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ADAPTATION OF THE 6S METHOD IN A FARM

Summary

The article presents the 6S methodology which may support functioning of enterprises and farms through facilitation of work organization and improvement of occupational safety and health. A definition was presented and implementation stages of the 6S methodology steps were described. Trends in adaptive changes which have to be carried out in order to adjust the 6S methodology to the requirements of a farm were indicated. Schemes of procedure during subsequent stages of implementation of the 6S method were developed and the most significant elements which should be considered during implementation of the method were indicated. Threats which could occur during implementation of the 6S methodology principles and opportunities of an enterprise after implementation of the described method were analysed.
***Key words**: 6S method, safety, work organization, Lean Manufacturing*

ADAPTACJA METODY 6S DO POTRZEB GOSPODARSTWA ROLNEGO

Streszczenie

W artykule przedstawiono metodę 6S mogącą wspomóc funkcjonowanie przedsiębiorstw oraz gospodarstw rolnych przez usprawnienie organizacji pracy oraz poprawiającą bezpieczeństwo i higienę pracy. Zaprezentowano definicję oraz krótko scharakteryzowano etapy wdrażania kolejnych kroków metody 6S. Wskazano kierunki zamian adaptacyjnych koniecznych do zrealizowania w celu przystosowania metody 6S do wymagań gospodarstwa rolnego. Opracowano schematy postępowania podczas kolejnych etapów wdrażania metody 6S wraz ze wskazaniem najważniejszych elementów, na które należy zwrócić uwagę podczas wdrażania metody. Przeanalizowano zagrożenia mogące wystąpić podczas wprowadzania zasad metody 6S oraz szanse, jakie przedsiębiorstwo może osiągnąć wdrażając opisaną metodę.
***Słowa kluczowe**: metoda 6S, bezpieczeństwo, organizacja pracy, Lean Manufacturing*

1. Introduction

Effective management of each enterprise, also of an agricultural enterprise or an individual farm is related to such elements as: maintenance of quality, care for environment and assurance of safety. In agricultural farms and in industrial enterprises striving to achieve the main aim, namely the highest possible profit, takes place by ensuring clients' satisfaction who more often pay attention not only to the amount and quality of offered products but also to the entire production process. In industrial enterprises clients who choose a partner often have specific requirements with regard to environment protection and compliance with occupational safety and health rules. Thus, failure to meet these requirements causes that enterprises lose clients and get negative opinions [4].

Since 2002, thanks to subsidies obtained both from the European Union and national funds, farms have had a chance to introduce a number of innovations both in the area of technical infrastructure of farms as well as management and organization. Changes introduced by farms are related to implementation of new products to the market, development of new technologies or production methods, finding a new outlet or a source of supply, use of new raw materials and introduction of new forms of market organization. Modernization and introduction of a new machinery park and new production and cultivation methods improves the quality of offered products but simultaneously enforces the change of the current work system including a greater care for maintenance and compliance with the occupational safety and health standards [6, 11, 15].

Referring to the data provided by the Agricultural Social Insurance Fund [KRUS] [9] 19,959 incidents were reported in 2014 and in 2015 the number dropped by 1,808 (9.1%) in comparison to 2014. Since 2006 one might have noticed a constant reduction of the number of incidents reported as accidents during agricultural work but the number is still considerable. In 2015, 74.3% of accidents resulted from incorrect organization of work and improper condition of machines, devices, tools and buildings caused 2,229 accidents which constitutes 12.3% of the total number of accidents. Among the most frequent reasons of accidents in 2015 the Agricultural Social Insurance Fund lists the following [9]:

1) improper organization of the work stand (27.1%),
2) improper care and living conditions as well as reaction of animals to unknown stimuli and surrounding (14.5%),
3) failure to use work protection measures (e.g. shoes, individual protection measures) by a farmer (11.2%),
4) lack of machines, devices and tools or improper use (9.4%),
5) improper behaviour of a farmer (e.g. carrying out an activity when a machine is still working) (8.0%),
6) intentional incorrect farmer's conduct (6.3%),
7) structural faults or improper technical and ergonomic solutions of machines, devices and tools (5.6%),
8) others (17.9%).

According to the cited data, one may assume that proper organization of work, care for environment and work tools could considerably reduce the number of accidents during farm works.

The 6S methodology is one of innovations which may be introduced by farms, and which facilitates work organization and improves safety. It was developed in order to support activities, maintenance of order, cleanness, compliance with the introduced principles and standards in various organizations. This method is based on numerous simple rules and comprises the lean manufacturing philosophy, which supports the increase of production effectiveness of high quality products without the need to incur high financial expenditures [2, 5, 14]. A priority of application of this methodology consists in identification of wastage sources and the number of errors by facilitation of the work stand. However, one may also notice other notable effects of application of the 6S methodology. Systematic cleaning actions connected to inspections of machines and devices decrease duration of stoppages at work by means of reduction of the number of faults and possible threats to safety. The above actions indirectly influence the reduction of damages and minimization of losses which occurred as their result. Arrangement of the workplace including the principles of ergonomics helps to identify invisible problems which may pose a threat. Moreover, requirements concerning self-discipline in compliance with determined standards of work directly affect the improvement of occupational safety and health [16].

The objective of the paper is to indicate the trend in the adaptive changes which are indispensable to implement the 6S methodology to the requirements of a farm. A seasonal nature is a feature characterizing the works which are carried out in farms. Thus it is justified to develop a scheme of activities during implementation to the 6S principles, in particular in case of an area, where this method has not been applied so far. Furthermore, according to many authors [1, 7, 16, 12], implementation of the 6S requires engagement both at the managerial and employer's level as well as at the level of all people working in an enterprise. Without duly performed trainings, a developed schedule of implementation and control of compliance with the 6S principles, the process of improvement of safety and reduction of wastage based on the method may be unsuccessful.

2. Characteristics of the 6S method

The 6S method is based on simple rules whose the main objective is to create and maintain a clean, efficient and well organized work stand. Implementation of the principles of this method mobilizes to constant improvement and ensures that the processes will be carried out according to the standards. It also causes not only reduction in the number of losses and errors and increase in efficiency, but also improves safety at a work stand through care for cleanness and fitness of machines and devices.

Maintenance or increase of the standard at a work stand (in the work environment) is possible due to the following five steps (fig. 1) [3, 7, 12]:
1. selection – removing unnecessary objects from the stand, leaving only those which are necessary,
2. set in order – arranging objects and allocating them in the place where they are stored according to the frequency of use including easy access and ergonomics, placing objects in specified places in a proper number,
3. shine – cleaning a work stand and washing all machines, devices, and tools which are there,
4. standardize – creation of procedures, which will ensure that the existing state will be maintained and the implemented principles will be complied with,
5. self-discipline/sustain – self-improvement in maintenance and development of the implemented method, raising standards,
and the sixth one which is safety – implementation and compliance with the previously introduced principles causes the improvement of safety at the work stand.

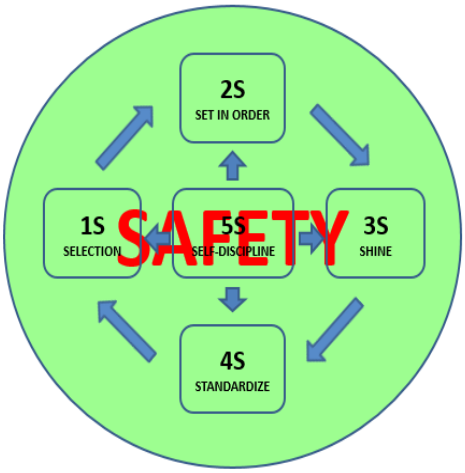

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Fig. 1. Implementation steps of 6S method
Rys. 1. Kroki wdrażania metody 6S

Care for cleanness and order at a work stand is often considered as an inessential element which does not affect the quality and efficiency of processes. However, experiences of many companies show [1, 5, 8, 10, 13, 14] that the 6S method may constitute a basis for implementation of quality systems and may considerably influence the safety.

3. Stages of the 6S method implementation in a farm

The 6S method implementation consists in going through a number of subsequent stages. It should start with trainings and workshops which present assumptions of the method. Presenting the theory, requirements and advantages which may be achieved by application of the 6S method helps to confirm the rightness of the decision taken and shows how much work should be done. After the trainings and with an absolute support one may determine the place of pilot actions and develop an implementation schedule. Implementation of the 6S method in the pilot area allows practical use of the acquired knowledge and refinement of actions so that the further implementation work in the entire farm is carried out without any considerable obstacles.

In a farm, due to specificity of works, one may distinguish areas, where actions aiming at implementation of the 6S method will be similar as in production enterprises e.g. a workshop, warehouse and places where implementation of the above mentioned methods should take place after principles are developed including specification of these methods. The area which requires an individual approach is e.g. a cowshed, milking parlour, fattening house, garage and warehouse for agricultural machines.

When these areas are selected and the method is implemented on the pilot area, the next step consists in starting a gradual implementation of the 6S method according to the

developed schedule. It is important to implement the process and follow the sequence of particular steps.

The process of implementation of the 6S method in a farm should start with the areas where the improvement may be reported at no financial and material inputs.

3.1. Selection

The stage of selection should take place according to the scheme presented in figure 2. Labelling each object with "red labels" should be accompanied with consideration of its usefulness, number and the place where the object will be stored. The label should include basic information referring to the reason of removal, date of labelling and original location. Each object placed in the determined zone should be registered, subject to the final assessment of usefulness after which a decision should be taken whether to leave the object or utilize it. Making a photo documentation of a selection may prove to be very helpful for later trainings, development of standards and motivating to further work and systematic selective actions in the future.

3.2. Set in order

The stage of the set in order is based on the assumption that each object has its place of storing and it can be found there when needed. It takes place according to the stages presented in fig. 3.

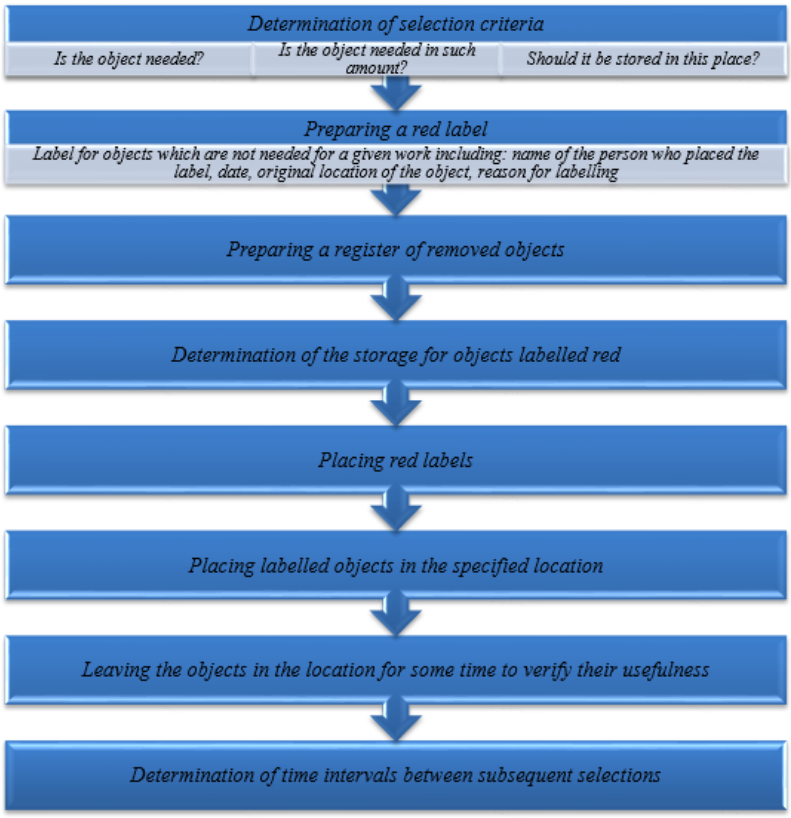

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Fig. 2. Diagram of carrying out the first step of selection
Rys. 2. Schemat przebiegu pierwszego kroku selekcji

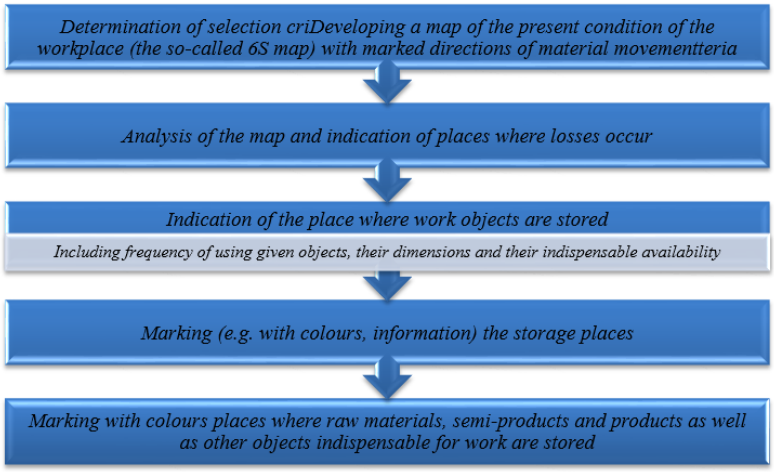

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Fig. 3. Diagram of carrying out the set in order step
Rys. 3. Schemat przebiegu kroku systematyki

After determination at the selection stage which objects should be left, their place of storing should be determined including the frequency of their use and their indispensable availability. Analysis of the map of the present work stand will help to plan the stand which reduces the losses related to searching for objects and their excessive number. Furthermore, a photo documentation before and after realization of the set in order actions may prove to be helpful in improvement of the self-discipline habit.

3.3. Shine

The shine step carried out according to the scheme in figure 4 ensures that the workplace becomes more comfortable and safe. Defining what does "clean" and "cleanness" mean at a given stand is a significant element. In the buildings for cattle or in a straw and hay storage cleanness will be assessed with other criteria than e.g. in a workshop or a fertilizer storage.

Precise cleaning of the working area and elimination of possible sources of dirt not only increases the productivity. Everyday cleaning allows maintenance of the existing condition which is important with regard to safety, inspection of machines, devices and tools which ensure their infallible operation.

When the action of thorough cleaning is completed, preparing a schedule of cleaning, where tasks with their frequency and a person responsible for their realization will be determined is a good solution for maintaining a clean workplace.

3.4. Standardization

In order to maintain previously introduced facilitations, ensuring a high standard and safety of work the best practices should be defined. Actions during the standardizing (fig. 5) should focus on formation of appropriate procedures, schedules and control lists without which implementation of the 6S method will not be successful.

3.5. Self-discipline

The fifth step of the 6S method implementation consists in creation of an environment and conditions which ensure that previous steps become habitual. Regular inspections of a workplace which evaluate the degree of implementation of the 6S method is a good tool sustaining and improving the effects of the selection, set in order and shine steps. The results of the audits on the area of pilot actions will constitute a basis for extension of the scope of application of the 6S method to other areas. Further control and evaluation of the compliance degree of the introduced principles and procedures will allow also introduction of actions which improve the implemented system. Motivation and awareness actions and cyclic trainings may prove to be helpful in developing a self-discipline habit.

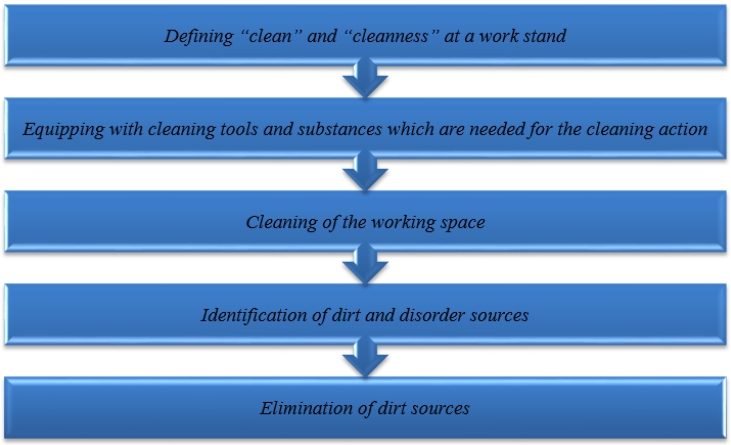

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Fig. 4. Diagram of carrying out the shine step
Rys. 4. Schemat przebiegu kroku sprzątania

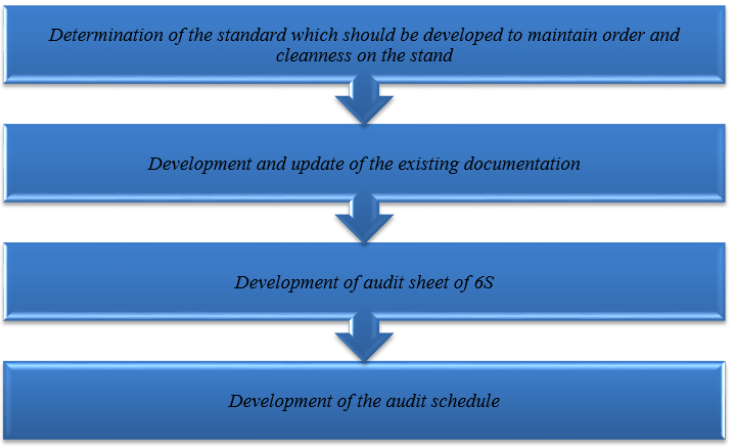

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Fig. 5. Diagram of carrying out the standardization step
Rys. 5. Schemat przebiegu kroku standaryzacji

Table. Opportunities and threats of implementation of 6S method in a farm
Tab. Szanse i zagrożenia przy wdrażaniu metody 6S w gospodarstwie rolnym

OPPORTUNITIES RESULTING FROM IMPLEMENTATION OF THE METHOD	IMPLEMENTATION THREATS
1. ensuring a higher quality of offered products 2. reduction of the number of waste 3. reduction of costs of farm operation 4. ensuring timeliness of supplies 5. reduction of the number of complaints 6. better availability of equipment 7. increase of the equipment performance - reduction of the number of faults 8. increase in the work safety 9. rational use of space 10. increase of the work comfort 11. improvement of communication 12. reduction of a negative impact on the environment 13. increase of the client's trust 14. development of a farm 15. clearly defined procedures of the process course 16. no need to incur high financial inputs	1. weak communication between employees may delay or make the implementation of the 6S method impossible 2. resistance and fear of changes 3. habits with regard to the work acquired in the previous political system 4. no engagement in compliance with the implemented principles 5. excess of work 6. no or incorrectly carried out trainings referring to the aim of the 6S method implementation 7. the method may be not completely implemented as a result of no external control 8. seasonality of works 9. weather – during a good weather works may prove to be more important than compliance with the implemented principles

Source: own work / Źródło: opracowanie własne

3.6. Safety

A step consisting in creation of a safe work environment is seemingly invisible. It results from compliance with previously implemented principles and care for a correct organization and cleanness at a work stand and elimination of possible threats. Creating conditions which encourage to maintain the implemented system results not only in the improvement of the quality of products but also translates into safety. All actions carried out as a part of selection, set in order, shine and self-discipline steps directly or indirectly have impact on safety and an outcome of these actions may be called the sixth S – Safety.

4. Chances and threats of implementation of the 6S method

During the process of implementation of the 6S method many obstacles and threats may be met and overcoming them may become a key step which preconditions the success of the enterprise. These barriers result mainly from attitude of persons who participate in the implementation process and their internal motivation. However, many companies where organization culture is based on the 6S method principles reports that numerous problems may be solved with the use of the method e.g. the problems with the quality of products, production costs, machine faults etc. [1, 7, 12, 16]. The most important barriers of implementation and compliance with the 6S method and chances which result from implementation were presented in Table.

5. Conclusion

The 6S method allows formation of a safe and effective workplace without the need to incur high costs. Implementation of the method in farms may cause not only the increase of the quality of products but also will improve the work safety. Although it is based on simple principles, the implementation process is not always successful. Making people aware that maintaining order and cleanness at the workplace is not a waste of time is one of the most important stages during implementation of the 6S method principles. The change of the manner of thinking may prove to be a key element which influences the implementation success. Thus, it is significant to properly prepare for the realization of the project and to actively participate in all stages of implementation.

Indication of persons who would carry out audits and trainings is a problem in small and medium farms. Thus, in the initial stage of implementation of this method both trainings and audits concerning the 6S should be carried out by a specialized staff e.g. by the Agricultural Social Insurance Fund, or Agricultural Counselling Centres. These trainings could be carried out e.g. at the time of training on occupational safety and health, application of crop protection substances.

With regard to the fact that the 6S is a constant process, a detailed pressure should be put on the self-discipline step. Developing a habit of compliance with principles and absolute engagement in correct functioning of the 6S method requires incurring high work and time expenses but will bring a range of long-term advantages which will not perish with time but will be sustained with self-discipline.

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