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Benefits of a learning factory in the context of lean management for the pharmaceutical industry

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Abstract

The past has shown that the successful implementation of lean in organizations needs employees with sufficient knowledge about methods and principles of lean management. The mediation of these skills during the ongoing production is known as a more efficient concept than other approaches. Consequences could be an additional cost and time pressure. Therefore the Fraunhofer IPK and TU Berlin have developed a training concept, together with a German pharmaceutical company, which makes it possible for the employees to acquire the new knowledge under real conditions and without disruption of production. The paper introduces this concept of a “Lean Factory” for pharmacy.

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1. Introduction

For industry and science the lean concept is a promising opportunity to realize an optimized and continuous quality while enhancing the effectiveness. Some industries, like the automobile industry, already reached a high lean status. The pharmaceutical industry has just started to invest more effort to enhance efficiency instead of focusing on high quality only. Thus pharmaceutical companies are going to implement lean approaches encouraged through a parallel qualification of employees. The focus lies on topics like 5S, standardization, types of waste. On this basis the training of employees emphasis the problem solving process. To realize and run these trainings the pharmaceutical company has decided to establish a learning factory. The paper will describe the chosen approach and point out characteristic features as well as valuable experiences made during the project [1].

2. Learning factory for the pharmaceutical industry

The pharmaceutical industry is one of the oldest and most research intensive economic sectors in Germany. The environment of this industry is exposed to changes, which are more dynamic and lead to heightened competitive constraints. Crucial drivers for this change are increasing costs caused by intensified expenditures in research and development, regulatory requirements as well as an increasing consideration of environmental and working safety aspects. Also the expiration of exclusive rights for important medications leads to a loss of turnover and profit [2]. The study “Pharma Operations Benchmarking” of McKinsey identified three major fields of action for companies in the pharmaceutical industry to take into consideration in order to ensure the corporate success in the future [1], [3], [4].

- Increase the performance of facilities and plants
- Interconnection and configuration of facilities and plants
- Increase of quality and compliance

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2.1. Concept and didactical design

The pharmaceutical industry does not enforces the implementation of lean concepts as long as the automobile industry, which looks back to a history of about 50 years since the first lean production elements were developed [4]. To face these identified challenges the company decided to bring a new initiative into being and built up a learning factory for teaching lean management methods and tools. It is called the "Lean Factory", because the focus lies on lean management topics.

The concept consists of an alternating sequence between observation, theory and practice. A realistic production, wherein methods and procedures can be tried out build the key element. Within this environment topics can be trained without risk and loss of production. Additionally it is illustrated how quality of products and processes can be improved with slight effort. The trainings have shown that the combination of theory and practical application of what has been learned has advantages over other qualification concepts. In the end it creates a higher learning effect (see Fig. 1). Furthermore the didactical concept of learning factories provides an environment in which theoretical knowledge is transformed into expertise. A self-learning process becomes active which fosters a sustainable learning effect. This effect is positively supported by the realistic environment which stimulates all senses [6], [7].

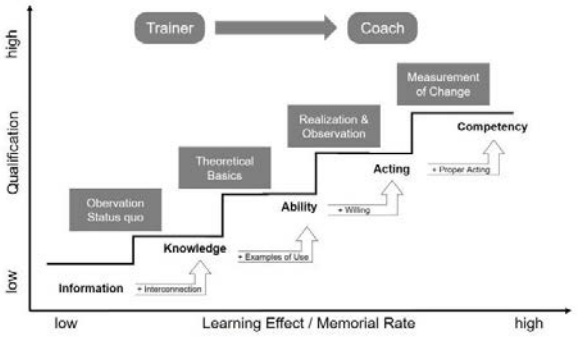

Fig. 1. Didactical design of the learning factory.

Figure 1 shows the learning process. In the following part a combined approach is used to explain the different phases. Firstly every step will be explained in general as illustrated in Fig. 1. Afterwards a concrete example of the "Lean Factory" will be described. This is supposed to support the understanding.

The first step, which has a low qualification and memorial rate as basis, includes the observation of status quo. This phase should enhance the motivation through active involvement on the one hand and self-awareness on the other. In the "Lean Factory" a lack of tidiness and order in the production process is chosen as the starting point (step 1). The observation is said to show the types of waste to the trainees.

The second step constitutes the impartation of theoretical basics. Thereby it connects the first information with theory and generates knowledge. The purpose of this phase is to foster basic and specific knowledge of methods. By using practical examples from the pharmaceutical and other industries during the theoretical parts, the pure knowledge is transferred to an ability to use the methods. Moreover an awareness why they are beneficial is created. The theoretical parts in the "Lean Factory" are used to establish a basic knowledge of types of waste as well as an understanding how to recognize and suppress these wastes.

Step 3 expedites the implementation and application of learned skills. It includes motivational aspects to encourage the trainees to support the approach and thrive them to a status where they are bent on acting lean of their own accord. The phase also includes the observation of changes after implementation. In the "Lean Factory" step 3 is realized by a practical part where the participants implement measures to improve tidiness in the shop floor. The fourth step is the measurement of change and success in the practical environment. To discuss the results in the end is a very important part of the training. This helps to prepare the trainees to recognize where potential problems during the implementation can occur and what impairs a successful application of methods. This phase is realized by a last observation. At this point a very good "lean-status" is reached but there is still some space for optimization. It shows the continuous improvement process in the context of lean management to the participants. Following this process, a high qualification and a high learning effect can be realized. During the transfer of learnings from the training to the practical realization at the respective workplace of the participants the support of the trainers as coaches is essential. A goal can be, that one day participants are coaches themselves at their site. Not least, the personnel qualification is an elementary component in the pharmaceutical industry to ensure company success [8].

2.2. Learning factory design and approach

To realize the learning factory, an existing production area at the site of the pharmaceutical company was refurbished. The created learning factory comprises three essential areas on 400 m². The core builds the production area in which the participants find all necessary devices and machines as well as input materials to produce solids like tablets (see Fig. 2).

The process starts with a weigh station to weigh the input materials. Continuing with different mixing stations (dry-mix, wet-mix, granulation), which are competent to mix the different input materials and liquids. It continues with a compression of the granule into tablets. In the end the tablets are blistered and packaged. The accuracy to reality becomes apparent in the complete reconstruction of a solid production.

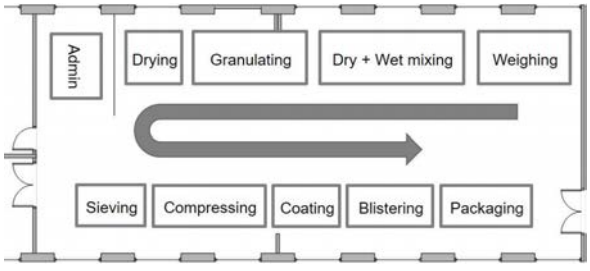

Fig. 2. Production process in the "Lean Factory".