

## THE PROFESSIONAL ENGINEER DEVELOPMENT: FROM THE EXTERNAL CONTROL TO THE SELF-DIRECTION

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**Abstract** - *The 90's could testify the beginning of the end of the traditional organization. A century dominated by one kind of organization – the mechanical bureaucracy – is being given place, slowly, to a new age. The organizations are being forced to reformulate themselves in order to survive and have some prosperity. And so are the workers being requested to reformulate their role.*

*This paper regards the tendencies toward the improvement of the self-direction as a better and necessary way of working due this new international scenario, and the importance of the continuing education for the professional engineer.*

*The technical aspects, although not dispensable, are already not the only indicative of a professional competence. A comportamental change is necessary to follow the new work world; and the comportamental change is a very slow process, that only can be held with continuous actions. Nothing new, as we are talking about continuing education. Five years of education are not enough to gain the necessary competences required by this new world now competitive, globalized, technological, requiring interpersonal skills and responsible.*

*We will focus our paper on the benefits brought by the implementation of the continuing education process in the organizations in order to have their engineers totally up-to-date with the new global requirements. The aspect we will emphasize is the continuing education as a way to change from the external control – the supervisors, managers etc – to a new organization structure: based on the self-directed employee, better saying, the self-directed contributor. This new structure is already been tested on many organizations and already*

*Index Terms – continuous learning, new work world, flexibility, self-direction.*

### Introduction

The 90's could testify the beginning of the end of the traditional organization. A century dominated by one kind of organization – the mechanical bureaucracy – is being given place, slowly, to a new structure, pulled by forces as described per David Nadler (1999), the competitiveness

forced enterprises to find ways of reducing their costs, in money and in time, the main forces that pressures the enterprises are: the high number of technological changes – threats the positions of the several existing investments -, the new concepts of competitiveness – high number of good competitors that are emerging on the principal industry sectors -, productiveness, flexibility, the globalization, the governments participation, and the work force dynamics – changes on the work force constitution, as sex, color, education level and age are creating a work force radically different from the past.

The organizations are being forced to reformulate themselves in order to survive and have some prosperity. The successful companies will be the ones that can foresee the changes and develop their strategies in advance. And so are the workers being requested to reformulate their role.

For this new kind of organization, the control is not direct and like coercive, as it was during the Ford/ Taylor period. We are experiencing the transition from the control via the work organization, to the control sustained by workers responsibility and autonomy on their duties, and on the self-control and the inter-worker control. As an indicative of this change, on the formal structures, are the significant reduction on the number of plant supervisors.

Although there are differences between the productive sectors, two main tendencies can be high-lighted: the work division redefinition, that creates polyvalence ways of work, and the emergence of new educational requirements; that are being reflected on more formal technical trainings -facing the traditional education on the job (that do not lose any importance) – and the raising levels of workers scholarization; bringing in evidence some cognitive skills - and comportamental aspects – that are, nowadays, more important for the production process.

On this paper we present an analysis of this new work world that begins to be defined straight ahead us. Then, we will discuss the expected new concepts of workers behavior. And finally, the skills and competences that this workers, in our case engineers, should develop to maintain their careers.

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## Work World Characterization

The economy globalization, brought to internal markets new competitors, the economic crisis forced by the oil price's increase, on the 70's and 80's, were the main forces that improved this productive restructuration. The main characteristics of this restructuration, at least the ones we will analyse on this paper, are the following:

- Low investments on capital goods, maintaining the strategy of the introduction of selected new technologies.
- Changes on the work organization, considering big changes on companies lay-out. The wider use of planning methods as jit/kanbam, as well as quality tools, high-lighting the estatistic process control. Slowly, during the 90's, the management tools were being directed to Total Quality Programs.
- The authority forms of managing the work force are being combined or replaced by new standards in order to gain commitment and workers compromise trough "partnership management".
- The large use of outsourcing became one of the fundamental tools of flexibilization and cost reduction.

There is no doubt that the process of productive restructuration is a consequence of the high competitiveness on the international markets and of the difficulties to sustain or increase the profits, aiming to attend share holders interests. In order to survive to the worldwide competition, the enterprises must act with competitiveness, on a magic square: high quality, the speed on inovations, focus on client and acessible prices (Baethge e Schiersmann, 1998:21). This restructuration base is found on the flexibility of the production organization. Been so, the criterion considered on this changes are:

- production process dynamization through out and in sourcing devices;
- organization's decentralize in multi-functional units;
- transversal cooperation (in temporary and permanent projects) among the employees from different areas, qualifications and interests;
- dissolution of the traditional occupational function trough the integration of new elements on the tasks;
- non hierarchy organizations internal's.

We can see from this restructuration speed up, with significant impacts on the work productive and the jobs reduction (Carvalho and Bernardes, 1996), based fundamentally in a deep work reorganization, inside the industries, as well as outside, trough the out-sourcing, giving automation a lower signification. The analysis of this transformations happened on the last twenty years show us a clear development on some significant tendencies on the way to use and control the work force.

## The New Work Wold Requirements

The thesis about the emerging of social-cooperation and social-communicative competences, as a consequence of strutural changes on productive reorganization (Castro, 1995; Market, 1996) and the individualization of social roles (Touraine, 1995; Giddens, 1990), were emphasized, on the last decade, on the analisis about worl work changes.

Baethge observed on his reserch an important element: the flexibilization caused big distortions on the productive lines of some enterprises, due to the growing complexity of cooperation between different departments, do not demand only a flexible formal worker, but with a big ocupacional experience in the company. As also recognize Machado: (...) the total quality program's criation marks the recognition that workers are capable of problems resolution that are not unknow for the functional services and the coletive qualification recognition ignored by Taylor (Machado, 1998:37).

The work group orientation on this progressive concept, as highlited by Baethge, improve the tendency of continuos integration about profissional-technical knowledge, the interdepartamental cooperation capacity with different proffessions – overcome traditional hierarchic and overcoming the old concept of unqualified and fragmented job.

For this author the "first order effects" are the ones that beging on the global tendencies that demands enterprises and workers changes, that can be described on the enlargement dimensions of communicative competences. These competences overcome the social sensibility dimension and intent to be a link between technical and communicative competences. (...) Comparing with previous conditions of taylorist production, the enlargement of communication competences are, nowadays, on the production process context, which can be appropriated, as they are attached to the new constellations and work situations (Bathge/ Schiersmann, 1998:24).

These same tendences can also be identified on the world services sector. With the production complexity, through the informatization, the new worker becomes "the productive worker" which can be capable to observe the fast changes, to know the productive process and the work organization, that can quickly and efectively interfere in technical interference cases. This worker should, at the same time, communicate with the workers envolved on the process, aiming these problems causes in order to have it solved by the group automaticaly. The hire of this "productive worker" is continuously growing, replacing the tradicional worker. To the productive worker, the work became always more reflective and language changer, converging on signs, simbols and codes manipulation (Bartotti, 1995;apud: Chinelle/Purao, 1999:102). To this professional, the comunicative capacity become the central, for the context domination where this knowledge can be applied.

To Baethge is important that the future professional education links better the professional learning process with qualified structures of new and inovative concepts of work group, as happens in pedagogical projects as learning offices and learning islands, and on the integral policy of professional formation of workers. Thus, we can avoid social segmentations between “winners” of production reestruturation and “losers” of the outsourcing process, national and international. On this direction, a continuous education policy became imperative for global markets.

## Conclusions

The tendencies exposed allow us to conclude that the deepen and the diffusion on the productive reestruturation process on the industries on the last decade caused an impact on the worker’s requested competencies.

On the production process dimension, it means the capacity to overcome the professional/occupational limits imposed to the workers by the capitalist work division logic. On this sense, that the project of four syndicates on Germany pretends to develop the necessary competencies to “create the learning integrated to the work”.

The concepts on continuous learning, driven to psychico-social skills is capable to provoke the overcoming scission between the workers lunatic conscience and their political conscience, transgressing the capital logic. And it is on the personal improvement, based on the self controlled work and communication, that we can trace a path of worker’s emancipating competencies.

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