

# Relationship of the PDCA cycle in occupational health and safety management

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## Abstract

Safety in the workplace is maintained as the discipline that allows the direction in the prevention of occupational risks in organizations. In Colombia, in recent years, safety and health at work has taken on great relevance in the business sector in search of creating a culture of the state's obligation to protect workers. This article aims to present in a simple way the essential information of the advantages and benefits that are presented to employers when applying safety and health at work following continuous improvement models such as PDCA regulated by Decree 1072 of 2015.

**Keywords:** Company, occupational health, safety, PDCA

## I. INTRODUCTION

The Security and Health in the Work that is executed in the companies is the base for the prevention and control of Risks that appear in the workers what entails "low accident rate and to maintain safe and healthy workplaces". [1] This is how companies currently show that workers are the main interest group and are the central axis and must be considered as socially responsible. [2]

Likewise, the international norms of Security and Health in the Work involve the formation in this area. An example that contemplates the actions that must be promoted by the National Policy of Safety and Health at Work, as to the infrastructure required to ensure the good performance of Safety and Health at Work, where Member States must "promote mechanisms to provide education on Safety and Health at Work, particularly to the entire company and those responsible for safety and health", allowing organizations to implement this system and obtain as a result continuous improvement in work environments and productivity. [3]

Studies conducted in companies on the approach of Safety and Health at Work, have given results in achieving the objectives of the company and these data are close to reality, if taken into account comparing them with international organizations that have highlighted the inadequacy of information systems and few reporting and recording practices.[4] Because of the above, this review article seeks to gather the most relevant information on the occupational safety and health system under the focus of

the PDCA cycle, in order to present the essential information on the advantages, benefits obtained by implementing it in the organizations and its impact in Colombia.

## II. THEORETICAL FOUNDATIONS

### II.I Occupational Health and Safety Management System

Workers in each company have the right to perform their duties in appropriate work areas that ensure safety, health, and welfare.[5] In Colombia, the Occupational Health and Safety Management System is governed by Decree 1072 of 2015, and is mandatory for all companies, both public and private, as well as for all types of contractors under any modality. [6] Favaro and Draais defined Safety and Health at Work as a management tool that includes people, policies and means whose objective is the continuous improvement of companies.[7]

On the other hand, the leaders of the Occupational Safety and Health Management System and the Joint Committee on Occupational Safety and Health (COPASST), have the function of guiding the planning, distribution, execution, maintenance, evaluation and improvement of the Occupational Safety and Health Management System; they must also have the backing and support of the organizational management and have the capacity to cover the entire company.[8] Therefore, it is assumed to define the Inspection of Safety and Health at Work as The system that carries out activities of technical, administrative and legal nature, to control the working conditions as well as to estimate the impact on the health of the workers, based on the laws, regulations and norms in force in each country.[9]

In this sense, it is necessary to consider the competencies of the professionals of Safety and Health at Work have become a problem due to the demands to meet the increasingly diverse challenges faced by the profession by the arrival of new technologies and effects on the organization of work. This implies that the experience of Occupational Safety and Health managers allows them to adequately influence the behavior of workers and the adoption of preventive attitudes to the extent that their goals are not only operational, but also address the strategic.[10]

## II.II PDCA Cycle

The PDCA Cycle is one of the main tools for continuous improvement in organizations. PDCA, plan, do, verify and act. [11] The PDCA breeding cycle is created by Walter Shewhart and popularized by Edward Deming. [13] Currently the PDCA improvement cycle is the fundamental basis of the ISO 9000, six sigma standards, and in some way this cycle is immersed in the process improvement methodology. [12]

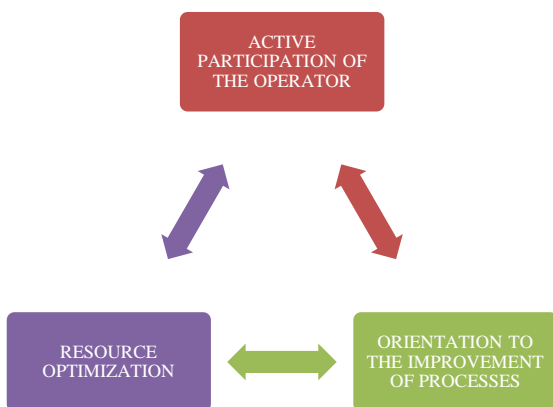


**Fig. 1. PDCA CYCLE**

Likewise, the PDCA cycle improves business processes and involves internal customers and maximizes the value of external customer satisfaction. Figure 2 shows the principles of the cycle in strengthening the processes in a company. [12]

## II.III Integrated Management System

When starting the process of implementing an Integrated Management System, companies usually start its application in specific areas, which does not allow to visualize a business management in a global way. It is for this reason that companies have implemented integrated management systems that benefit in efficiency and competitiveness in the market, they seek to establish internal and external processes of the company. [14]



**Fig. 2. PDCA PRINCIPLES IN PROCESS STRENGTHENING**

Implementing an Integrated Management System is beneficial for the organization, this can be seen in Figure 3, also for organizations to overcome the challenges and business obstacles is important to make an effective accompaniment and monitoring of systems integration. [15]



**Fig. 3. BENEFITS OF THE INTEGRATED MANAGEMENT SYSTEM**

## II.IV Relationship between the Occupational Health and Safety Management System and the PDCA cycle

Regarding the PDCA cycle, it is said that the Occupational Health and Safety Management System is by logical stages, which includes the organization with its policies, planning,

application, as well as evaluation and auditing whose purpose is to prevent and control risks and at the same time minimize them in Occupational Health and Safety. [16] Likewise, within the stages of the PDCA cycle in an Occupational Safety and Health Management System, the interested parties are initially considered, the person responsible for Occupational Safety and Health, the workers and the strategic level present the proposal, with a DOFA analysis in a clear and precise document. However, to advance in the proposal, the whole organization must be very well known, the project is shaped and its respective operational presentation by the top management considering what the company needs most. It is necessary that a sensitization is made with the personnel about the policies, the program and its intentions; later the different activities with their objectives and results will be discussed with the workers, to finalize, a work plan is executed, according to its objectives that fulfills the legal frame, in each level of performance where this work is being done, in this one methods and techniques of evaluation standardized for the organizations are used, the measures for the different work areas will be applied and it will be reconciled with the person in charge of the area and the work personnel. [17]

The purpose of the Integrated Management System is the continuous improvement, its results will be seen in the long term in terms of reduction of occupational accidents, to achieve certification. [18] In addition, the joint evaluation, the safety culture, the work environment, the workload as well as the performance in the position, will favor the design of cycles of improvement of the safety of high efficiency in the organizations. [19]

Likewise, relating Occupational Safety and Health to the PDCA cycle, it is of great importance to know the risks and health of the workers in the company, if the method is based on the PDCA cycle. Next, the problem is defined and then the cycle is applied. Finally, the changes executed, and the result of the control indicators are analyzed, which will serve to obtain the assessment of the company's situation, with the contribution of opinions and parameters of continuous improvement that will be made in actions that will be planned, to then start the cycle again. It is important to have reliable indicators to find the rate of compliance with the predicted actions and their effectiveness [20]

#### II.V Benefits of implementing the PDCA cycle in Occupational Health and Safety Management Systems

Currently in the companies to comply with legal aspects and meet the objectives of optimizing resources, minimize procedures, increase efficiency, as well as productivity and profitability, take as a good opportunity to prioritize and integrate Health and Safety at Work, quality systems and environment.[21] In addition, companies emphasize in the processes of integration of management systems to the workers as the main stakeholders and the greatest force available for improving productivity, despite the existence of the latest technology, the productivity of the company will not improve if they do not enjoy good working conditions and adequate health because occupational health is constituted as an added value in the organizations. [22] Another benefit of the implementation for the companies is that they contribute to the preservation of the environment since the interaction of the environment with the Safety and Health at Work based on the OHSAS 18001:2007 standards, focused on risk prevention can control aspects such as water, air and noise emissions, waste generations, soil alterations and other environmental aspects that are developed in the processes according to the activities of the companies could cause diseases or accidents in the worker.[23]

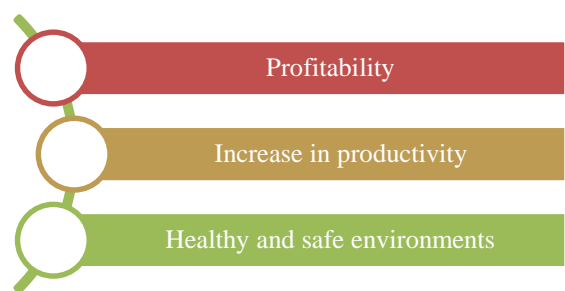
On the other hand, the Management System for Safety and Health at Work presents a guide for the design, remodeling and innovation of facilities for new jobs, implementation of machinery, technology, handling of hazardous substances, and development of preventive programs; designed by professionals in the area. [24] Likewise, the benefits that the companies obtain when implementing the Management System in Security and Health in the Workplace are: the reduction of costs in the related thing to Security and Health in the Workplace, to promote a culture of prevention of risks in the security and hygiene, work in equipment for the continuous improvement of the processes. [25]

Leadership is very important for effective safety management, so managers must be able to take safety management proactively and leadership can improve safety performance by strategically integrating the mission with new competitive scenarios of the company, motivating your team to think autonomously on the best ways to drive and enhance participation in safety activities.[26] Likewise, the quality of

work and a safe working environment affects the productivity and economic growth of any company, it is also determined that the Management System in Safety and Health at Work affects the results of the organization, therefore, the absence of preventive culture involves expenditures that affect the profitability and competitiveness of the company.[27]

Consequently, if a worker is in optimal conditions of mental, physical, psychological and social health, he is in the capacity to execute any activity in his job in the best way, besides for the worker to feel emotionally motivated it is important to offer him the Safety and Health at Work, comfort and benefits for him and the family, where the risks that these can present at work are taken into account. [28] In addition, in the System of Management in Security and Health in the Work are developed preventive systems in the organizations with the purpose of diminishing labor accidents this way can be maintained safe/healthy places of work and optimal conditions of work. [29]

Likewise, through globalization, the innovation of technologies and industries has developed, as well as the acquisition of great knowledge and changes in the organization of work, all of which causes new occupational diseases to emerge, establishing new medical practices on occupational health with an increase in productive activities. [30] Therefore, companies that do not implement the Management System in Safety and Health at Work are exposed to legal sanctions by the control bodies that are awaiting compliance with these standards. Similarly, companies decrease their productivity levels due to employee turnover and absences. [31] Finally, the main motivation for companies to implement Health and Safety at Work is the legal aspects and the sanctions for not executing them. Figure 5 shows the corporate objectives that companies obtain by investing in Occupational Safety and Health. [32]



**Fig. 3 BUSINESS BENEFITS OF IMPLEMENTING AN OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM**

#### II.VI Impact of the Management System on Safety and Health at Work in Colombia

The Occupational Safety and Health Management System in Colombia must be involved within the stakeholders of the entire organization, i.e. workers, those responsible for Occupational Safety and Health and senior management.[33] Currently the organizations are supported by national and international regulations for the implementation of the

Management System in Safety and Health at Work, which establish procedures that companies must have to control the risks of Occupational Health and that this gives optimal results in companies. [34] In addition, it is important to emphasize the holistic conception of Safety and Health at Work, so that Colombian public policies are dispersed with strategies that respond to the needs of workers and companies. In Colombia, this implies reviewing the parameters of public policy for protection at work, socializing it and formally deploying it in its national plans for Safety and Health at Work and public health, built together, in such a way as to make them elementary, practical, dynamic, and in terms of public policy on the problem of high accident rates in Safety and Health at Work. [35]

However, the limited resources set aside for occupational safety and health plans affect the ability of senior management to fulfill their duty to ensure the implementation of the PSLT. Consequently, conditions are generated that affect the productive capacity of the personnel in charge and disinterest in participating in the related activities.[36] In addition, strengthening the Management System in Safety and Health at Work in the Psychosocial Field will positively impact those responsible for the organization and control the factors to which workers are exposed in a way that generates awareness on the part of employers, who must implement management strategies to consolidate and strengthen actions for promotion, risk prevention, diseases and accidents. [37]

### III. DISCUSSION

According to the documentary review carried out on the impact of the PDCA cycle on the implementation of a Management System on Safety and Health at Work in an organization, it is proposed that the following aspects should be considered when implementing the system in any organization and some informal work is mentioned where Safety and Health at Work should also be taken into account.

The goal of every company is to improve working conditions and reduce accidents, so they have the Management System in Safety and Health at Work as a primary tool to ensure that the entire organization operates with preventive management. [38] In addition, the principles of the Occupational Safety and Health strategy propose three phases: adaptation of the legal framework, support for progress management and integration of the Occupational Safety and Health problem in other Community policies that favour its organisation in companies.[39]

Each Management System that the company has must establish its own Management Manual, which includes the policy, assigned resources, document control, activities, standards and norms that are applied for the respective compliance and the elements that configure it; all this within a framework of continuous improvement.[40]

It is necessary that the business management does not observe this system as a factor that should be implemented when accidents or complaints from workers occur, so there must be a policy based on continuous improvement of these and can only

be implemented if the planning of funding for the period establishes a minimum percentage for working conditions, which will be invested in specific objectives.[41] However, workers are also exposed to psychosocial risks, such as negative feelings that can lead to incompetence in interpersonal relationships and work problems. [42]

In addition, it highlights the role of work psychology and organizational psychology that aims to increase productivity and quality of work, improve working conditions, human relations, handle the stimuli to work, but the main purpose is to increase efficiency in the organization and the worker needs to work and evaluate their results.[43] Likewise, the affiliation to social security is very essential for all the workers of a company, because for the exercise of any profession it is important to have factors that guarantee security and labor stability. [44]

Therefore, the probability of having an occupational disease is explained by age, being more likely the older you are. Among the risk factors, being sedentary increases the probability of these events, as well as among work accidents, age, as a non-modifiable factor, contributes to the occurrence of the same, while being sedentary also influences.[45]

In addition, working in a barbershop is not without risk, in this occupation they use chemicals, where the temperature of the work area and the use of repetitive movements and physical efforts increases the probability of suffering from occupational diseases, is currently a public health problem in the country by the demand for such workers who perform their work to survive and have no idea of the Safety and Health at Work.[46] Therefore, the occupation of recycling should be with corporate responsibility, which allows the recyclers have guarantees in social security, so the recyclers face biological risks such as inadequate body posture, physical and chemical risks inherent in their work, contact with cutting material and / or contaminated, extreme changes in temperature, vibration and repetitive movements.[47]

In some companies, social protection and occupational health systems are not seen as a cost, but rather as an opportunity to strengthen the worker's commitment to his or her company.[48] However, the working conditions present in the agricultural sector are characterized by the almost null connection of the workers to the integral social security system, in addition the workers ignore the consequences of the permanent exposure to the risk factors that they have when cultivating, for that reason they must take control of this to minimize the accidents and occupational diseases.[49] Finally, it is necessary to emphasize the conditions generated by the COVID-19 in the health of the workers by teleworking in relation to their risks, where the companies are the ones that assume them in most cases, some of them are the problems that are generated by isolation, behaviors of addiction to the work and psychosocial risks, that although in many occasions they are not easy to identify in a worker in normal conditions, that in a teleworker can become more complex to identify it.[50]

### IV. CONCLUSIONS

Workers are the fundamental pillar of organizations, so it is important that every company has a Management System in Safety and Health at Work properly regulated and structured, with the system will achieve their work environments healthy and safe, primarily motivated and committed to their processes to achieve gains in productivity and profitability in organizations.

In general terms, having implemented the Management System in Safety and Health at Work in the organizations is a key to strategic success that the company acquires to benefit in its competitive advantages, economic results, quality of life and mainly safe work areas.

Companies that do not have an Occupational Health and Safety Management System have high levels of occupational risks and accidents, which increases health costs, as well as absenteeism and staff turnover.

The Management System in Security and Health in the Workplace must be an integrated system capable of generating well-being and health in the workers, where there will be more commitment and responsibility in the processes that the personnel handles in their daily life.

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