Quality and work organization with advanced automation in Portugal

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Quality and Work Organization with Advanced Automation in Portugal [i]

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Abstract. In this paper it is analysed the relationships between work organisation and quality systems in firms that uses some forms of advanced automation. Are characterised the existing quality control structures in the Portuguese industry, and the main factors that hidden or fosters the development of sociotechnical methods of quality control organisation strategies. Are analysed some industrial cases that explains more clearly the critical issues of the implementation of quality systems and work organisation systems. A few recommendations are given about the possibilities for the development of new forms of work organisation aith quality systems associated to automated manufacturing systems.

JEL classification: D24; L23; O14; O33

1. Introduction

The increasing market competitiveness felt all over the world has been perceived by Portuguese economic forces as a serious threat in the near future. The general belief is that, to become more competitive, Portuguese products and services have to be improved with regard to quality and productivity [1]. To tackle with the problem, a few initiatives have been carried out throughout the country, both at central and regional levels. Among them, one can cite the organisation of awareness seminars, the creation of infrastructures such as quality control laboratories and technological sectoral centres, the funding of new industrial equipment, the promotion of a national quality campaign and several other activities related to quality and productivity improvement under the umbrella of the program PEDIP.

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As a result, there has been a slight change in managerial attitude and some firms have started the development of new management systems towards a total quality and productivity culture, which also imply new forms of work organisation. It is felt, however, that much more has to be done and achieved, especially with regard to small and medium-sized enterprises which form the great majority of Portuguese industry.

The present analysis is based on recent studies and results obtained from a survey which was undertaken in 1992 in Portuguese industrial firms. The survey was funded by the Ministry of Industry in the field of PEDIP [2]. About a thousand questionnaires were sent and 120 responses were received, 111 of which were analysed. This sample will be thereafter considered as A1 (sample 1). Sample 2 (A2) is composed by 41 firms (37% of sample 1), in which some type of quality control activity was found with advanced technologies. After this sample was analysed, it was concluded that only 11 of those firms, corresponding to 10% of sample A1, had or are introducing Quality systems. In this paper the sample formed by the above mentioned 11 firms will be designated as A3.

2. Data analysis

Portuguese firms seem to be really concerned with quality and productivity improvement, as Table 1 shows. In fact, these two features come first, in a scale from 1 to 5, among the objectives mentioned in the questionnaire. Results also show that, firms of A2 and A3 samples are more worried with quality, productivity, working conditions improvement and human resources than those of A1.

Table 1 – Firms objectives

Firms objectives	A3	A2	A1
Increase of productivity	4.8	**4.9**	4.4
Quality improvement	**4.8**	**4.8**	4.4
Improvement of working conditions	3.7	**3.8**	**3.4**
Development of human resources	**4.3**	**4.0**	3.3
Improvement of Management Quality	**4.7**	**4.4**	3.8

As regards critical issues, work organisation is one of main concerns (Table 2). Lack of qualified workforce seems to be of great importance for firms in which integrated quality systems already exist (or are intended to be implemented), but the lack of motivation is not a special preoccupation in these enterprises.

Table 5 - Critical issues

Critical issues	Value (Scale 1-5) A3	A2	A1
Existing work organisation	3.4	**3.6**	**3.5**
Lack of personnel motivation	2.6	2.8	2.9
Lack of skilled personnel	**3.9**	3.5	3.4

Another important feature, since the late 80s, has been a more intensive use of new technologies within Portuguese industry. A sociological survey conducted in 1986 and interviews carried out in 1987-88 [3] showed that about 21% of industrial firms used some sort of advanced technological system (CAD, CAD/CAM, PPC, etc.). Computers were mainly used in administrative and financial management (37%), and in production management (12%). Use of CNC machine tools or manipulators and robots was quite limited (2.5%). The same happened with the use of new quality and R&D techniques (4%). Recent results from the 1992 survey [2] show that the diffusion of new technologies has increased, especially in the late 80s, in the following areas:

- Administrative and financial management computerisation,
- Computer aided design,
- Quality control,
- Machining.

Data also shows that there is a change in production strategies. In fact, for the past five years, companies have been directed towards new markets and specialisation in few products. In the mid term companies plan to be even more directed to new markets but, at the same time, they plan to introduce new products (table 3). On the other hand, priority given to the specialisation in few products decreased. This is true both for A2 and A1 samples. It is logical that to consider new markets and products as priorities will imply the development of appropriate advanced technologies and quality systems.

Table 3 Production strategies (%)

Production strategies	**A2**		**A1**	
	In the last 5 years	For the next 5 years	In the last 5 years	For the next 5 years
Specialization in few products	**24**	19	20	15
Market specialisation	20	15	18	16
Product diversification	14	11	17	11
Penetration in new market	**25**	**29**	**22**	**30**
Introduction of new products	12	17	16	20
Integration in networks	5	8	4	6
Others	1	1	2	2
Total of choices	100	100	100	100

Table 6 also shows that the integration in networks starts to be important for Portuguese industrial firms. One can then expect organisational aspects to improve, although quite slowly, due to the greater development of relationships between firms (including subcontract links), especially in those firms with quality systems and advanced technologies. As far as work organisation is concerned, it could be concluded that Taylor principles still exist in many of industrial enterprises.

Table 4 Characteristics of work organisation (%)

Characteristics of work organisation	Yes			No		
	A3	A2	A1	A3	A2	A1
Workers do simple tasks easily performed	36	83	**89**	**9**	17	5
Repetition of the same task by the same worker exists	45	83	84	9	17	11
Attribution of a job to each person	36	63	72	**55**	**37**	23
Each task has a pre-determined time and way to do it	73	**85**	74	18	15	**20**
Supervisors have as main function the control of orders execution	**73**	71	77	27	29	15
Only management and supervisors are responsible for the design and/or preparation and job control; workers do not take decisions about issues related to their job	18	61	68	55	**37**	26
Work is performed individually and not in group	18	73	77	55	27	19
Total of firms	11	41	111	11	41	111

There is, however, an important segment in which work organisation does not follow the classical principles (as shown above). It has to be noted that only in 36% of A3 workers easily perform firms' simple tasks. On the other hand, there is a significant difference between the two samples as far as work planning and control and teamwork are concerned. As can be seen, there are much less cases in A3 in which "only management and supervisors are responsible for the design and/or preparation of job control" or in which "work is individually performed and teamwork does not exist".

It can be concluded that the tendency for flexible and multi-skilled working methods also increases, when concern about quality matters grows, which is according to the theory of TQM. In fact, as the broad literature on the matter can show, Taylor model of organisation has been one of the main obstacles to the implementation of appropriate quality systems. Results on the work place where quality control is performed seem to confirm these remarks, as showed in the next table.

Table 5 - Location of quality control

Quality control	A1 %	A2 %	A3%
In each job by the operator	37.8	73.2	72.7
By specialists	36.9	73.2	72.7
Materials control (laboratory)	54.1	56.1	81.8
Final product control (laboratory)	47.7	63.4	81.8

This data shows once again that there is, in A2 and A3 samples, a greater motivation towards a total quality philosophy and new methods of work organisation than in A1. Still related to work organisation, one can see in Table 6 that the most common forms have been multi-skilled working groups and job rotation.

Table 6 - New forms of work organisation

Forms of work organisation	**A2**	**A3**
Job Rotation	56.1	52.3
Multi-skilled Working Groups	58.5	63.6
Self-managing Work Teams or production cells	32.0	45.4

Self-managing work teams, i.e. groups of workers who can plan, execute and control their work, thus contrasting with the traditional Taylor system, have greater expression in sample A3. Also in this sample the definition of task execution and planning is allocated in 45% of the cases to the working teams. As regards participation and representation of work force in problem solving, it can be concluded that legal representatives, such as trade unions, have been dominant in A1 (table 7). It is believed, however, that participation of unions and quality circles (or similar types of quality teams) will tend to grow in the near future.

Table 11 Participation instances

Participation/representation instances at firms	A1 (%)	A2 (%)	A3 (%)
Workers Committees	**26**	24	18
Union leaders/Union Committee	**54**	46	36
Committee for Working and Safety Conditions	50	54	**55**
Quality Circles, Progress Groups, Suggestions Systems	29	34	**55**

In Portugal, more than in other European countries, modernisation of companies is done without direct or indirect involvement of work force. Thus new technologies, mainly in SME's, are introduced without union or any other workers representatives' intervention [4]. This can lead to conflicts and difficulties in the implementation of new methods.

4. Conclusions and recommendations

Portuguese industrial firms still present serious deficiencies related to productivity and quality improvement. There is, however, an important part in which new methods of organisation improvement are visible. Data showed that these firms export a great percentage of their products and, therefore, they need to be competitive in order to survive. Results from this study also showed that there is a straight relationship between advanced forms of work organisation and participation and efficient quality management systems. In fact, as companies move towards a total quality system, the need for implementing flexible models of organisation and autonomous working groups also grows.

The fact that work organisation has been pointed out as a major critical issue might reveal a certain "open mind" to new methods. It is crucial, however, that a few initiatives are taken with Government participation and commitment. Promotion of innovating experiences and discussion of their results can play an important role in achieving a change in attitudes. There has been, for the past few years, a great concern about acquisition of new equipment. This is not enough. In order to become more competitive, Portuguese industry must have organisational structures that allow and motivate workers to contribute for quality and productivity improvement.

To change attitudes, education and training will be essential. The inclusion, in training and educational programmes, of new forms of work organisation, employees' participation and quality management will certainly contribute for a quicker development. These programmes should not be confined to technicians and engineers, but must also be extended to upper and middle management and shop floor workers.

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