganisation of information systems to access wider markets. The White Paper on Electronic Commerce in Portugal, prepared at the initiative of the Portuguese Association for EDI and Electronic Commerce, showed that the number of Portuguese SMEs with some form of electronic commerce is somewhere around 1000, about 2.6% of the total.

The SOWING survey findings

The study developed for the SOWING project was based on the sample and weighting collected data in a SPSS tool that proceeded the characterisation of Portuguese companies concerning the information society diffusion. Data was characterised and analysed join together a ponderation coefficient as well as 91% of confidence when estimations are making

A deep and meaningful analysis shows a set of characteristics that can lead us to assume how diversified is the application and diffusion of information and communication technologies in Portuguese companies. This assumption is independent of the activity sector where companies belong and it's specially related within organisational and managerial concepts than technological or financial concerns. Considering the geographical localisation of the companies in the sample, we can observe that they belong to areas where the industrial activity is more dynamic and intensive, namely the region of Lisbon and Tagus Valley (45,6%) and the North region (19,6%). We've also collected a significant number of answers from companies located in the autonomous regions of Azores and Madeira, more than we expected initially. Concerning the dimension of companies we can observe that those with *'more than 100 workers'* assume a relevant position in the sample collected, representing 55,6% of the answers. Small and medium sized companies appear in second place with 35,7% of the total.

Concerning the geographical localization of clients we verify that the region where the company is operating it's the one that concentrates the majority of their customers (48%). Other regions in the country concentrate 42% of customers. Finally, only 10% of customers from the companies in our sample are from other countries in EU or in the rest of the world. It's possible to extrapolate this observation: we are in presence of a sample that maintain privileged dynamics with other companies in the national market, and it seems that is needed a more dynamic expansion and enlargement of economic relationship within companies, namely international relations and exportations (based on a more developed marketing policy).

When companies were confronted with the market criteria that could be more relevant to their business and activities, we found that quality was the most important criterion in the competitive market dynamics. It's followed by the innovation (17,1%) as the market

criteria more referred. Productivity and flexibility were draw both with 16,2%, and finally, the delivery periods were referred in the last position (5,4%).

In what concerns the kind of services or products offered by the companies we could observe that the product flexibility (specified by the customer or with standardized variants) is a constant variable and from which the most important market criterion depends. Due this we can detect that the majority of companies (38,7%) affirmed the existence of products or services with standard variants: different variants of products or services can be offered, but they have fixed specifications. We also cannot forget companies that referred their products or services were tailored to the customer specifications, indeed, 36% affirmed that clients specified their products or services. Finally, about 25% of companies assumed their products or services were standardized: they have fixed specifications and without variants.

But considering the companies which products or services are specified by their customers, focused their market criteria in quality (42,5%), flexibility (40%) and innovation appears as a relevant concern only for 4,5% of them. For companies which products or services are standardized, the most relevant market criterion to them is productivity (53,5%). So, the productivity criterion is more relevant to companies with standardized products or services than companies that have standardized variants or products and services. For this companies customers' quality is the most mentioned criterion. In other words, quality can also be considered as the most strategic criterion in a more and more competitive market.

It's a fact that communication networks and the integration of technologies in work contexts tend to be the axis of a structural transformation or renewal. Even their diffusion and application produces an intensive change of the companies and activity sectors socioeconomic relations. We could verify that 89,5% of the inquired companies affirmed the existence of a *local area network* (LAN). This can be a data that induces the increase importance of the technological field in the Portuguese companies. However, we must consider that 75,2% of them still have stand alone PC's even if they apply simultaneously any kind of computer infrastructure. The usage of mainframe and terminals was referred by 53,4% of the companies and the electronic data interchange (EDI) was maintained by 27,4% of them. Concerning the programmable machines they have an inferior weight in

the pondered sample due the fact that activity sectors based on industry have a lower representation both in the sample and in the universe. Thus, programmable machines, quite emblematic of the industrial sectors were referred by 20,5% of the companies (proportionally they are also less significant than other sectors presented in the sample). The given data wont allow us to confirm that we are in presence of a hi-tech group of companies as well as an aggregation of firms presenting a technological positive trend in a short term. This occurs in a way that the weight of stand alone PC's is quite considerable in the collected sample. As well, the technical integration between the different stages of the production or services processes doesn't seem to be a typical practice among inquired firms. Indeed, only about 25% of them stressed the existence of a computer support or infrastructure between tasks or stages of productive processes.

An important fact emerges when we consider the data collected: it's a fact that nowadays almost all companies, wherever the activity sector is, make use of ICT even if the software focus is on word processing activities or accounting with stand alone computers. The tasks that are done by mean of specific software are: invoicing (97,1%); accounting (95,6%); personnel and salary administration (79,9%); purchasing (76,6%); sales and marketing (68,4%) and, finally, customer service (50,8%).

The approach to the contexts on information society or the application and diffusion of ICT at the core processes of the surveyed companies cannot be assumed only as a purely quantitative dimension: we should meet the actors that *'define'* the success of technical-organisational structures and that edify those technological representations all together. Success doesn't occur only by the technical integration among activity stages, but it depends fundamentally on a human-machine relation integrated in several work contexts.

About the workforce profile the sampled companies showed a tendency to increase schooling levels of their workers. We can observe that 21,4% of them stated to have more than 50% of workers with 4 and 5 years of schooling (1st and 2nd cycles of basic education). We can also detect 28% of firms that stressed less than 10% of workers with lower schooling levels. This tendency also seems to have repercussions in the influence assumed by workers with 9 schooling years (compulsory level in Portugal), secondary school (12 years) or vocational school. Indeed, 40,2% of the inquired companies affirmed to have between 25% and 50% of workers with 9 years schooling and 52,2% of them

held that 10% to 25% of their workforce have the secondary school or a grade from a vocational school.

In what concerns average or higher education levels it still exists a profound gap between the revealed needs of companies and school levels of their workforce. From the inquired companies, 60,2% has less than 10% of workers with an average school (higher non-universitary schooling, politechnic education). Similar trend, however less emphasized, is seen in terms of the higher education: 47,4% of the companies has less than 10% of bachelor or graduate workers. We can perceive that organisational design of companies assume a larger proportion of workers with higher education (bachelor or graduate) than workers with a higher but non-universitary schooling. This fact can be an evidence of a strangled competence pyramid, and of a certain underestimating from companies to average levels of education or even vocational schooling.

Given the workforce tendencies concerning the age structure we could easily extrapolate from the majority of inquired companies the desire of younger workers, that can mean, major qualifications. This strategy, not always conciliatory, passes by the *'refuse'* of the considered older workers and by the inclusion of young people in a *'flexible'* contract situation, or a precarious work circumstance. The insecure inclusion of some people conduce to the precocious exclusion of other from the labour market under different causes, sometimes disguised with discourses associated with the introduction of new information and communication technologies.

The presence of a male group in their workforce it's revealed by 73% of inquired companies. Indeed, over 50% of their effective is male. The reference of female in the organizational design of companies is quite dispersing in a way 32,4% of companies referred the existence of female between 25 to 50% of their workforce and, 29,7% of inquired companies stressed the presence of female between 10% to 25% of their workforce. In spite of a great men representation it's a fact that female incidence it's revealing a growing tendency in those inquired companies.

Besides being slow the changing process seems to produce effects as the regenerating desire that is felt at the *'heart'* of companies. This is interpreted as the inclusion of young workers and also the increasing of schooling levels. Female segregation at labour market seems to confirm some of the trends (mostly about wages). However, the raising of their

presence at the active life it's a fact. Effectively, gender seems to give place to other characteristics more related with the qualification levels (social skills, technical skills or even experience), schooling and other immaterial factors inherent to the worker himself.

Organisational change

When confronted with organisational changing aspects the majority of surveyed companies (77,1%) referred at least one kind of changing. We can observe that organisational changes stressed by the inquired companies are fundamentally related within numerical formulas that confer more flexibility workforce. In fact, declared changes occur essentially in terms of downsizing, enlargement or splitting of the companies. The effects so far conferred to the globalisation processes assume, in the present case, a pertinent role namely the nearly 50% of companies that were a target of geographic (re)localisation of activities or even the nearly 35% of inquired companies that established strategic alliances with other companies.

We can verify that organisational changes related with anthropocentric models or work labour relations humanization take less weight in the majority of inquired firms. Indeed, only 6% of the companies referred flatter hierarchies, which could represent a beginning towards work horizontality still in a small scale. However, the introduction of groups or teamwork and the establishment of networks with other companies seem to be growing. By this, companies privilege a kind of differentiated organisation in a way to apprehend their workers abilities, skills and experience. The growth towards the establishment of profit or cost centres it's also an element to consider and that reinforces the previous statement.

About changing contexts we can verify they tend to generalise quantitative and numeric flexibility through the establishment of profit or cost centres aiming the control and costs saving. These strategies can cover, in the most part of the cases, a reduction or a precarious enlargement of workforce. As it is verified, the linkage to new work organisation logics, namely the flattering hierarchies, the establishment of networks or

even the teamwork introduction, assume a relative weight with less importance when considered organisational changes occurred during the last 5 years among inquired companies.

With reference to the departments or functions that were especially affected by the mentioned changes we can observe that *'sales and marketing'* was the most referred category. Indeed, 73,9% of changing was related to the department or function connected to the sales and marketing activities of the company. The other affected target was at *'administration and financing'* department, with 47,8% of the companies that referred any change in their structure. In third place we can notice 28,3% of companies that stressed changes at the *'core process'* level, be it the actual production of goods or services. With less weight we can verify that only 6,5% of the companies alleged changes at *'electronic data processing or information management'* level. This fact can lead us to the evidence of the influence that ICT external consulting have in inquired companies and how dependent inquired companies are on them.

Companies under a quite deterministic paradigm assume technology introduction at work context. In a way, to verify the existent relation between the technical integration of different stages of production process (supported by a computer infrastructure or automated) and the importance to the ICT implementation towards personnel cost reduction, we carried out statistical independence Kolmogorov-Smirnov (K-S) test. Results allow to infer that ICT application and diffusion in work contexts can be an important path for managers to reduce costs with personnel. Thus, potentially they recognize unemployment situations or even other human resources policies related with technological determinism.

It's quite relevant to know the importance degree recognized by companies to ICT in the different dimensions of the entrepreneurial reality. Indeed, it could be determinant to identify company perceptions concerning their own strategies with a particular socio-economic context. With a factor analysis, by the extraction method of a principal component analysis, we intended to compact groups formed by correlated variables, or in this case, firm categories (factors) classified by the degree of importance that they confer to ICT in different dimensions of organisational reality. The output from the rotated component matrix helped to confirm which original variables form each one of the four

factors. Thus, groups of companies were made in relation to the kind of response they answered.

Table – Firm categories (factors) by ICT importance degree

FACTOR 1	Dynamic companies through organisational changing	42,0%
FACTOR 2	Technological deterministic companies (post-fordist based)	16,7%
FACTOR 3	Companies based on the co-operation and quality intensification	9,2%
FACTOR 4	Companies that react actively to external exigencies	7,5%

The *dynamic companies through organisational changing* (Factor 1) considering the presented importance degree to ICT in work contexts explain the main variance of original data (42%). We can observe that organisational changing it's a constant reality at our sample independently of the organisational design point of reference. Companies that orient ICT diffusion based on a technological determinism (Factor 2) explain about 17% of the original data variance. Explaining 9,2% and 7,5% of the original data variance we have respectively a group of companies that point out the ICT importance towards the *co-operation and quality intensification* and those companies that *react actively to external exigencies*.

Independently of the type of orientation or organizational design, ICT diffusion and application towards companies go side by side with changing strategy (most of them as a market reactions and demands). Part of the inquired companies wants this changing aiming the enrichment (empowerment) of their workforce (decentralizing hierarchies or even work organisation flexible forms). However, a large majority of them tend to adopt 'lean' strategies in terms of personnel or internal immaterial investments (among other: training, workers social benefits and the contractual situation).

In what concerns the main factors that hinder the introduction of ICT in inquired companies we also intended to identify groups with reference to their own obstacle perception. With a factor analysis, by the extraction method of a principal component analysis, we intended to compact sets of variables in a way to form firm categories (factors) classified in terms of their perception towards the main barriers and obstacles of ICT diffusion or application. Output from the rotated component matrix helped to confirm what are the original variables from each factor created. Therefore, we found three new categories (factors) of companies.

Table – Firm categories (factors) by ICT application barriers (factors that hinder ICT introduction)

FACTOR	Technical, personnel, information and connected costs barriers	68,1%
FACTOR	Workers resistance and consultancy deficit	13,3%
FACTOR	Participation and organisational design barriers	7,5%

The barriers that explain the main variance of original data (68,1%) are deeply connected with *technical, personnel, information and connected costs* towards ICT application among inquired companies. Indeed this category of firms can have a direct link with the fact that the integration of technologies in work contexts tends to be one of the main axes of a structure transformation or renovation. However, this is a gradual process and it's happening with some blockages namely the lack of information concerning the alternative technological structure pertinent to companies, inherent costs towards ICT's, lack of qualifications and a fundamental barrier it's the incompatibility between systems in a way to support technical integration.

Companies that enounced ICT barriers connected with *workers resistance and consultancy deficit* explain 13,3% of the main variance from original data. In fact, workers motivation towards ICT implementation can be a quite relevant variable through the success of technology performing. In parallel, probably due to a lack of information about ICT, companies often recur to external units for the handling of customer queries with the support of computer technology. This situation leads companies to a deep dependency towards outsourcing activities and IT consultancy. Also the lack of *participation and a planned organisational design* form a category of obstacles to ICT introduction (explaining 7,5% of the main variance of original data). This category shows how relevant the participation (of workers and unions) can influence ICT choices and also how outsourcing dependence have inherent fears among inquired companies.

Organisational restructuring appears as a common practice within companies. As a central point of this transformation modern ICT's are seen as playing an important role either as driving factors or as facilitating factor. For instance, at almost of the Portuguese case studies, companies stressed the importance of ICT as a masterpiece or a key at the organisational level, allowing certain types of organisational structure or design.

Companies were also confronted by their own ICT evaluation. In fact, based on their experiences they were confronted with a range of statements where they should express an opinion between each declaration and ICT application at the organisational context. First, we noticed that a lot of inquired companies affirmed 'no opinion' in presence of ICT statements concerning their own experiences. This could reveal a lack of knowledge, unfamiliarity with certain technological situations and, in a way, some fear that hinds some uncertainties by the side of companies. To form groups shaped by their experiences and opinions about ICT we did a factor analysis statistic, by the extraction method of a principal component analysis. The output from the rotated component matrix selected 3 factors, or firm categories in relation to their own evaluation on ICT. Those factors explain 69% of original variables.

Table 2 – Firm categories (factors) by the evaluation of ICT's

FACTOR	ICT as a tool of power and control	48,7%
FACTOR	ICT as a tool of change and new organisational practices	12,2%
FACTOR	ICT as a 'friendly' and co-operation tool	8,4%

ICT is still viewed as a *tool of power and control* among companies (Factor 1). Indeed, it can lead us to observe a majority of firms that assume technology as a mean to reach an end and not a tool with choice alternatives. Other category of companies interprets ICT as a *tool of change and new organisational practices* possibilities (Factor 2, that explains 12,2% of main variance of the original data). Finally, companies also evaluate *ICT as a 'friendly' and co-operation tool* even if it's perceived in a small scale (Factor 3 explains 8,4% of main variance of the original data). Definitely ICT starts to become perceived as a masterpiece in terms of work organisation, but its still need a lot of efforts to do. Synthesising, at organisational and technological changing processes, ICT plays effectively a major role. As we can detect by the extracted means of the preceding factors the relevance of ICT depends on the way inquired companies' deals with the changing process and the choices or preferences made by management. It is a question of choice or alternative.

When we are studying the aims and barriers in introducing modern ICT, it's understandable the importance degree given to technology in all firm categories

established by our factor analysis. Companies oriented to co-operation and quality intensification at core process level revealed a rather high mean considering the ICT importance degree. Indeed, for those companies ICT take part in all processes of the main activity of companies: they depend on the total or best quality, short period delivery, co-operation with other companies based in communication supported by ICT. External exigencies also engage an enormous attendance of ICT from companies when confronted to exogenous requirements like environment or market demands.

Considering the main factors that could obstruct the introduction of ICT we can verify that the presence of technology assumes more importance in the case of companies with *'technical, personnel, information and connected cost barriers'*. In fact, for those companies the ICT support, or its lack, is rather important than in the case of firms where *'workers resistance and consultancy deficit'* or barriers related with *'participation and organisational design'* are manifest. Workers resistance and organisational design barriers consist in shapes that get more involvement with management choices concerning organisation than with the introduction of a new kind of technology or production process itself. When people get implicated, participating at the organisational change, usually they face the new reality in a more integrated and innovative way, facilitating the application and diffusion of ICT at firm level.

Even if the relevance of ICT depends on the way how inquired companies' deals with the changing process and the choices or preferences made by management, it's a fact that the Portuguese situation has changed a lot since the last two decades (especially after '86, year of the EC Portuguese integration). So, an analysis about the *'evaluation degree'* based on the companies' experiences could help us to detect that ICT starts to be fundamentally seen as a tool of change and an instrument towards new organisational practices. In fact, the average of answers can demonstrate the positive agreement level from companies concerning ICT diffusion and their own organisational changing experiences.

'ICT as a tool of power and control' seems to loose relevance among experiences of Portuguese companies, however it's still quite significant. And this fact is fundamentally relevant when we verify how negative could be experiences concerning *'ICT as a friendly and co-operation tool'* amongst inquired firms. Indeed, ICT is loosing the

character of supremacy, or power or even control, but it's not achieving at the same time and in the same proportion, a role of co-operative and *'friendly'* tool. That's why there's a lot of work to do in a way to synchronize the emergence of new production systems and help companies, by an integrative approach, to reconsider their organisational practices based on ICT.

Teleworking

Types of telework which companies were confronted are: **telehomework** – information processing work done at home for at least 20% of the time and provided with an ICT infrastructure to communicate with employer and / or customers; **telework** – employees working at variable locations (customers, in travel) and provided with ICT infrastructure to communicate with the employer; and finally, **teleworkcenters** – workers located in regional office buildings or in hired workplaces at telework offices and connected with an ICT infrastructure to headquarters.

The design of new organisational realities, namely teleworking, it's not a quite disseminated practice amongst inquired companies. In fact, about 94% of them refer the total inexistence of any form of telework, or teleworkers. From the small percentage of companies that stressed any kind of telework the most referred was telehomework, representing 5% of our sample. The majority belong to *'other business activities'* (NACE 74) and, in average, 2% of their workforce are telehomeworkers. Concerning the dimension of companies they are essentially SME's.

Telework interpreted as employees working at variable locations (e.g. satellite centres) represents 1,3% of the sample. However, this form of telework is sustained in average by 30% of inquired companies workforce. Fundamentally, the majority of companies that practice this kind of telework are big companies (over 100 employees), belonging to transport activity sectors (NACE 60).

We can find more current telehomework amongst companies. Nevertheless, in terms of workforce proportion we can realise that the most practised kind of telematic activity is

telework, consisting in employees working at variable locations, in customers or travelling, provided with an ICT infrastructure to communicate with the employer. Finally, we can observe that the main characteristics of teleworkers: the great majority are high-qualified young male. In majority we observe full-time workers and only a few percentage of part-time teleworkers. In terms of the kind of contract it is verified a balance between full-time permanent contract and full-time with periodic contracts. The few experiences indicate that "telework" can be a stable job, and used in a shared employment system. But this means that are jobs in rotation? or jobs within a shiftwork system? Or, mainly, an independent job performed high qualified person (consultant, maintenance technician)?

Skills and qualifications in a changing context

An analysis of the emergent new practices in information society needs to take into account the role of workers in technology support development and the application of modern ICT among inquired companies. To measure the degree of importance of certain workforce characteristics, companies were confronted with different situations in a way to consider skills and qualifications amongst the organisational changing process in the last five years.

Table - Importance degree of skills (% of inquired firms)

	Less Important	Equal	More Important
Responsibility (care for the ultimate result or assigned tasks)	0,1	13,2	80,7
Social competencies (ability to co-operate, consult, communicate)	0,2	25,4	72,4
Information processing qualifications: handling electronic data, computers.	0,1	13,6	71,5
Creativity and initiative	0,1	39,0	58,2
International skills (languages, knowledge about other countries)	0,2	37,7	33,7
Specialised professional qualifications	12,2	35,0	50,3
Multi-skilling (broader qualifications, from different professions)	2,0	29,5	50,4

Practical knowledge (knowledge which must be acquired in the production process)	2,6	29,1	48,9
Organising skills (ability to organise and plan one own work)	0,4	13,3	34,1

As we can observe skills or competencies that become more important for workers in the core process all over the changing contexts are fundamentally related with individual characteristics of workers. In fact, responsibility taken as the care for the ultimate result or assigned tasks was referred by 80,7% of the companies as the capability that becomes more important in the last 5 years of organisational changing. At the same time social competencies of workers were stressed by 72,4% of inquired companies as growing skill among workers, namely their ability to co-operate to consult and to communicate.
Skills and qualifications related with technology and ICT application was carried by 71,5% of the companies. In reality, this can corroborate how important became skills related with the emergent technological paradigm like handling with electronic data or computers. All hierarchical levels of the workforce and not only top/middle management are implicated in this new ICT skills based context.
Skills that become less important for workers all over these changing contexts are fundamentally based on the required specialisation of post-fordist models. However, we can't forget that about 50% of inquired companies stressed that specialised professional qualifications got importance amongst organisational changes. With this we perceive that skills based on ICT are emerging as well as a kind of organisation compatible with it. Nevertheless, it's still very high the importance degree of skills and other competencies associated with *old* organisation structures not friendly with ICT diffusion in most part of the cases. ICT needs new contexts taking into account the new organisational environments associated, for example, to globalisation and all relevant criterions connected to these transformation process. Companies need to develop new sensibilities, but also other institutions should do it in a way to interact together and co-operate towards an emergent transformed context. Finally, skills and competencies that maintained their importance degree equal in the middle of these changing contexts were creativity and initiative of workers (39%), international skills like languages or

knowledge concerning other countries (37,7%) and specialised professional qualifications (35%).

Major issues under discussion

To summarise, the main issues that we could find in our national study on the dimensions of technological practices and its influence in work organisation in industry, can be the following:

- The majority of inquired companies (77,1%) referred at least one kind of changing. Organisational changes stressed by the inquired companies are fundamentally related within numerical flexibility (downsizing, enlargement or splitting of the companies). The effects so far conferred to the globalisation processes assume, in the present case, a pertinent role namely the nearly 50% of companies that were a target of geographic (re)localisation of activities or even the nearly 35% of inquired companies that established strategic alliances with other companies.
- Quality was the most important criterion in the competitive market dynamics. It's followed by innovation (17,1%) as the market criteria more referred. Productivity and flexibility were draw both with 16,2%, and finally, the delivery periods were referred in the last position (5,4%).
- 89,5% of the inquired companies affirmed the existence of a *local area network* (LAN). Nevertheless, we must consider that 75,2% of them still have stand alone PC's even if they apply simultaneously any kind of computer infrastructure.
- Product flexibility (specified by the customer or with standardized variants) is a constant variable and from which the most important market criterion depends. The majority of companies (38,7%) affirmed the existence of products or services with standard variants.
- Companies at the sample have experienced a tendency of schooling levels increase of their workers, although the average is still very low.

- Workers with between 25 and 39 years old constitute the most frequent category within the inquired companies. However, younger workers tend to increase their weight when compared with workers with over 40 years old in national industry.
- Independently of the type of orientation or organizational design, ICT diffusion and application towards companies go side by side with changing strategy (most of them as a market reactions and demands). A large majority of firms tend to adopt 'lean' strategies in terms of personnel or internal immaterial investments.
- The design of new organisational realities, namely teleworking, it's not a quite disseminated practice amongst inquired companies: about 94% of them refer the total inexistence of any telework form or teleworkers.
- It's still very high the importance degree of skills and other competencies associated with *old* organisation structures not friendly with ICT diffusion in most part of the cases. ICT needs new contexts taking into account the new organisational environments associated, for example, to globalisation and all relevant criterions connected to these transformation process. Companies need to develop new sensibilities, but also other institutions should do it in a way to interact together and co-operate towards an emergent transformed context. Success doesn't occur only by the technical integration among activity stages, but it depends fundamentally on a human-machine relation integrated in several work contexts.

But this left open other issues for an increased discussion on new field for sociological debate on the information society trends of change, as a) the networking forms of organisation, b) the social and cultural effects of emergent globalisation, c) the new problems of an incresed importance of lifelong learning/education, d) the technicial issues of distributed management, e) the flexibility of working time and telework, f) the development of task-based work, and g) the new problems for social dialogue.

Social exclusion and Information Society

ICTs have had a major impact on skills and qualifications. On the one side, they can contribute to the improvement of qualifications in the labour market but, on the other side, they can have the opposite effect, when considering workers that do not have the required skills and qualifications to work in this changing labour market. Actually, there is a strong need for a qualitative adaptation of the labour force: “The technologies underpinning the development of the information society are in rapid evolution. Advances in information processing and communications are opening up exciting new possibilities. There is a shift from stand-alone systems to networked information and processes. Digitalisation is resulting in the convergence of information processing, communications and media. However, the increasing diversity and complexity of systems is also presenting new challenges for their development and use”.[3] The fact is that, even if the diffusion and application of new technologies is lower in Portugal comparing to other EU countries, the dissemination of ICTs is increasing (in particular, during the last decade) with all the impacts on skills and qualifications' requirements.

There were some difficulties regarding the implementation of a planning policy that was coherent with the diffusion of ICTs.[4] Management strategies are, in many cases, based on unstable and precarious work forms mainly oriented to cost reduction (labour force) all along with insufficient training. Actually, training is considered out of join of the real needs and this is one of the features of traditional management.

Strict qualifications and insufficient training are associated with traditional forms of work organisation, even when the application of ICTs exists - there is a weak diffusion of new work organisations form and participative management methods. In these terms, the introduction of new technologies assumes very often a "technicist perspective", supported in a great extent by "unilateral decisions and less personal involvement".[5] Which reveals a lack of insight to the “risk” groups in information society that can increase the social inequality processes.

Firms are trying to provide the best answer in terms of quality, flexibility, productivity and cost reduction and searching new ways to fulfil these requirements, following

---

[3] In: Creating a user-friendly Information Society: Introduction - http://www.cordis.lu/esprit/src/istwork.htm - 5 November 1997.

[4] MONIZ, A.B., KOVACS, I., Evolução das Qualificações e das Estruturas de Formação em Portugal, Lisboa, Instituto do Emprego e Formação Profissional, 1997. This study made a reference to Porter Report concerning Portugal: Monitor Company, 1993.

[5] MONIZ, A.B., KOVACS, I. Op. Cit. 1997, 83.

different strategies. Information society is often defined as a knowledge society, based on know-how, skills and wisdom (we can distinguish several kinds of knowledge: theoretical, abstract, technical, practical and tacit knowledge). However, within this new framework, we must anticipate some concerns, avoiding the exclusion of certain groups in society, namely handicapped and older citizens. At the same time, the increase of computerisation in work and leisure implies a major capacity for innovation and for adaptation and change.

The productive system is characterized by a weak market share and based on sectors characterized by low and medium-low technology intensities, although there are some important and advance niches and sub-sectors (electronics, auto industry, chemistry). The relative weak scientific and technological performance results clearly from the structural limitation and the low investment mentioned before, but above all reflects the inadequacy of this type of analyses for discussing the process of technological change in Portugal [6].

Therefore, we can say that our case studies tend to agree with the first half of the SOWING hypothesis once *"*ICT is implemented within the existing organisational structures. In most of the cases, the organisation influences the design of technology at firm level. Once ICT is implemented, technology driven phenomena influences the organisation".

The Portuguese cases studied point out to organisational changes supported by ICT, but not determined/induced by it. For most of the changes that were recently developed, ICT had an important role. In the cases where ICT is already implemented, the new organisational options will take into account ICT installed resources. The ICT can further induce new working procedures. There are even experiences where new techniques are being developed based on working teams based on concurrent engineering methodology. Nevertheless, the effects on working conditions and job opportunities , implies the study of new alternatives and problem prevention.

There is a belief that the technology is able to promote an internal cooperation culture toward a better integration among departments removing heavy hierarchical decision making flows. This is not verified in most cases. The organisational rules, culture, relationships depend more on traditions in the sector or region, and on the market

relations, rather than on ICT. Most of interviews (and other sociological studies on the theme) concluded that social skills can be considered relevant in a way they can't be learned or changed that easily as ICT related skills [7].

So, as in other countries and regions, independently of the economical development level, we didn't found explicit technological determinism in the relation between ICT and social exclusion. But, if the *direct* risk of exclusion is not present in any of the cases studied, the *indirect* one can be more implicit whether organisational processes can take place decreasing the levels of employment security, or even precarising the industrial relations. Some outsourcing, or mostly, rationalisation processes can in the near future endanger some workplaces in some firms.

---

[6] cf. CONCEIÇÃO,P. and HEITOR, M.: 2000

[7] p.e. MONIZ and KOVÁCS, 1997, op. cit; or KOVÁCS and CASTILLO, Novos Modelos de Produção: Trabalho e Pessoas, oeiras, Celta, 1998