Organizational Culture and its Effect on Continuous Improvement Tools – Total Productive Maintenance

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Abstract

This paper is geared toward evaluation of the relation between the organizational culture and continuous improvement tool – Total Productive Maintenance (TPM). The data set used in this research included all managers and experts of Automotive organizations. The data set was incorporated in this paper as a sample in full/complete executive category (n=175). Questionnaires of personal traits (developed by the author), Marshal Sashkin organizational culture were used to collect information. This is a correlation research conducted using Pearson correlation test, independent groups T-test, one-way analysis of variance and LSD post hoc test. Results indicated that there is a significant positive correlation ($P < 0.045$) between the organizational culture and TPM.

Keywords: Continuous Improvement Tools, TPM, Organizational Culture, World Class Manufacturing

1.0 Introduction

Business and technological changes are threatening organizational sustainability and modern management faces many challenges (Drucker, 1999). Organizations are continually under competitive pressures and forced to re-evaluate their business models and underlying business processes. Operations management thus focuses on the careful management of internal processes along with processes in the supply chain, particularly by improving their efficiency and effectiveness, which are today needed more than ever. The extensive literature on business process change (e.g. Davenport, 1993; Hammer and Champy, 1993; McCormack and Johnson, 2000; Burlton, 2001; Harmon, 2003) suggests that organizations can enhance their overall performance by adopting a process view of business. However, what is too often neglected is that most problems regarding business process management are not technical but arise from an inappropriate organizational culture that may impede innovations being implemented and superior performance being achieved (see e.g., Terziovski et al., 2003; Hammer, 2004). Robert Queen believes: recognition of an organization is a fundamental step toward recognition of organizations, and performance and behavior or its staff. This is due to the fact that alterations and new orientations may be easily facilitated and effected by and of the culture. Unfortunately, enhancement of the organizational culture is not considered as the most crucial responsibility of managers (Richard,m. Morries 1996). However, many researchers have described the culture as a predictive factor indicating success of an organization (Yun Seok, 2007). Dellobe, Haccoun, and Vendenberg (2000) have recently made reference to the understanding of the organizational culture as one of the most powerful theoretical tools for development of an organization. On the other hand, one of the most important factors causing dynamism and survival of organizations is adopting continuous improvement tools. Given the fact that the organizational culture and continuous improvement tool are two important factors behind dynamism and success of each organization, this research is oriented toward identify the relationship exist between the organizational culture and continuous improvement tools especially TPM in an automotive organization.

2.0 Organizational culture

An organization's culture is its set of shared ideas and values that serve as a means of accomplishing its mission. As such, it can and does play an important role in many facets of the organization. In general, organizational culture represents the pattern of values, beliefs, and assumptions shared by members in an organization (Sigler and Pearson, 2000; Schein, 1985, 1992). Specifically, organizational culture is defined as ''a pattern of basic assumptions invented, discovered, or developed by a given group as it learns to cope with its problems of external adoption and internal integration—that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems'' (Schein, 1985). The values, beliefs, and assumptions underlying an organization's culture bind its employees together and become the manner or strategies through which the organization achieves its goals (Marcoulides and Heck, 1993). Culture has been simply specified as "the glue that makes up a common identity between different individuals" (Smircich and Morgan, 1982; Smircich, 1983; Wilkins and Ouchi, 1980).

Established organisational cultures are expected to induce inertia, maintain social structures and promote unitarianism (Schein, 1985; Young, 1989; Borum and Pedersen, 1992). Despite this, organisational cultures have not always displayed the level of cohesion that has come to be expected. Harris and Ogbonna (1998) associate cultural influences with a low willingness to change, they also identified that subcultures can contribute to a translation of the culture into modifying values. The essence of a company is expressed by the way it does business, the way it deals with its customers and employees, and the level of autonomy it grants to its members. The dimensions of organization culture are shown in Table-1.

Dimensions of organizational culture (adapted from Robbins, 1999)

Dimension	Description
Innovation and Risk	Corresponds to the level to which employees are motivated to be creative, to innovate, and to shoulder risks when taking decisions
Detail Orientation	Corresponds to the level expected to which employees demonstrate precision, analysis, and attention to details
Outcome Orientation	Corresponds to the level on which administration focuses more on results than on techniques and processes used to obtain them
People Orientation	Corresponds to the level on which decisions of the administration take into account their effects regarding people in the company
Team Orientation	Corresponds to the level on which work activities are done, having the team for base, rather than each member individually
Aggressiveness	Corresponds to the level on which people are more aggressive and competitive than cooperative
Stability	Corresponds to the level on which activities focus on maintaining *status quo*

Table-1: Dimensions of organization culture (adopted from Robbins, 1999)

As the organization's cultural values shape the character of an organization and enable the employees to define their understanding of reality, it drives the way things are done in the organization (Nahm et al., 2004), organizational culture may be viewed as an explanatory variable that distinguishes one organization from another (Schein, 1985) and affects the way the organization operates and consequently plays an important role in many facets of the organization (Denison and Mishra, 1995; McDermott and Stock, 1999). Group culture focuses on flexibility and internal maintenance by emphasizing strong human relations, cohesion, and participation of members. Developmental culture emphasizes flexibility but external positioning through growth, resource acquisition, creativity, and adaptation to the external environment. Rational culture puts a focus on the external environment while stressing control by encouraging competition and achievement of well-defined goals. Hierarchical culture emphasizes stability and internal organization and thus stresses centralization and regulations with rules and routinization (Cameron and Freeman, 1991; Denison and Spreitzer, 1991; McDermott and Stock, 1999). Organizations seldom reflect only one culture type; rather each organization will exhibit a combination of different culture types, although it may be that one type is more dominant than the others (McDermott and Stock, 1999; Quinn and Spreitzer, 1991). The

ratings on the four culture types may vary independently (Quinn and Spreitzer, 1991). In other words, a high rating on one end (e.g., internal orientation) does not exclude high rating at the other end (e.g., external orientation) (McDermott and Stock, 1999). Though the framework is divided into named quadrants with distinct characteristics, no organization is likely to reflect only one value system. Instead, one would expect to find combinations of values in one company, with some more dominant than others.

3.0 Continuous Improvement

CI comes into world in the field of manufacturing for the purpose to reduce cost and improve quality (Tersine, 2004). It takes its initial shape as suggestion scheme in its early sprout. The suggestion scheme also contains corresponding incentive and reward plan. In such a programme, employees are treated as individuals that have the ability to 'think', not just to 'execute' (Ishikure, 1988), though in the Japanese form individuals act collectively in organizations such as Quality Circle (QC) team. CI includes a range of concepts from employee involvement, empowermnt, teamwork. The philosophy that employees are able to think is a deviation from the traditional Taylorism approach. Consequently, the launch of CI implies a culture transformation from centralization to decentralization, from expert governance to high involvement management (Savolainen, 1999). CI was finally defined as 'the planned, organized and systematic process of on going, incremental and company-wide changes of existing practices aimed at improving company performance' (Boer et al., 2000). CI has benefited countless of manufacturing companies in Japan and many other countries. The early examples could be dated back to the 19th century in the UK and the USA (Schroeder and Robison, 1991), whilst Japanese fully exploited the potentials of this approach in the mid and later of the 20th century in the form of *Kaizen* (Imai, 1986; Nonaka, 1991; Schroeder and Robison, 1991). So many efforts have been poured into the research and application of CI that it becomes the core instrument of incremental organizational change afterward. CI is organization-specific in nature and path-dependent during acquisition (Teece, Pisano and Shuen, 1997). The process of CI is evolutionary and developmental. A suggestion scheme will ultimately transform the organization in aspects of structure, leadership, culture and so on by accumulative effect, acting as an approach of incremental organizational change and development. Its ultimate outcomes shift from operational objectives (productivity and quality) to strategic competitive advantage (sustainable dynamic capability).

Improving the performance of the process is fundamental to a firm's business success. In an attempt to improve quality, firms have pursued many continuous improvement programs, most notably total productive maintenance (TPM). As companies such as BIRLA, TVS, TTK, APPOLO claimed substantial benefits (up ward trend of productivity, quality, safety and morale) from their investments in adopting TPM. In order to better understand whether and how TPM approaches affect organizational performance, it is important to study the organizational contexts in which these approaches are implemented (Sousa and Voss, 2002). While the impact of organizational culture on TPM, despite the recognized important continuous improvement tool of TPM adoption and deployment on the organization culture have called for research investigating the culture changes.
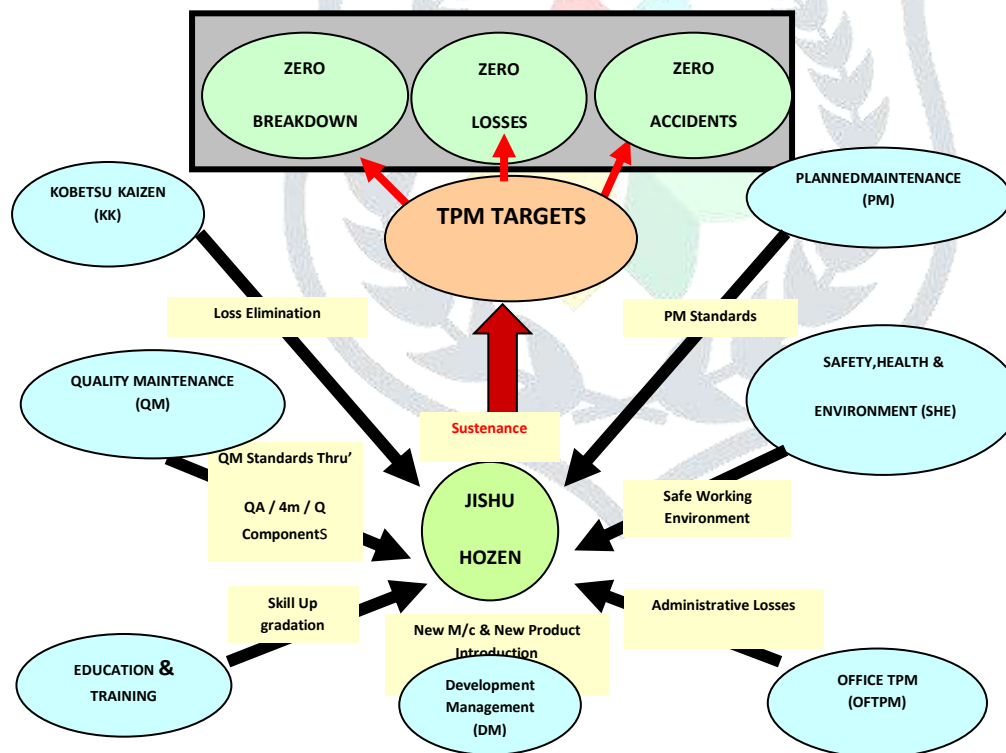
3.1 Total Productive Maintenance (TPM)

In response to the maintenance and support problems encountered in manufacturing environments, the Japanese developed and introduced the concept of Total Productive Maintenance (TPM) initially in 1971. TPM describes a synergistic relationship among all organizational functions, but particularly between production and maintenance, for continuous improvement of product quality, operational efficiency, capacity assurance and safety (Nakajima, 1988). TPM seeks to engage all levels and functions in an organization in maximizing the overall effectiveness of production equipment. Whereas traditional preventive maintenance programs are centered in the maintenance departments, TPM seeks to involve workers in all departments and levels, from the shop floor to senior executives, in ensuring the effective operation of equipment. TPM combines the American practice of preventive maintenance with the Japanese concept of Total Employee Involvement (TEI) (Maggard, et al. 1992). The word "total" in TPM has the meanings of i) "total

effectiveness", ii) "total maintenance system", and iii) "total participation" (Nakajima, 1988). TPM focuses on the use of basic resources like man, machine, and materials towards the state of zero defects, zero breakdowns, and zero accidents. The target of TPM is to achieve the above-mentioned 'ZERO' objectives (TPM Co-ordinator, 2004).

In TPM, the machine operators must be trained to perform daily or simple maintenance work whereas in most of the traditional production the operators are not viewed as a member of the maintenance team. The main contribution of TPM implementation is teamwork and maintenance practices (Rolfsen and Langeland, 2012). Preventive maintenance was introduced into Japan. Nippondenso, which is the part of Toyota, was the first company in Japan to introduce plant wide preventive maintenance in 1960. TPM implementation could not be successful in many manufacturing industries due to many obstacles or problem (Majumdar and Manohar, 2012). In preventive maintenance, the operators were producing goods on machines and the maintenance personal was busy in maintaining those machines. Autonomous Maintenance is one of the features of TPM. The implementation of all the 7 steps of autonomous maintenance in any organization will benefit (Lazim et al., 2009).

The TPM activities have been carried out in the organization using the pillar structure framed by the Japan Institute of Planned Maintenance (JIPM), Japan (Tokutaro Suzuki, 1999). The TPM pillars in the manufacturing organization consist of 1. Kobetsu Kaizen (KK); 2. Quality Maintenance (QM); 3. Education and Training; 4. Development Management (DM); 5. Office TPM (OFTPM); 6. Safety Health Environment (SHE); 7. Planned Maintenance (PM); and 8. Jishu Hozen (JH). Among the eight pillars, the most important TPM pillar is Jishu Hozen (JH) i.e., autonomous maintenance. All other pillar efforts concentrated on the improvement of JH pillar are shown as in Figure 1. The aim of JH pillar is to make the machine operator carry out the maintenance function i.e., "I do, I maintain" and implement the concept of "My machine, My cell, My business", creating ownness in the operation being carried out (Tokutaro Suzuki, 1999).

Figure-1: TPM Pillars & Its link

Muthukumar et al (2014) studied the effect of imperative factors of continuous improvement tool– total productive lean manufacturing for improvement of organizational culture towards world class performance. Their research focused mainly to acquire world class manufacturing performance status an organization should implement continuous improvement tools in their manufacturing process. They have concluded that the organizational culture can be improved by implementing continuous improvement tool – total productive lean manufacturing in order to achieve world class manufacturing performance standard.

4.0 Objective

To find out the relationship between organization culture and continuous improvement tools – Total Productive Maintenance

5.0 Method

This is a correlation and descriptive research conducted as field study. The data set includes managers and experts in the automotive organizations (N=230). Statistical samples of this research equal the data set, while census is used as the selection method. Statistical operations were conducted on 175 questionnaires as some questionnaires were either incomplete or never returned. To collect data, Questionnaires of Marshal Sashkin organizational culture (1996) was used. Collected data were analyzed by the descriptive statistical method. Pearson correlation coefficient was used at a significance level of $\alpha=0.05$ to determine the relation between the various types of organizational culture and the continuous improvement tool of TPM.

5.1 About survey

To assure the conceptual equivalence of the translated questionnaire, the survey was validated through two pilot studies. First, a committee reviewed the conceptual and measurement issues of the survey qualitatively. After that, eight experienced nurses tested the questions. This led to a small adjustment to clarify some of the question structuring (Trost, 2001). The survey included registered and assistant managers, supervisors, experts, and personnel connected to more automotive organization. Informed consent was obtained from the head of the departments before the study started and each respondent was given written information and could choose whether or not they would participate in the survey. The managers of the various departments were contacted and informed about the study and in addition to this letters explaining the aim of the study together with a self-administered questionnaire collecting descriptive data were sent out. Response envelopes labeled with a code for each department/ organization culture were included in the letters. The answered questionnaires were sent anonymously back to one of the authors. One reminder note was sent out after three weeks. By this categorization of the questionnaire issue, retrieval becomes easier for analysis and framing conclusion.

6.0 Results

Research findings are presented in Table 2. Research results showed that there is a significant positive relation between the organizational culture and TPM of automotive organization (P<0.05).

It may be seen from comparison of different organizational culture types with TPM pillars in Table 2, that the highest and lowest correlation belong to Jishu hozen pillar and New product development pillar respectively. Meanwhile, all the 8 pillars have relation with various types of organization culture. The empty cells indicate that the p value obtained is more than .05 (significance level) so the data related to this cells are not displayed and the relation obtained is also very less between these pillars and the culture types.

Various types of orgnisation culture			Pillars of TPM						
Dimension/components		Kobetsu kaizen	Jishuhozen	Quality maintenance	Office TPM	Safety health environment	Planned Maintenance	Education & Training	New product development
Administrator	Hiearchial / Security / Control / Documentation / Centralisation / Stabilisation				Corr : 0.15, Avg : 22, Standard deviation 19.86, p<0.013	Corr : 0.11, Avg : 14, Standard deviation 12.86, p<0.022			
Achiever	Market/Rational / Goal accomplishment / Result orientation / Aggressiveness / Market leading / Competitiveness	Corr : 0.18, Avg : 20, Standard deviation 9.86, p<0.035							Corr : 0.02, Avg : 10, Standard deviation 7.05, p<0.025
Enterprener	Developmental/Adhoc / Resource acquisition / Flexibility / Creativity/innovation / External conentration			Corr : 0.15, Avg : 15, Standard deviation 3.86, p<0.012			Corr : 0.16, Avg : 12, Standard deviation 1.86, p<0.035		Corr : 0.2, Avg : 11, Standard deviation 10.95, p<0.028
Facilitator	Group / Team work / Human development / Commitment		Corr : 0.28, Avg : 50, Standard deviation 5.76, p<0.045					Corr : 0.22, Avg : 20, Standard deviation 2.72, p<0.033	

Table-2 : Correlation between the Organization culture types and TPM Pillar

7.0 Discussion

Results of this research indicated that there is a significant relation between organizational culture and TPM of automotive organization. This research did not indicate a linear relation between the organizational culture and TPM pillars. This discrepancy is probably due to the difference between the data sets and various cultures particularly in small work groups, in addition to difference of the existing structures influenced by those cultures. Anyway, findings of this research suggest that managers should apply various methods to introduce and implement TPM for the growth of the organization. In addition, there is a significant relation between the Jishu hozen & Education training pillar with group culture. TPM has strong correlation with the Group culture and having weak correlation with market culture.

8.0 Conclusion

The relation between the organizational culture and continuous improvement tool – Total Productive Maintenance (TPM) is analyzed in this research by considering the managers and experts of automotive organizations. Questionnaires of personal traits (developed by the author), and Marshal Sashkin organizational culture were used to collect information. Pearson correlation analysis, independent groups T-test, one-way analysis of variance and LSD post hoc test were used to analyze the data. The results show that different types of TPM support different organizational culture. Irrespective about the types of organizational culture the TPM will have an impact towards achieving excellence.

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