

SYSTEMS MEDICINE: THE REQUIRED CONCEPT OF MAINTENANCE FOR BUSINESS SUSTAINABILITY

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Abstract:

Nowadays, all the different thinking schools in technological and business world agree upon the paramount importance of **Maintenance Function**. At the same time, the progressive worth of the Activity opens a greater number of ways pointed up to the conquest of its scientific status. Taking into account this scenario, this paper investigates the new strategic role to be performed by Maintenance to assure the sustainability of business, organizations and their related physical assets, discussing the decisive modification foreseen in its own concept and definition, which will also require its Professionals empowerment in their new position: "***Systems and Machines Physicians***". For that, influences of factors such as Quality, Training, Resources, Management Performance and Maintenance Policies are herein analysed.

Key words: Maintenance, Sustainability, Business, Management, Strategies

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1. INTRODUCTION

Along his history, Human Kind has been showing that his best efforts of advance and development arise in times of crisis and difficulties, when it seems that his creative potentialities most stand out and bloom. It was so in all ages, it is being so in the present and, doubtlessly, it will be so in the future, in all the areas of Human Knowledge (Crema, 1996).

Maintenance, a typically human creation, could not escape from this context. Almost a bastard daughter of the "*Production Empire*" installed by the Industrial Revolution, it has suffered an impressive change along this few years of existence (Flores Fº, 2004). Four milestones can be considered fundamental in landmarking these changes, all four of them, as always, fruits of the need of rationalization and optimization imposed by instants of crisis (Pinto and Nascif, 2001):

- the birth of Maintenance as Corrective Maintenance;
- the advent of Preventive Maintenance;
- the arisal of Predictive Maintenance;
- the spreading of Total Productive Maintenance (TPM) and Reliability Centered Maintenance (RCM).

Certainly, many other aspects were and are important in this process of continuous evolution, but we judge that the four already mentioned better illustrate and anchor which we mean by "*crisis-powered progress*".

The planet's present situation, which experiences difficult moments of routes choice, lack of investments and natural resources, anguishes, absence of wide horizons and 2.8 billion people living with less than US\$ 2.00 a day (Senge, 2000) - i.e., a great "*pressure cooker*" - allows us to assume, based on past experiences, that we are close to great conquests, could they be social, political, technological, or - why not? - even in the Maintenance Area, which is being pointed out as the best investment for the Sustainable Development (Crema, 1996).

An early analysis could conclude that we should bet all our chips in the dissemination of TPM - Total Productive Maintenance (Nakajima, 1991) and RCM - Reliability Centered

Maintenance (Moubray, 1991) as the certain and forthcoming future of the Activity. However, we believe in the possibility of being a little bit more daring and ambitious.

Considering the present incubated effervescence conditions already described, and the Sustainability Question requirements (Gonçalves, 1997 and 1998), we think this contribution is only a drop in the perfectly plausible ocean that can appear in a not very distant future, i.e., we foresee as possible the effective conquest of Science category by Maintenance, changing the Activity into the "**Systems Medicine**".

In this process, we judge to be extremely important the participation of not only the TPM and RCM, but also other policies of Maintenance - such as Physical Assets Management (Tavares, 2000) - as well as several disciplines which are occupying ever larger spaces in the workshops and offices of the Sector, but which have been acting in a somewhat disordered and pulverized way.

We believe that, at the moment we can integrate all these efforts and turn them to the preparation, qualification and empowerment of the Area Professional, through his (or her) necessary awareness to the previewed transformation, we will be at only few steps from the desired goal, when this same guy will finally play the role that was always reserved to him (or her), that of "**Systems and Machines Physician**". The performing ways of each of these disciplines - Quality, Training, Resources, Management Performance and Maintenance Policies - in the search for this desired integration are discussed from now on.

2. THE LEGITIMATE QUALITY AS A VEHICLE OF CHANGE

The definition or concept of **Quality** leads us to meditate on the role of the client in the proposed change: "*Adequacy to Use*". Thus, the client must signalize, indicating the road to be followed by Maintenance, in the direction of obtaining the established Quality. This is the starting point for the implementation - and not the pure and simple implantation - of a Quality Management System, i.e., a work system that leads us to reach the negotiated Quality level (Cabral, 2003).

The required transformation to achieve this level of development passes, necessarily, by the Maintenance Professional awareness of the importance of the final product with Quality. Only making each one to see his (or her) mark in the final product, identifying his (or her) participation and taking pride in the result of his (or her) work and such of the team, we can obtain the engagement and integration of all participants in the project of the Function transmutation into science, i.e., into "**Systems Medicine**".

As the change of the Maintenance concept is proposed, the entire class will definitely be placed at an evidence position. Just the discovery that he (or she) is being considered important will certainly awake, in the Professional, the motivation to participate actively in the process of change, in which he (or she) will become, in a first stage, a patient, even to acquire a complete understanding of his (or her) evolution to "*Systems and Machines Physician*". After all, Pasteur had to self-inoculate to prove the efficiency of his discovery, and Freud to self-analyze, to create his psychoanalysis technique.

Then, if the Maintenance Professional awakes to the requirement of changing because he (or she) is fundamental to the Quality objectives, we will have, in the behalf of the transformation, his (or her) pride and, as Guarantee, his (or her) responsibility, calling to him(herself) the refurbishment of **Quality Assurance** concepts.

3. THE ROLE OF TRAINING IN THE CHANGING PROCESS

For the advent of this proposed Maintenance new concept, it is necessary to face the reality that the foreseen changes will not happen just in the conceptual and organizational sides (Gonçalves, 1998), but, fundamentally, it will have to include deep alterations of cultural and behavioral orders (Porto, 2004). All struggle in the direction of this conquest will be fruitless if the members of the Community are not aware motivated, to participate in this great effort, in a way that the pessimistic or skeptical attitudes could be minimized and even eliminated.

In this context, **Training** appears as one of the foundations in which the expected qualitative jump will have to forcibly support itself, in the direction of developing a new mentality, compatible with the role to be played by the Maintenance Professional. Then, the new programs to be implemented must worry not only about the technical teaching, but also about the sociological aspects which will have to be ministered (Novo, 2004).

Thus, a special care must be bestowed to the learning of relationship competences - interpersonal, with the clients, with the machines and even with the environment (Roggero, 2003). It is necessary to understand that the new times will not allow the existence of large spaces for personal conflicts which might put in risk the spirit of integration, fundamental to the success of all Maintenance Organizations. It will be of paramount importance, also, the existence of a climate of harmony with the clients; besides, the old axiom "*the client is always right*" will never be so true, having the Maintenance Professional to understand and respect it, so that his (her) new posture could also be respected and understood.

On the other hand, the relationship with the machines must incorporate remarkable modifications. The machines, devices and systems must be faced as true "*patients*" and, as so, must be worthy of a very deep attention, even when a minimal problem arises. As we know from the medical experience, the disdain and disrespect with a patient leads, often, to his death.

It will also be important the acquisition of knowledge related to dealing with the outside environment - physical, political and social (Weil, 1991). The Maintenance Professional will have to be mindful to these different outside influences and, for such, Training will have to provide him (her) with subsidies that will allow the acquisition of a holistic view of the Activity and the environment in which it is inserted.

Last but not least, we can not forsake to remark upon the position of Training in relation to the famous conflict specialization x general practice (Ulrich, 2003). We do not intend herein to discuss if it is more important that Training supplies profound knowledge about this or that discipline or simple notions of all of them. Notwithstanding, taking into account the use of increasingly sophisticated resources, we judge that a very clear movement is being made by the organizations towards the union of these two tendencies - i.e., the multi-specialization - and the employ of professionals with multiple backgrounds is becoming ordinary and natural in Maintenance (Kroener, 1989). Thus, it seems that the competences to be ministered must contemplate a large span of knowledge, establishing learning levels (Cabral, 1989 and 1990) that will be more consolidate in those areas of activity considered as preferential, according to the endowment of each individual.

4. THE IMPORTANCE OF RESOURCES AS PHYSICAL SUPPORT FOR CHANGES

A "*Systems and Machines Physician*" will not be able to work without the support of instruments and equipment compatible with a scientific performance. Thus, the monitoring of operational conditions will be the main support for the perfect carrying out of the Maintenance attributions, assuring the exact diagnosis of eventual malfunctions and the definition of the best "*treatment*" to follow - from the prescription of "*common remedies*" (re-tightenings, cleanings, alignments), up to the need for "*surgical interventions*" (revisions, overhauls, component replacements).

For that, the Maintenance Organizations must depend on sophisticated instrumental for measurement, recording and analysis of the important parameters, as well as on qualified

personnel to operate and understand it. It is clear the word 'sophisticated' always provokes shivers, since it is inextricably associated to high costs. However, we believe that the cost x benefit analysis within the scope herein presented is extremely advantageous, in view of the objective of Maintenance inclusion in the Human Sciences list, with the consequent contribution to Sustainable Development.

We can not also forsake to consider the Computer Science resources. Since the introduction of the computer in Maintenance, in the 70's, a range of facilities ever larger has been offered to the Professionals of the Sector (Tavares, 2000). Nowadays, we already have an impressive number of computerized tools to give a lot of support to the Function scheduling, execution and control. Thus, the desired change will not be able to happen without the massive employ of these resources, with which our future "*physicians*" must possess total familiarization, also allowing their participation in the design of new specific hardware and software. We glimpse, even, the implementation of on-line services in Internet for communication and spreading of similar problems and their solutions in real time, such as it is presently done in several medical centers all over the world.

On the other hand, it is important to note that a good tool is absolutely not enough to have a good professional. Talent, will and training are fundamental (Brandão and Guimarães, 2001), but they have to be associated with good techniques and good work practices.

Thus, in the development of the transformation project, it will be essential the establishment of written work procedures that will compose an actual Maintenance Manual, holding the description of "*how*" to execute each task. With this, we will be able to achieve the standardization and systematization of jobs, so important to a scientific focus of the Activity, and a better performance evaluation, besides a better work planning and scheduling. As practical examples of valorization advances of the Function, with favorable deployments for business sustainability, we can quote the Maintenance Procedures included in the Operations Manual of Eletronuclear Angra 1 and Angra 2 Nuclear Power Plants - a legal requirement that decisively contributed to change the local Maintenance Organization culture - and the EHS System developed at Petrobras, which includes Technical and Administrative Guidelines for the Maintenance activities in its several business unities and sites.

5. MANAGEMENT PERFORMANCE IN THE PROCESS OF CHANGE AND IN THE NEW ORDER

Considering the characteristics of the new attitude and position of the Maintenance personnel - participation, awareness, engagement and ownership - and taking into account that the change itself is a process which has to be assumed by the "*patients*" - the more internal it could be, the more effective it will be - an autocratic Manager will be out of tune with the proposed model. An authoritarian posture from the Manager will certainly inhibit the creativeness, the spontaneity and the involvement of the employees in the new order and in their own change.

On the other hand, the process conduction must be done by a solid management, that can be able to "*keep the deals*" during their evolution, so that the course is not deviated from the proposed objectives. Thus, there is a style of management well-defined for this stage of change: the **Sharing Leadership**, with decision authority and adequate support by the company high administration (Stodgill and Bass, 1981).

The success of the Maintenance Personnel as "*Systems and Machines Physicians*", depends on cooperation, mutual trust, honesty, responsibility and discipline, and these are values often fragile and susceptible to disastrous and inadequate managerial performances.

Being so, the modification to be introduced is as much in the execution and supervision personnel, as in the Manager, that will lead different crews, with another posture and mentality, that will demand from him (her) a new positioning, more democratic, shared, integrated. Thus, a very important role is taken by a correct, efficient, intelligent and adequate Communications, considering that, if the interlocutors change, the Manager's attitude, his (her) message and its frequency must change in the Communications process with the employees (Scofano and Reis, 2004).

6. INFLUENCES OF THE DESIRED CHANGE IN CHOOSING THE BEST MAINTENANCE POLICY

As already suggested, it seems clear that, amongst the several existent Maintenance policies, strategies and philosophies, we shall choose the RCM, in order to obtain the maximum fitting of the Activity into the analogy herein discussed. In fact, the practices adopted in the Reliability Centered Maintenance are very similar to the ones existing in Medicine, such as, for example, when we compare the systems monitoring with the medical check-ups indicated for the detection of human malfunctions. In the same way, the Trending Analysis of the monitored parameters allow us to identify **symptoms** of "*diseases*", which, together with a **history study** (i.e., the *anamnesis*), lead to the formulation of a precise

diagnosis (**determination of the root cause**) and to the prescription of the best applicable therapy in each case, enabling more **accurate** ("**where**" and "**how**") and **opportune** ("**when**") interventions.

On the other hand, we can not worry just about the selection and implantation of a determined policy, but also about its conduction. In this direction, the role of the Maintenance Manager must also stand out in the establishment of a "**Systems Psychology**", with a performance similar to that of a psychologist or even a psychoanalyst. It is necessary to know how to "*listen to the man-machine system*", find out how it "*thinks*", so that the organization of this "*thought*" can be understood to improve it. We propose this "*Psychological Managers*" must worry deeper with the social aspects of their teams, in order to develop a climate of confidence, harmony and respect to sustain the cultivation of the ideas herein presented.

Thus, we must avoid "*ready*" and imposed attitudes, ignore the conventional and search for new angles of vision, the detail, the motivation, the involvement with commitment (Rezende, 2004). In truth, the proposed Maintenance Manager may not have all the answers, but he (she) **must** be aware of all problems that come up; for that, he (she) must learn to listen and, being so, must develop and use, continuously, the "*Systems Psychology*".

To reach the objectives herein established it is still fundamental that the adopted policy includes the fierce fight for **the active participation of Maintenance in all stages of every project**. After all, the medical attendance of a Human Being is carried out since his conception and gestation ("*design*") until his adult phase ("*production*"), passing through the childhood ("*erection*") and adolescence ("*commissioning*"). Why we can not do the same with the "*Systems Medicine*"? We believe that, with this framework, a great jump will be taken in the direction of a better quality and price for the products/services and a greater economy of necessary resources, allowing the access of a greater number of people to them.

7. CONCLUSIONS

We would like to make clear that our intention here was not to make bad philosophy, nor take on dreamy or romantic attitudes. We just think that, with the actual great advances of Maintenance Function and the excellent perspectives for its strategic role in the Business Sustainability area, there is no other way left to this Activity but that of its promotion to the category of Science.

Thus, we seek only to plot a parallel between the Function and the Human Science which is closest to it, i.e., the Medicine, which can be considered, without any presumption

and by definition, as the "*Maintenance of the Human Being*". Hence, why can't the Maintenance be the "*Systems Medicine*"?

On the other hand, we must once again reinforce that no conquest is achieved exclusively by outside pressures and influences. Such forces are important and must be considered, but the movement in the direction of a great transformation must have its main fulcrum located in the core of the organism that desires to change. Considering this evidence, it must be fixed that the conceived alteration must not happen just in the conceptual and organizational fields, but will have to happen mainly in the cultural and behavioral sides of the question, through the mentality and posture change of all the community members.

It is also worth to remember that the efforts to achieve this ancient longing of the Maintenance Community can not come forth in an isolated form. It would be pointless to invest only in Quality, only in Training or only in Resources. Doubtlessly, to guarantee consistent and real advances, an integrated and systemic approach in all the areas is mandatory.

Briefly, we intended herein to present a new focus for the Maintenance Function, from the inside and outside points of view, since the scenarios shimmering nowadays will demand basic modifications in the attitudes of the Maintenance Personnel, which will allow them to perform the respectful and prominence role of "*Systems and Machines Physicians*", contributing decisively to the Business Sustainability.

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