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Possibilities of Utilizing Lean Management Tools in the High-Level Structure (HLS) Concept

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Abstract:

Purpose: *This article attempts to identify Lean Management tools that have the potential to support the implementation of management requirements outlined in the International Organization for Standardization (ISO) standards, including ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018.*
Design/Methodology/Approach: *The research aimed to identify Lean Management tools that could support the requirements of businesses operating based on the High-Level Structure (HLS) framework. The theoretical and cognitive objective was to conduct a comprehensive review of the subject literature and scientific works related to management systems. The analysis of the problem revealed the previously unidentified potential of utilizing selected Lean Management tools to support the requirements outlined in ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018.*
Findings: *The generated conclusions will allow companies operating based on the HLS framework to increase the likelihood of effectively implementing quality, environmental, and health and safety management processes.*
Practical Implications: *Lean Management tools have been presented in a practical format that enables their application in companies operating based on the HLS framework. The generated conclusions will allow companies with multiple management systems and those operating based on the HLS framework to use the presented Lean Management tools, which may contribute to developing more cost-effective solutions for these companies.*
Originality/Value: *The authors present the possibilities of using individual Lean Management tools in companies operating based on the HLS framework. The article pays particular attention to the HLS concept, which operates based on unifying the structure of all management system standards (consistent text, identical terminology). The analysis of the problem revealed the previously unidentified potential of utilizing Lean Management tools to improve processes related to quality, environmental, and health and safety management.*

Keywords: *Lean Management tools, Lean Management, High Level Structure (HLS), management systems, quality, environment, health and safety.*

JEL: *L15, L16.*

Paper type: *Research article.*

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1. Introduction

The proposal to utilize Lean Management tools in the High-Level Structure (HLS) concept explores previously unidentified potential ways of fulfilling (or supporting the fulfilment of) the requirements contained in the standards developed by the International Organization for Standardization (ISO). The purpose of the article is to characterize and identify the possibilities for utilizing individual tools derived from the Lean Management concept in enterprises that possess multiple management systems.

The article is conceptual in nature; it presents a theoretical compilation based on correlating selected Lean Management tools with specific management standards developed by the International Organization for Standardization. The result of the conceptual work is recommendations for enterprises that employ the HLS concept regarding the utilization of Lean Management tools in fulfilling the requirements contained in specific management standards.

The conducted literature analysis enables a clear presentation of the role of selected Lean Management tools in optimizing processes within enterprises that operate based on the HLS concept. This article is based on a broad literature analysis of the HLS and Lean Management concepts. In this study, the potential compatibility of management systems (quality, environmental, and health and safety) with selected Lean Management tools has been determined.

2. High Level Structure - Characteristics

The High-Level Structure (HLS) concept entails the application of a uniform nomenclature, base text, terminology, and basic definitions to aid in understanding and properly interpreting the requirements of standards developed by the International Organization for Standardization (ISO). HLS enhances coordination through the structuring of documentation and serves as a means of mutually complementing systems (Linders, 2020).

The aim of introducing an integrated system encompassing multiple standards is to increase the consistency and compatibility of various management system techniques. The HLS concept predicts that in the future, all management system standards will have the same overall appearance (Rączka, 2015).

Implemented according to International Organization for Standardization (ISO) documentation, the HLS structure has allowed for the standardization of management system standards in terms of structure. The main changes that have been implemented in the latest version of the standard include (Rączka, 2015):

- Organization context – "combination of internal and external factors that can influence the organization's approach to developing and achieving its objectives."
- Exclusions – "the organization should apply all the requirements of the standard (…)."
- Leadership - increased responsibilities and requirements are imposed on the top management of the enterprise, including, among others, responsibility for the effectiveness of the system and integration of quality management with the company's business processes.
- Risk - enterprises should adopt a more systematic approach to risk identification, without treating it solely as a requirement of the quality management system.
- Documented information - a quality manual and procedures are not required (which does not mean that they cannot be used).

The purpose of the HLS is to standardize and integrate different management systems (Scrimshire, 2015). In HLS, the majority of requirements are of a general nature, which enables its application in many enterprises regardless of their specific functioning. The HLS should be adapted to the management systems operating in the enterprise and consist of ten chapters (ISO High Level Structure for Management system standards, 2015):

1. Range
2. Normative references
3. Terms and definitions
4. Context of the organization
5. Leadership
6. Planning
7. Support
8. Operation
9. Performance evaluation
10. Improvement.

Researchers studying the HLS confirm the possibility of integrating individual management systems (Majernik *et al.,* 2017; Ferreira *et al.,* 2019). Implementation of the HLS can be carried out by implementing management systems sequentially or simultaneously. When management systems are implemented sequentially, companies typically start with a quality management system. This phenomenon may be due to the fact that quality was one of the first aspects to be systematized through standards. Quality is also the most widespread area of management systems, as it is important regardless of the specificities of a company's operations (Kopia *et al.,* 2016).

A unified structure of standards and regulations should support management processes in companies (Purwanto *et al.,* 2020; Fahmi, 2021). The HLS seeks to

meet the growing expectations of companies by combining management systems into one structure. Changes in system requirements within the HLS structure aim to better adapt standards to market realities and use them to create a useful system that serves not only to monitor and improve quality, but also to create a system that is compatible with business processes (Tarí *et al.*, 2012). This approach seems to provide a better platform than previously for utilizing tools derived from the Lean Management concept.

3. Possibilities of Utilizing Lean Management Tools in the ISO 9001:2015 Quality Management System

The primary objective of a quality management system (QMS) is to meet customer requirements through the application of quality procedures and techniques (Gordon, 2009). A QMS should maximize the likelihood of a company producing products that meet customer requirements and demonstrate that the company is focused on quality and continuous improvement (Feigenbaum *et al.*, 2004).

Lean Management, on the other hand, focuses on identifying value-added activities and eliminating waste in all areas of the production process (Pepper *et al.*, 2010). The use of Lean Management tools has the potential to support a company's efforts to meet customer requirements and lead to the improvement of their QMS (Ilkay *et al.*, 2012).

To gain the benefits of implementing a QMS, a company should understand that it is a continuous process that should be implemented gradually, with full support from motivated employees (Yang *et al.*, 2011). A successful QMS implementation should lead to the understanding and adherence to the principles contained in the procedures by all employees (Clapperton *et al.*, 2010).

The following information is presented from various literature sources discussing the possibilities of utilizing selected Lean Management tools in improving quality management systems:

- The proposal to enrich the requirements with guidelines (derived from the concept of Lean Management) for their implementation would have a chance to minimize waste in manufacturing companies (Gajendran et al., 2011). Placing greater emphasis on production rhythm (One piece flow[3]), permanent workplace organization (5S[4]) and the implementation of a coherent program with potential for improving production processes

[3]*Individual products are manufactured one by one and then individually passed on to subsequent workstations, allowing for optimal and consolidated production.*
[4]*Optimization of the workplace through selection, systematization, cleaning, standardization, and self-discipline.*

(Empowerment[5]) appears to pose no barriers to fulfilling the requirements set forth in ISO 9001:2015.

- Researchers often cite 5S as an example of a Lean Management tool that can be used in companies with an implemented ISO 9001 system. Many studies indicate the usefulness of this tool in the context of reducing documentation (Micklewright, 2010; Chiarini, 2011).

- In 2011, an attempt was made to define guidelines integrating ISO 9001:2015 and Lean Management in a French document called FDX 50-819. This document aligns ISO 9001 requirements with Lean Management tools such as 5S, One Piece Flow, etc. The primary objective of this document is to identify the most appropriate Lean Management instruments for complementary interaction with ISO 9001 requirements. The recommendations in FDX 50-819 coincide with those identified by Chiarini in the article titled "Integrating lean thinking into ISO 9001: a first guideline" (Chiarini, 2011).

- Lean Management tools aim to "streamline" the company by optimizing costs and improving adaptability to market changes. Such results can be achieved through the use of tools such as 5S or Empowerment (Borys *et al.,* 2012).

- Empowerment appears to be a tool with potential for use in companies with an implemented QMS, as it sets out principles of employee participation in eliminating dysfunctions in processes and pro-efficiency actions at workstations. Empowerment focuses on stimulating employee creativity, which can contribute to an increase in staff potential (Jones *et al.,* 2013).

In Micklewright's work "Lean ISO 9001" from 2010, one can find a lot of information concerning the application of Lean Management tools in the ISO 9001 quality management system. It is believed that in manufacturing companies, two parallel organizational units dealing separately with QMS and Lean Management often function - such a solution causes blurred responsibility and waste of resources (Micklewright, 2010). Blurred responsibility can be a source of desynchronization between individual units in the organization. QMS and Lean Management focus on common goals, but in many companies, they are not integrated with each other (Ścierski, 2011).

The advantage of the correct use of Lean Management tools in companies with an implemented quality management system is that the impact of these tools on

[5]*Empowers employees of the enterprise to report productivity changes in their job positions. Each employee may submit proposals for improvements of observed dysfunctions.*

processes in the company is measurable and visible. The vast majority of companies that have decided to apply Lean Management tools in the ISO 9001:2015 system have achieved economic benefits and reported increased customer satisfaction (Bacoup *et al.,* 2018).

Based on the above literature analysis, it should be concluded that the ISO 9001:2015 quality management system implemented in companies creates circumstances for the use of Lean Management tools, including 5S, One piece flow, and Empowerment.

4. The Possibilities of Using Lean Management Tools in the ISO 14001:2015 Environmental Management System

The ISO 14001:2015 standard contains requirements for the operation of an environmental management system (Martins *et al.,* 2018). The main objective of the ISO 14001:2015 standard is to monitor compliance with legal requirements rather than measure the environmental performance (Fonseca, 2015). Measuring environmental performance would allow management to identify the successes and failures of the system and assess the level of achievement of environmental objectives (Casadesús *et al.,* 2008; Purwanto *et al.,* 2021).

One distinctive feature of the ISO 14001:2015 standard, which sets it apart from other environmental standards, is the integration of managerial decision-making processes with environmental protection activities. This is a more effective approach as it combines environmental protection activities with management activities. Despite its advantages, the ISO 14001:2015 standard has received many critical comments, such as its lack of focus on environmental performance results (Sharma, 2003; Corbett *et al.,* 2001).

The inclusion of Lean Management tools in the ISO 14001:2015 standard has the potential to make environmental system effectiveness more realistic, which in turn will influence the creation of added value for customers (Lewandowska *et al.,* 2014).

The use of Lean Management tools in the ISO 14001:2015 system has the potential to make the system more effective according to the concept of continuous improvement (Simpson et al., 2005). Integrating the ISO 14001:2015 standard with Lean Management tools typically leads to increased environmental protection effectiveness through the establishment of measurable parameters and continuous improvement. The effectiveness of integrating Lean Management tools and the ISO 14001:2015 standard can be achieved by implementing processes aimed at waste elimination and creating an economically sustainable working environment (Sroufe, 2003).

According to research into academic literature, Lean Management tools that can be used to support the requirements of the ISO 14001:2015 standard include:

- The Hoshin Kanri tool can support management systems that have already been implemented in the company by creating a synergy effect. Hoshin Kanri involves setting development goals for the near future and their continuous achievement. These goals are set by individuals who supervise specific sub-processes and their subordinates. Improvement can be achieved through consistent and systematic implementation of these goals, which aim to eliminate waste within the organization and generate added value for the environment.

- The implementation of Value Stream Mapping requires a company to identify the processes involved in producing finished products for customers. The actual use of the Value Stream Mapping tool involves graphically mapping the current state of the production and logistics system and designing the future state. Value Stream Mapping has the potential to create added value for the environment. This value is created through the analysis of processes and can be used to improve ISO 14001:2015 by identifying waste and inefficiencies (Wirkus *et al.*, 2011).

- Just in Time is also one of the Lean Management tools that can be applied in companies with an implemented ISO 14001:2015 system. Just in Time promotes minimizing losses associated with unused components or semi-finished products (the company eliminates losses due to expiration dates, thus avoiding generating unnecessary waste). In addition, Just in Time reduces the consumption of various fuels/electricity by companies as it eliminates unnecessary manipulation of palletized load units (Puvanasvaran *et al.*, 2012).

The above information appears to confirm the possibility of incorporating tools derived from the concept of Lean Management (Hoshin Kanri, Value Stream Mapping, and Just in Time) into the ISO 14001:2015 environmental management system, thus confirming the purposefulness of conducting the research presented in this study.

5. Possibilities of Utilizing Lean Management Tools in the Occupational Health and Safety Management System ISO 45001:2018

The International Organization for Standardization (ISO) published the ISO 45001:2018 standard “Occupational health and safety management systems” on March 12, 2018, replacing the OHSAS 18001:2007 standard.

It is worth noting that ISO 45001:2018 devotes much more attention to the directives of the International Labour Organization than previous standards on occupational health and safety before 2018. ISO 45001:18001 is also the first standard for occupational health and safety to be constructed based on the High-Level Structure (HLS) concept. This approach ensures documentational compatibility with other

management systems, such as ISO 9001:2015 and ISO 14001:2015 (Ewertowski, 2018).

The new version of the standard that standardizes occupational health and safety was created with enterprises in mind, allowing the implementation of individual requirements to be integrated with the implementation of requirements of other management systems. Similar to other standards developed in accordance with the HLS structure, the Deming Cycle (PDCA Cycle) is located in the first part of ISO 45001:2018 (Orzes *et al.,* 2019).

The Deming Cycle is recognized by researchers as one of the Lean Management tools (Walentynowicz, 2014). It should be noted that the Deming Cycle is part of all management systems described in this article, thus demonstrating the excellent potential for its utilization[6].

Thanks to modifications compared to previous versions, it seems that ISO 45001:2018 standard creates many opportunities for the use of Lean Management tools. Among the identified possibilities for improving the level of occupational health and safety, there are (Walentynowicz, 2014):

- The implementation of the Poka Yoke tool - according to ISO 45001: 2018, the enterprise is obliged to implement and maintain a reporting process, investigate causes and take corrective actions related to incidents and non-conformities. Poka Yoke is a tool used to implement preventive solutions used in workstations - it serves to prevent mistakes caused by fatigue or inattention of personnel. The Poka Yoke tool is developed using visual elements.

- Implementation of the Andon tool - the Andon tool notifies the production personnel of a failure/potential failure of the production line/specific machine using a visual or auditory signal. Such a solution allows for a quick response, which can reduce losses associated with waste of materials (semi-finished products) and the production of defective products.

- The implementation of the Jidoka tool - in a literal sense, refers to automation with a "human touch." Jidoka is most commonly used in enterprises as an automatic (or manual) system for stopping production lines in the event of a production shortage and, more importantly, in the event of a threat to the health and/or life of employees.

[6]*Information about the Deming Cycle has a systematic character in organizing knowledge about management standards constructed based on the HLS concept.*

It seems that the utilization of Lean Management tools such as Poka Yoke, Andon, and Jidoka has the potential to support the fulfilment of the requirements included in the ISO 45001:2018 standard, and thereby contribute to strengthening a system dedicated to improving occupational safety and health in an enterprise.

6. Conclusions

HLS is a concept composed of multiple elements. The utilization of Lean Management tools in such a complex environment can assist enterprises in improving processes and eliminating waste. Lean Management tools can support the fulfilment of requirements included in management systems developed by the International Organization for Standardization.

The Lean Management concept can contribute to the more effective fulfilment of requirements included in the HLS framework since the presented management standards only indicate the requirements that need to be fulfilled, while ISO standards do not indicate how to fulfil these requirements.

The utilization of Lean Management tools in enterprises operating based on the HLS concept can also help build a culture of continuous improvement where employees are encouraged to take a proactive approach to quality, environmental, and occupational health and safety-related processes. This can, in turn, contribute to increased efficiency and decreased costs, which are crucial for the functioning of enterprises.

In this study, management standards constructed based on the HLS concept have been compared with selected Lean Management tools:

- ISO 9001 - 5S, One piece flow, Empowerment.
- ISO 14001 - Hoshin Kanri, Value stream mapping, Just in Time.
- ISO 45001 - Andon, Poka Yoke, Jidoka.

It should be noted that management systems in the HLS structure are interconnected and even partly “penetrate” each other. Therefore, assigning a particular Lean Management tool to support the implementation of requirements in one management system does not mean that it cannot be used to support the implementation of requirements in another management system.

It seems that the evolution of management system requirements is moving towards their alignment with market reality. Better adjustment of management system requirements to aspects related to economic profitability can contribute to the creation of a system that, in addition to monitoring formal aspects, will be compatible with business processes. Thus, the literature analysis conducted for the purposes of this study generates a certain framework for implementing tools derived from the Lean Management concept into the High Level Structure concept.

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