ROLE OF ETHICAL FACTORS IN 5S AND TPM IMPLEMENTATION: STUDY OF KURDISH CEMENT INDUSTRY, IRAQ

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Abstract- Organizations pursue policies and strategies to gain competitive advantage against their competitors. To overcome cost issues and production quality issues, many organizations adopt lean manufacturing techniques such as 5S and TPM. However, many of these organizations especially in developing countries face problems in effective and successful implementation of these techniques 5S and TPM. This is mainly due to lack of employee related factors that are not considered when organizations adopt these techniques. The present study attempts to investigate the role of ethical factors in the implementation of 5S and TPM. The results of the study reveal that manager-subordinate relationship (empowerment) is having insignificant influence on the implementation of 5S and TPM; while ethical training and ethical instructions and commands are found to be influential in the implementation of these techniques. The study provides limitations and future directions for researchers interested in the area.

Keywords- 5S, TPM, Manager-Subordinate Relationship, Ethical Training, Ethical Instructions And Commands, Developing Country, Iraq.

I. INTRODUCTION

Most of the companies nowadays seek to improve their financial situation by improving their profits without increasing the sale price of their products throughout the world. This can be done only by minimizing the manufacturing cost of the products by increasing productivity and reducing losses during production (Habib and Wang, 2008). On the other hand, these industrial companies are also trying to improve their competitive position by gaining competitive advantage. A competitive advantage is a consequence of low costs and high work efficiency, and customer-oriented operations. (Gajdzik, 2009). However, with today's global economy, the changing circumstances and the growing demands on the part of the customers, increased pace of competition and organizations' ability to innovate and improve, have made most of the industrial organizations realize the need for proper use (efficient and effective) of resources for each production facility and systems in a way that overcomes these obstacles (Nachiappan and Anantharaman, 2006). But, the industrial plants, machinery and equipment that owned are more complicated and difficult to control as a result of recurring breakdowns and the risks associated with these malfunctions (Ohunakin and Leramo, 2012).

Global industrial community has adopted many strategies that help in overcoming problems associated with the production line and maintenance is one of such strategies used (Murthy, Atrens, &Eccleston, 2002; Tsang & Chan, 2000). However, the maintenance task is becoming increasingly more complex due to the changes in the production and the environment of the industrial organizations. These changes can be described by factors such as the level of automation and capital intensity associated with automated production lines, globalization, restructuring and downsizing strategies, organizational structures, personal competence development and the difficulty of assessing the impact of maintenance on the companies' competitiveness (Alsyouf, 2004).

Therefore, organizations especially industrial organizations are taking up Total Productive Maintenance (TPM). TPM has been introduced and developed in Japan in 1971. This came in response to the problems of maintenance, which prevailed at that time in most Japanese companies and factories (Gosavi, 2006). Pramod (2007) is of the opinion that in some countries TPM implementation is not yet comprehensive enough to increase the productivity and reduce the losses and thus, benefit the organization as a whole. Most important reasons cited by researchers regarding partial implementation of TPM program in such countries is the lack of safety regulations, which encourages machine operators to take on maintenance work on their own and secondly, lack of top management's ability to provide conducive environment for proper implementation of the TPM program (Admin, 2010; Ahuja and Khamba, 2008b). Mainly due to problems highlighted, organizations adopt techniques such as 5S to overcome problems and help in successful implementation of the TPM program (Singh, et.al., 2013; Kennedy and Mazza, 2010; Bamber, et al., 1999; Ahuja and Khamba, 2008b; Arashpour, et al., and Karimi, 2009).

Researchers have highlighted that 5S principles if applied at workplace can help the implementation of TPM (Bicheno & Holweg, 2009; Todorovic & Djapan, 2013). However, there are several industrial organizations that face challenges such as dilemma of the relationship between the manager and the subordinate (autonomy); absence of incentives and

rewards; poor awareness and follow up in the ethical training programs and following the unethical instructions and commands are all important contributors towards the lack of success of contemporary techniques like 5S and TPM (Wagel, 1990; Nachiappan & Anantharaman, 2006; Nelson Raja, Kannan &Jeyabalan, 2010).

These factors have been termed as ethical factors. All of these factors play a big role in the implementation of many of the techniques successfully by the organizations (Wagel, 1990; Robinson &Ginder, 1995; Panneerselvam, 2012; Ahuja & Khamba, 2008b; Aspinwall & Elgharib, 2013). Furthermore, research points out that for successful performance of modern techniques, it is necessary that employees are empowered (Ahuja & Khamba, 2008b; Haroun &Duffuaa, 2009; Rolfsen & Langeland, 2012). Unfortunately, many organizations follow rigid organizational structures and managers are reluctant in given autonomy to their sub-ordinates and thus suffer from improper or unsuccessful implementation of modern techniques (Robinson &Ginder, 1995; Ahuja &Khamba, 2008b).

For the successful implementation of the techniques like 5S and TPM, it is crucial that management and employees should be in a harmonious relationship by developing an environment of trust and cooperation and that both should realise that the implementation would yield benefits for both the employees, as well as the organization (Robinson &Ginder, 1995; Gapp, et al., 2008; Ahuja &Khamba, 2008a; Kumar, et al., 2014). This harmonious relationship can be achieved if organizations try to incorporate employees concerns, before and during the process of implementation. Ethical factors represent the concerns of the employees regarding these modern techniques, which could either raise or lower the employees' morale and motivation necessary for the successful implementation of these techniques. The present study is an attempt to understand the real role ethical factors in the implementation of 5S and TPM. Majority of the studies on 5S and TPM implementation deal with the implementation process and their impact on production effectiveness and very few studies take up human resources and their impact on 5S and TPM implementation especially factors like ethical factors. The present study is the first study on ethical factors especially in cement industry in Iraq taking into consideration of employees regarding these techniques and how various ethical factors affect the implementation of these two techniques and for the matter any lean manufacturing techniques.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

In this age of technological advancement, organizations concentrate on improving their activities and processes (Dubois, 2002) in order to get a lasting competitive advantage by providing the best products with quality and at reasonable price (Georgescu, 2010).

To attain superior capabilities and to maintain their competitive position, organizations are compelled to use many techniques among them 5S and TPM for improvement in overall production lines effectiveness as these techniques allow organizations to gain the ability to diagnose the reasons and the challenges that prevent improvement in the effectiveness of their production lines (Nachiappan and Anantharaman, 2006). Thus, 5S and TPM allow management to take the necessary operational decisions to address the challenges as much as possible to improve production effectiveness and maintain competitive position (Nelson Raja, et al.,2010).

2.1 5S and TPM Implementation

Van Patten (2006) has highlighted the benefits of using 5S method. He points out that 5S method when applied not only improves the communication between employees but also helps them acquire skills and capabilities that are useful in reducing downtime, lead time, inventory, defect, injury and associated costs (Van Patten, 2006). Researchers suggest that implementation of 5S method helps organizations to implement changes, improve their health and safety standards as well as housekeeping (Rahman, et al., 2010; Esain, et al., 2008; Khamis, et al., 2009). Similarly, researchers have pointed out that the implementation of 5S method helps organizations to attain competitive position (Osada, 1991; Kumar, 2007; Chitre, 2010).

5S is one of the lean manufacturing techniques that is widely accepted and adopted by the industry (Boca, 2011) and its implementation largely depend on the organizational characteristics (Sousa and Voss, 2008; Bayo-Moriones, et al., 2010). The method not only improves health and safety environment of an organization but also improves and enhances data information system within organizations (Khamis, et al., 2009; Ananthanarayanan, 2006). It has been reported that companies that implement 5S method, had a significantly reduced rate of work related incidents mainly due to safety steps included in the technique that enhances the overall well-being of employees (Ansari and Modarress, 1997; da Silveira, 2006; Roziana, 2011). Researchers like Hamzah and Ho (1994) and Michalska and Szewieczek (2007) point out that 5S method is the key to productivity and quality, and the adoption of the 5S techniques could help in resolving many day to day problems that are encountered by the employees. Therefore, they recommend training employees on how to implement the techniques of 5S method to improve working conditions in the organization. Researchers have outlined five levels of 5S method

implementation like commitment of the top management, promotional campaign, proper and systematic record keeping and 5S training and evaluation (Ho and Cicmil, 1996; Warwood and Knowles, 2004).

Seiichi Nakajima, in his well-known book, TPM Development Program, has pointed out that the TPM program is an innovative Japanese concept. This concept can be traced back to the introduction of preventive maintenance in Japan during 1950s to support lean manufacturing by using preventive and corrective maintenance (Lemma, 2008). Through preventive maintenance the useful life of equipment can be prolonged before deterioration causes failure (Cua&Mckone-Sweet, 2006). In this concept the machine operator does not handle maintenance of the machine but maintenance staff does it. This concept was applied by Nippondenso Co. a supplier of electrical parts to Toyota during 1960s to handle preventive and automated maintenance and to carry out modifications for improving the reliability of the installed equipment (Suzuki, 1994;Kholopane, 2008). Thus, preventive maintenance along with Maintenance prevention and Maintainability Improvement gave birth to TPM (Venkatesh, 2007), which later on evolved into strategy focusing on total productive maintenance through employee participation (Lemma, 2008).

The TPM program bases itself on the concept of "prevention at source". Through this concept, factors are identified and eliminated before equipment enters into deterioration stage, thus prolonging the useful life of the equipment and at the same time enhancing its productive utilization. Today the concept of TPM is widely accepted and has been implemented in various industries (Kennedy, 2002; Eti, Ogaji, & Probert, 2006).

Research suggests that 5S method and total productive maintenance (TPM) can be integrated together (Ahuja and Khamba, 2008a; Moradi, Abdollahzadeh, and Vakili, 2011). Hedge, et al., (2009) is of the view that there is a need to make 5S techniques as a basis stone for the implementation of TPM program, which in turn helped to minimise the breakdowns, increasing performance and quality rate of machine thus improving the effectiveness of productive equipment. Similarly, Gapp,et al., (2008) and Gajdzik, (2009) highlight that 5S and TPM together are key concepts in Lean and World-Class Manufacturing models, where 5S method is the first and basic step of implementation of TPM program, leading improvement in the workplace safety and environment, asset performance, quality, delivery, productivity and most importantly financial performance.

While, Sahu, et al., (2012) considered that, the 5S techniques are the first pillar of TPM program pillars. According to them "TPM starts with 5S, problems cannot be clearly seen when the work place is unorganized. Cleaning and organizing the workplace helps the team to uncover problems. Making problems visible is the first step of improvement".

2.2 Ethical Factors for 5S and TPM Implementation

5S and TPM techniques have been developed for optimal utilization of existing organizational resources (Chan, et al., 2005; Gajdzik, 2009) and to benefit from them fully, the organizations need to develop strategies and take into account factors that may hinder in the proper implementation of these two techniques (Hedge, et al., 2009). These techniques not only affect the production processes but the organizational as a whole. Thus, for their effective implementation the main corner stone is the employee itself, that needs to take into consideration before any implementation process takes place. Ahuja and Khamba (2008a) also highlight that a major shift in the psyche and behaviour of employees is required before successful implementation of 5S and TPM can take place. Employees being the main pillar of implementation process are affected by ethical factors that are related to the organizational strategies and policies like manager-subordinate relationship in terms of autonomy and empowerment, ethical training programs and the ethical instructions and commands. These factors are necessary to study, because they are directly linked to the performance of employees in the implementation of many modern techniques such as 5S and TPM, therefore these factors can leave a negative or positive impact on the implementation of these techniques in industrial organizations.

For successful organizations, both management and employees need to be in harmony by developing an environment of trust and cooperation. The improvement process must be recognized as benefiting both the company and the employees. The ultimate responsibility for success or failure in achieving the desired goals rests with the management. Employees can accept the concept of teamwork, cooperation and empowerment if management provides leadership, security of employment and reasonable compensation (Robinson &Ginder, 1995; Ahuja, 2009).

Thus, researchers (Robinson and Ginder, 1995; Haddad and Jaaron, 2012) highlight, that the major roadblock in successful implementation for modern techniques that lead to improvement in production effectiveness is the reluctance of management to empower employees.

Ahuja and Khamba (2008b) also share the same view point that the rigid bureaucratic structures of the organizations are that impede empowerment of the employees.

Similarly, many researchers are of the view that employees are the major corner stone in implementation of modern techniques (such as 5S, Kaizen, Six Sigma and TPM) that could enhance efficiency of an organization and its competitiveness, and without their involvement in the process of the implementation, would render these techniques ineffective during their implementation (Ahuja and Khamba, 2008b; Haroun, and Duffuaa, 2009; Rolfsen&Langeland, 2012).Thus, all of this means that employee empowerment and involvement in the implementation process are crucial and the management need to understand this fact if they want to reap the benefits of successful implementation of these techniques (5S, Kaizen, Six Sigma and TPM); on the other hand, the lack of employee involvement in the overall implementation can lead to their either failure or partial implementation of these techniques (Suzuki, 1994). Based on the above discussion following hypothesis has been formulated.

H1: Autonomy/empowerment would have a positive relationship with 5S and TPM implementation.

Panneerselvam, (2012) highlights the role of correct training and ethics in effective functioning of functional departments of an organization and overall improvements in the results, this is through the provision of correct information and their development. He is of the view that to meet the changing requirements, it is necessary to provide a correct training and necessary instructions to employees. He further stresses that the training requirements of the employees is to be determined and managed by the top management of the organization. Similar views have also been expressed by Robinson and Ginder (1995) who also highlight the role of correct training and retraining of employees with a view to developing their knowledge and information for successful implementation of tasks needed for 5S and TPM.

Therefore, it requires awareness and follow-up in training programs by officials to determine if the information provided to the employees is correct and sufficient for the purpose of implementing of tasks assigned to them as required for achieving the desired results. However, Sims (1992)has highlighted that the lack of follow up in the training programs is the ethical dilemma faced by many organizations. Furthermore, Hayes and Pisano (1994) note that the low awareness and follow-up in ethical training programs, leads to negative consequences for the organizations. Similar views have also been expressed by many researchers that partial or unsuccessful implementation of techniques like 5S or TPM is caused by employees' resistance, lack of training and ethical education and lack of its follow up by the officials in the organization (Westphal, et al., 1997; Maier, et al., 1998; Mckone, et al., 2001). The purpose behind training and retraining of employees is to develop multi skills that could help them work more diligently, enthusiastically, independently and responsibly (Venkatesh, 2007; Arashpour, et al., 2009; Paropate, et al., 2011). This requires officials to closely monitor and follow-up on the training programs that helps to improve the organizational capabilities by enhancing the problem solving skills of its employees and enabling learning across various functional areas (Mckone, et al., 2001). This helps employees' to identify the root causes of a problem that could help them solve it without delaying and stopping the production (Sahu, et al., 2012). Thus, following discussion leads us to the following hypothesis.

H2: Ethical training programs would have a positive relationship with5S and TPM implementation.

The third factor which is important in the successful implementation of 5S and TPM in organizations is ethical instructions and commands. Sometimes employees are subjected to the pressures of work, including pressure from managers in the organization, that can be represented in the control of the managers on the behaviour and performance of employees, which would have a negative effect on the efficiency of the implementation of several techniques such as 5S, Kaizen, Six Sigma and TPM as employees are asked to do certain tasks that are not according to the training they are provided (Mullins, 2007; Ahuja and Khamba, 2008b, Kumar, Soni and Agnihothri, 2014). This, in turn, can lead to, employees working under the table for officials seeking their personal interests in the organization (Wagel, 1990). Consequently, employee performance for tasks would be in the unseemly form and unethical, thus reflecting negatively on the success of organizations to achieve the desired goals (Kumar, et al., 2014).

Trevino and Nelson (2010) further confirms about some of the immoral positions in the organization, when some of the employees are subjected to the pressures of the so-called ethical instructions and commands at work. For example, employee may be asked to purchase items or equipment from manager's quick approval without going into the details of the equipment or item necessary for the organization or not. These positions and others can put the employee in front of difficult choices, which can be exposed either directly or indirectly, and that, in turn, could put the employee under pressure of the reaction of immediate supervisor, which can cost him stability of his job or profession in the future (Kelley, 1999; Gibson, 2007).

Therefore, many researchers confirm, that for the success of organizations in the implementation of techniques like 5S and TPM, for improving the level of productivity and attaining competitive advantage,

organizations should: 1) Issue rules and instructions and standardized procedures, and all employees should abide by them literally and ethically during their performance of the tasks entrusted to them. 2) Fight wrong behaviors, which can be established by many immoral attitudes in the organization (Ramayah, et al., 2002; Seth and Tripathi, 2005; Haroun, and Duffuaa, 2009; Rolfsen&Langeland, 2012; Aspinwall and Elgharib, 2013; Kumar, et al.,2014). The above discussion leads us to the following hypothesis.

H3: Ethical instructions and commands would have a positive relationship with5S and TPM implementation.

III. RESEARCH METHODOLOGY

The present study is descriptive in nature, aiming to explore the roles of ethical factors towards successful implementation of 5S and TPM program. For the study, three cement plants located in Kurdistan, Iraq were chosen. These three plants are in process of applying 5S and TPM program in their production processes. One of the plants is publicly operated while two of them are in the private sector. There are 4100 employees in the three selected cement plants. The sample of the study was 354 respondents selected on the basis of stratified sampling following proportional sampling technique.

Self-administered questionnaire was designed for the study. The questionnaire consisted of three sections. Section one comprised of items measuring ethical factors. There were nine items measuring three dimensions of ethical factors (manager-subordinate relationship; ethical training programs and the ethical instructions and commands). The items measuring the three dimensions have been taken from the studies of Ireland and Dale (2001), Brah and Chong (2004), Ahuja and Khamba, 2008, Aspinwall and Algharib (2013), Sims (1992) and Haroun and Duffua (2009). These items have been measured on a 5-point Likert scale using level of agreement or disagreement.

The second section of the questionnaire consisted of items measuring the implementation 5S and TPM in terms of the safety of work environment and easy access to the necessary equipment and the unification of procedures and training, and other items that can reflect the perceptions of the employees regarding the implementation of 5S and TPM in their factories. These dimensions have been measured through nine items taken from the studies of Ahuja and Khamba, 2008b; Gapp, et al. (2008), Gajdzik, 2009; Graisa and Al-Habaibeh, 2011and Aspinwall and Algharib (2013). These items were also rated on a 5-point Likert scale using level of agreement or disagreement. The third section of this survey comprised of demographic details of the respondents like age, gender, education level, position in the factory, department and work experience.

The data collected was analyzed using factor analysis for validity and reliability. Once reliability and validity were ascertained, Pearson correlation was determined to find out the association of the variables of the study. For investigating the impact, multiple regression analysis was done. Before applying regression analysis, assumptions pertaining to regression were satisfied.

The reliability of the instrument was found to be 0.832 (ethical factors) and for implementation of 5S and TPM (0.787). Reliability using Cronbach alpha indicated that the instrument was reliable as all the alpha values were found to be above 0.70. The factor analysis indicated that the instrument was valid as all the items were found to have more than 0.40 factor loadings and were retained.

IV. RESULTS AND DISCUSSION

Human resource is the most important element providing competitive advantage to organizations. Previous researchers have highlighted that many organizations face problems in effective implementation of 5S and TPM. For implementation, technology is not the only factor. Many studies have previously looked at the implementation of 5S and TPM and their influence of productivity. The present study attempted to investigate the factors beyond technological or organizational and focused on human factors especially ethical factors in the effective implementation of 5S and TPM. To establish the association between the variables, Pearson correlation was analysed. The results of correlation are shown in Table 1.

Table 1 Ethical Factors and 5S & TPM Implementation Correlation Matrix

	MSR	ETP	EIC	Implementation of 5S & TPM
Manager-Subordinate Relationship	1			
Ethical Training Program	.583**	1		
Ethical Instructions & Commands	.295**	.436**	1	
Implementation of 5S & TPM	.349**	.481**	.390**	1

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation results indicate that all the dimensions of ethical factors have moderate relationship with implementation of 5S and TPM.

Once association was established between variables, regression analysis using multiple regression technique was conducted. The results are shown in Table 2.

Table 2 Regression Model for EF-Imp Model

Model	R	R^2	Adj. R^2	*F*	Sig.	β	*t*	*p*
	.526	.276	.267	29.932	.000			
Manager-Subordinate Relationship						.062	1.332	.184
Ethical Training						.152	4.576	.000
Ethical Instructions & Commands						.162	3.531	.000

The regression results indicate that ethical training and ethical instructions and commands are most influential factors in effective implementation of 5S and TPM. The result further indicates that manager-subordinate relationship is having an insignificant influence on implementation of 5S and TPM. Previous researchers have pointed out that due to traditional management practices; managers are reluctant to empower employees (Robinson and Ginder, 1995; Haddad and Jaaron, 2012; Ahuja and Khamba, 2008b). Employees are the vital component of effective implementation of modern techniques like 5S and TPM. If the employees are not empowered, the 5S and TPM benefits could not be obtained by the organizations. Thus, involving employees and obtaining their opinions is the crucial step in effective implementation of 5S and TPM. Researchers have highlighted that correct and informed training and retraining programs are crucial for the effective implementation of 5S and TPM (Panneerselvam, 2012; Robinson and Ginder, 1995). 5S and TPM require continuous training of employees. If the employees are not trained properly, 5S and TPM implementation would be faulty. Thus, if organizations adopting 5S and TPM program should engage in proper and detailed training and retraining of their employees on continuous basis. These training programs would develop the skills and knowledge base of the employees so that they could take informed decisions when necessary (Venkatesh, 2007; Paropate, et al., 2011). Another important factor that influences effective implementation of 5S and TPM is the ethical instructions and commands. Instructions issued by the management are sometimes cause of ineffective implementation. It has been reported that managers to reduce the cost cut corners or acquire equipment that is not needed just to utilize the budget. This is especially true in public organizations, where managers use allocated budgets on unnecessary items to show their efficiency in budget utilization. Similarly, managers also put undue pressure on employees to comply with instructions that may result in loss for the organization (Trevino, et al., 2010). Researchers also point out that managers give instructions to employees that are not according to the training provided to the employees (Mullins, 2007;
Ahuja and Khamba, 2008b; Kumar, et al., 2014). Thus, ethical instructions and commands play an important role in effective implementation of 5S and TPM in organizations.

CONCLUSION

Organizations pursue policies and strategies to gain competitive advantage against their competitors. To overcome cost issues and production quality, many organizations adopt lean manufacturing techniques such as 5S and TPM. However, many of these organizations especially in developing countries face problems in effective and successful implementation of these techniques 5S and TPM. Organizations facing issues regarding successful implementation normally do not involve employees nor take into confidence when adopting these techniques. It should be realized that it is the employee who operates the machine and employee who maintains it.

If employees are not involved nor given empowerment in the implementation of these techniques, the organizations cannot gather the benefits these techniques are suppose to provide. The study is not without limitations. The foremost being the sample size. Only three organizations were selected and respondents to the survey belonged to these three selected organizations. Increasing sample size and the number of organizations may affect the results of the study. Further, doing a comparative study of organizations that have implemented and organizations that are in process of implementation of 5S and TPM would definitely reveal results that could provide more insights into the successful implementation of these techniques. There are many organizational factors as well that affect implementation of these techniques such as top management, organizational culture, HR policies, employee behaviours and concerns, etc. that are also needed to be investigated in detail for successful and effective implementation of 5S and TPM. Future researchers could take up any of these factors and detail analysis could be conducted for organizations that are implementing these techniques to gain useful insights.

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