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Total Productive Maintenance According To Kaizen, Benchmarking And 5s: An Implementation For A Business In The Service Industry

Kaızen - Sürekli İyileştirme, Karşılaştırma Ve 5s'e Bağlı Toplam Üretken-Verimli Bakım: Hizmet Sektöründeki Bir İşletme İçin Uygulaması

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ABSTRACT

Total Productive Maintenance (TPM) is a maintenance scheme, which involves a newly established plant and machinery maintenance concept. The purpose of TPM application is to massively raise production while also time increasing the performance of the employees and career progression. The businesses have to prepare their own sustainability plans in order to follow changes in environmental change. This situation greatly affects the TPM plan depending on the Total Quality Management (TQM) policy of the business and they are prepared in conjunction with each other. Some of the resources of business are used to incorporate and refine the company's TPM services, such as workplace control, benchmarking, reporting, etc. This study encompasses the literature review on TPM and the analysis carried out in the implementation of TPM to the department of business and other departments in particular. This study comprises corporate management, production and communication departments, which are key-core departments in the service sector and thus, strong communications and connections of each department in the business with other departments are provided. This situation creates a significant positive effect on the performance of the business. According to these issues, in the scope of this research, A well-designed of TPM integrated with Kaizen, Benchmarking and 5S application on every departments of this business is provided to be applied for being effective. In addtion, depending on the subject, some improving suggestions are presented for sustainablity of business within the scope of the research.

Keywords: Benchmarking, Kaizen, Total Productive Maintenance, 5S, Total Quality Management

ÖZET

Toplam Üretken-Verimli Bakım (TÜB-TVB), tesislerin ve tesis içi her türlü makinaların bakımını içermek üzere tanımlanmış bir bakım programdır. TÜB programının amacı işletmedeki üretimi önemli ölçüde arttırırken aynı zamanda çalışanların moralini ve iş memnuniyetini arttırmaktır. İşletmeler, çevresel değişimdeki değişiklikleri takip etmek için kendi sürdürülebilirlik planlarını değişimlere bağlı olarak hazırlamak, düzenlemek zorundadır. Bu durum, işletmenin Toplam Kalite Yönetimi (TKY) politikasına bağlı olarak TÜB planını büyük ölçüde etkiler ve birbirleriyle bağlantılı hazırlanır. İşletme kaynaklarının bazıları; işyeri kontrolü, kıyaslama, raporlama vb. şirketin TÜB faaliyetleri-hizmetlerini dâhil etmek ve iyileştirmek için kullanılır. Bu araştırma, TÜB ile ilgili literatür çalışmasını ve TÜB'ın işletmenin departmanlarında-endüstriyel uygulanmasına yönelik yapılan çalışmayı içermektedir. Bu çalışma, hizmet sektöründeki kilit-çekirdek bölümler olan kurumsal yönetim, üretim ve iletişim bölümlerini içermektedir ve böylece şirketteki her bölümün diğer bölümlerle güçlü iletişimleri, bağlantıları sağlanır. Bu durum işletmenin performansı üzerinde önemli bir etki oluşturur. Bu konular ışığında, bu araştırma kapsamında Kaizen, Benchmarking ve 5S tekniği

ile birleştirilen-entegre edilen iyi tasarlanmış bir TÜB planı, bu işletmenin her departmanında uygulanması için etkili olması sağlanmıştır, Konuya bağlı olarak bir takım geliştirme, iyileştirme önerileri araştırma kapsamında sunulmuştur.

Anahtar Kelimeler: Kıyaslama, Sürekli İyileştirme, Toplam Üretken-Verimli Bakım (TÜB-TVB), 5S, Toplam Kalite Yönetimi

1. INTRODUCTION

TPM is a technique that emerged in Japan. It originated in 1971, when JIPM President Seichi Nakajima introduced the Concepts of Preventive Care (PM), common in the US between 1950 and 1960. This began as Full Productive Maintenance, but extended to both explicitly and indirectly linked manufacturing fields and became a controlling form of output. TPM is a management solution which encompasses all employment in a factory and is based mainly on efficiency in production (Levitt, 2010; Borris, 2006; Ireland and Dale, 2001; Elliot and Hill, 1999; Jostes and Helms, 1994). The TPM is the 7th pillar (see the Figure 1) and is focused on all areas supporting and supporting organizational functions. The foundation provides the most critical TPM processes for waste disposal. The foundation ensures that all levels help production processes optimisation (Url 1; Borris, 2006; Elliot and Hill 1999).

TPM offers productivity and flexibility in the company's management activities, which reduces costs. It includes an study of procedures and approaches for the stayed modernization of the workplace. The Office TPM idea is new, and there aren't comprehensive publications on the subject. The popular misconception regarding Office TPM is that the businesses usually tailor the products of Office TPM. Office TPM does not need to use 5S strategy or render greening processes. When TPM is used, the aim is to eliminate the defects caused by the business arrangement, improve the overall output of the framework or organization, reduce all the processing time and thus improve all the production goods and conditions of employment overall performance, which can pose complications which bring the company into serious difficulties (Borris, 2006; Elliot and Hill, 1999; Eşit, 1998; Hiyoruki, 1995).

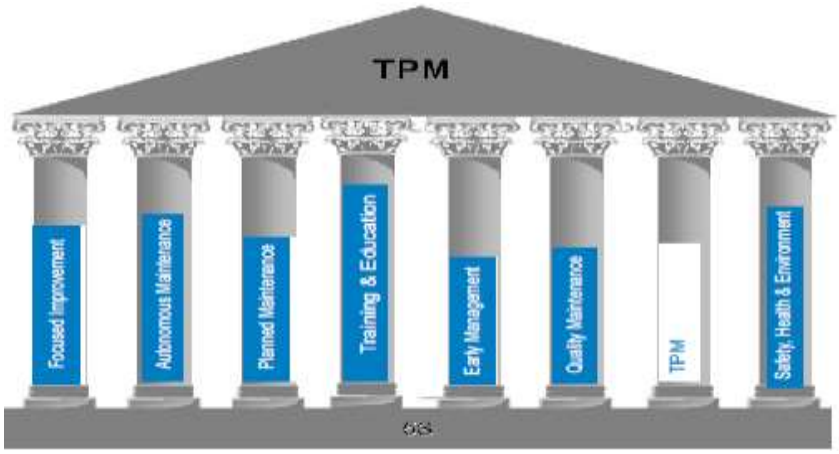

Figure 1. Dimensions of TPM (Url 1)

TPM (Total Productive Maintenance) framework, which currently operated in the concept of TQM (Total Quality Management). In a company, in particular, there will be a variety of maintenance workers who will fix and restore operators' machines. Some of the same tools as staff productivity, benchmarking is utilized for the installation and optimisation of TPM services. TPM increasing be defined as a framework that implements a recently adopted business and equipment sustainability principle. TPM's goal is to increase production-service while also expanding employee trust and work satisfaction. Companies implementing TPM often yield surprising results and TPM approaches help improve machinery structures, operational phases and repair and construction processes to prevent possible problems (Muniswamy, 2008; Borris, 2006; Willmott and McCarthy, 2001; Jostes and Helms, 1994).

TPM aims to reach 100% utilization of manufacturing processes by removing unexpected outages of machinery and interruptions, waste induced by deteriorated machine efficiency, decreased output due to reduced machine pace, slowdowns or drops demanded by low-level employees or shortage of experienced staff and loss of capacity (Ribeiroa et al., 2019; Ahuja, 2009).

2.TOTAL PRODUCTIVE MAINTENANCE (TPM)

TPM is a set of comprehensive strategies adopted to maintain the most effective efficiency of facilities outside the traditional servicing structures and with the cooperation of all teams (Url 2; Singh et al., 2013; Levitt, 2010; Willmott and McCarthy, 2001; Elliot and Hill, 1999; Robinson and Ginder, 1995). The Objectives of this issue are zero work accident, zero quality problem, zero unplanned stance with maximum equipment life and minimum cost can be obtained.

TPM was first targeted to improve equipment performance, reducing variables, reducing lead time with additional techniques and disseminations that were developed later, to increase total company performance has been taken as the main target The main goal of "Total Efficient Maintenance" is to increase the efficiency of employees and equipment, to provide radical developments in the organization and to improve the working culture. It is a long-running marathon that takes 3-4 years from the beginning of the transition to the TPM System. Transition to TPM is easier if the company has an infrastructure and studies on efficient maintenance (Robinson and Ginder, 1995; Elliot and Hill, 1999; Willmott and McCarthy, 2001; Singh et al., 2013).

2.1. Benefits of TPM

To improve productivity, efficiency in the administrative functions and identify and eliminate losses. This includes analyzing processes and procedures towards increased office automation. TPM addresses seven major losses processing loss, cost loss including in areas such as procurement, accounts, marketing, sales leading to high inventories, communication loss, Idle loss, set-up loss, accuracy loss and non-value-added loss (Pascal et al., 2019; Díaz et al., 2018; Kiran, 2017).

2.2. Definition of P Q C D S M in TPM- The Roadmap of TPM

Growing organization needs to identify itself, reflecting at all the problems that impact the output of the plant: here are some instances:
P – production level loss due to lack of resource Quality Personnel production rate loss due to lack of resources

Q – Defects in the processing of audits, payments, invoices, payroll Client returns / guarantees due to BOPs Rejection / rework in BOP's / job Office field rework,
C – Cost / unit purchase Logistics expense – incoming / outbound inventory costs Expense of communications DEPB costs advantages – on time.
D – Lack of logistics (load / unload delay) Supply delays due to some of the support functions delay in payments to providers
S – Product protection / warehouses / logistics Soft and hard data security
M – Number of office kaizens

The phases of TPM have much more steps orderly. These phases are listed as below; The next steps are providing all help groups with information of Office TPM to support them recognise P, Q, C , D, S, M in-plant output role. This method has definition the scope of each role for development, relevant data collection, helping them overcome their circle problems, build an action board that tracks progress on both aspects-results and along with develop professional, actions and also arrange all departments to accommodate both personnel and channels (Pascal et al., 2019; Díaz et al., 2018; Kiran, 2017; Borris, 2006; Elliot and Hill, 1999).

3. APPLICATION 5S

The 5S is a five-step method that is clear and fundamental to all simplification/restructuring activities, designed to better structure the work atmosphere and reduce waste due to Kaizen. The aim is to insure that the world you stay and function in is clean, orderly, stable and secure and to maintain these conditions running (Güray, 2003; Hiyoruki, 1995).

5S seems to be a rather basic and core generalisation / restructuring approach composed of five measures aimed at 'helping to coordinate the working atmosphere and reduce waste.' The goal is to insure that the atmosphere in which you stay and operate is clean, orderly, stable and secure and that these standards are preserved. 5S, as you might expect, consists of the following measures, the initial in Japanese is represented in 5 terms.

Table 1. 5S Analysis for ABC Business

Japanese	English	Turkish	Application Objectives-Description
Seiri	Sort	Sınıflandır	It should mark the objects in your work area that do not contribute to your job. Method: Red Label Method. Dealing with the causes of pollution First of all, these kinds of elements and items are placed in a Red Label. in the next stage they are collected in a central place and grouped again. The ones that will not be used in the next stage are destroyed, the rest are stacked and stored outside the working area on a regular basis.
Seiton	Setin Order / Straighten	Sırala/Düzenle	Employees can find what they are looking for and put it back in place by using eye-catching methods such as labels and colored areas. Smooth looking working environment. Effective and efficient settlement and planning
Seiso	Shine/Sweep	Sil / Temizle	Creating a clean and bright working environment. Raising the motivation of the employees. Detecting and removing sources that cause pollution. Increasing productivity and performance by earning the time spent searching for the material. realization of zero pollution. more efficient - efficient cleaning.
Seiketsu	Standardize	Standartlaştır	A 4-step process should be followed. Planning: Who will do what and when? Creating Resources: Determine the tools, materials and time-process to be used for the work to be done. Apply: Perform Classification, Sorting and Cleaning processes in daily life. Supervise: track, track, compare and return to the previous stage
Shitsuke	Sustain/ Self discipline	Sahiplen/ Sistemi Koru	Creating checklists and using them periodically, the results should be open to everyone and the system should be improved with suggestions. Communication and back as daily routine Notification must be provided. The employer and employee should have individual responsibility.

The floor covers must be slick, dust free and simple to clean and must, where possible, have the best electric and heat insulation. The paths should be wide enough to allow employees and vehicles to move through simultaneously during peak hours (lunch breaks and closing times) and easy evacuation in emergencies. The required collections will take place for waste from dangerous pollutants such as oil , gas or dust (intoxic chemicals, refractory materials, asbestos or lead-oxide) (Hiyoruki, 1995; Guray, 2003; Url-2; author Opinion). Table 1 summarizes all approaches to the 5S analysis.

In the context of data gathered from the Questionnaire of ABC Business at the stages of implementation, market operation surveys, review of literature, and shared agreements, this form was developed to answer the information or feedback of expertise interested in this field. It is the linkage that introduces the association between consumer needs and technological features for maintenance protection in the market setting.

Table 2. Interaction between the Ideals of 5S and TPM

5S / TPM	Sorting	Setting In Order	Shining	Standardizing	Sustaining
Based Enhancing	The elimination of unwanted things from the working place allows way for more Development	Decreasing times for connections to machinery and resources	Prevention of accelerated degradation Detection of quicker faults	Building a platform of recording, recognition and Enforcement of quality requirements	Additional support in having a contribution to quality development Construction of facilities
Safety and Protection	Enhancement of health in a healthy working atmosphere	Training in the usage of monitoring tools		Improving safety in clean working conditions	
Preventing services	Based of the proposed maintenan on the infrastructure needs	Attaching more resources to repair as a consequence of increased workload Job efficiency	Modifying to the Strategy	Implementation of quality management by way of branding, numbering by using several requirements;	Creating a promise not to execute events
Control of Process improvement	Reducing exposure to hardware for performance management	Cooperation of price requirements adoption & service	Creating community for independent infrastructure growth	Verification, recognition and application community creation Requirements in management	Sustained development of devices for defense purposes

Table 2 demonstrates the interaction between the ideals of 5S and the TPM foundations in a similar manner. It should be explained because the application of the 5S standards does not specifically impact the teaching element of the TPM, however because the introduction of the 5S standards does not directly influence the TPM teaching element. It may form the foundation for growing the ability of workers to consider potential development programs, accompanied by training courses

The general methods of specification and self-discipline also have an interesting influence on the establishment of the TPM pillars. In several other terms, the application and establishment of these two concepts (TPM and 5S) in organisations involves sufficient mental and behavioral conditions to improve the capacity of persons to take on obligations and, ultimately, to support the company in meeting the specific objectives of TPM.

4. BENCHMARKING

The transition is slowing by developing information technology, but as time continues, the shift is increasing. Organizations will adopt modern conditions and incorporate emerging technology for ever to thrive organizations. The companies in the field of business, and what would better be achieved by benchmarking in their fields. The features of knowledge and communication era may not only include details but also recognize what has happened to the world. Nonetheless, it is necessary in the current climate to hit information as soon as possible and store data, analyze and exchange information. Benchmarking is a structured method for evaluating potential solutions, applying policies and enhancing efficiency through the interpretation and application of the effectiveness of internal and external policies. Benchmarking should also be interpreted as a learning mechanism that encourages reengineering of the market cycle (Pert and Hollonsen, 2001; Rodriguez et al., 2003; Wah et al., 1998; Eker, 1996).

Relevant infrastructure information was collected. Essential infrastructure has been found. Daily, weekly, monthly and annual reviews have been established and carried out. In fact, all repair details is registered. Thanks to the success of 5S in offices via benchmarking, there is a strong organizational environment for the implementation of administrative TPMs and the employees of these offices are already able to carry out autonomous maintenance.
Nonetheless, on the basis of existing data and knowledge, it is sadly not essential to evaluate the objective impact of the introduction of 5S on the management of the case business and on its preparation for the implementation of this system.

5. CONCLUSION

Practical application of TPM is not a straightforward challenge for organizations, and several failure to reach their TPM objectives or demolish technology completely. This study outlines many checkpoints for proper performance as well as the strategic objectives for overcoming those checkpoints. TPM performance needs effective and involved managerial engagement, consistent corporate goals and priorities for TPM adoption, systematic deployment of the TPM approach, unwavering emphasis on the removal of infrastructure/system failures and service degradation, commitment and desire to adapt and improve within the enterprise, and dedicated attention towards long-term objectives. With the focus on TPM, repair interruption has been an important part of the processing or output cycle itself. Maintenance activities are now fully planned and conducted with coordinated schedules. Maintenance occurrences are no generally clustered when there are limited output demands or poor material movement in manufacturing lines. Occupational accidents that cause the employee to lose his life or become weak financially or spiritually may be prevented as a result of serious occupational safety practice. This occupational safety should be primarily based on education. Because when we look at the reasons, accidents with human factors are seen mostly. This is an indicator of our people's need for education and motivation. An employee's life comes before all other interests. For this reason, investments in occupational safety are the guarantee of the right to live. The more investments are made, the fewer accidents and the less danger-maintenance are provided.

As a result, production disruptions will decrease and quality will increase. Ergonomic measures are aimed at providing workers with the best working environment where they will use their physical properties, physiological and psychological abilities in the most appropriate way, as well as maintaining the physical integrity of the workers, thereby realizing worker welfare. It should be determined to identify important points in the production and service process, it is important to find real problems and address them. A harmonious and healthy working environment can be created by establishing a healthy and correct communication in the light of real data with improvement and preventive activities.

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