

ISO 14001: 2015 Environmental Management System Design in a Milk Industry

Praditya Ajidarma*, Ayunda Rahmadini, Wildan Trusaji, and Dradjad Irianto

Manufacturing System Research Group, Bandung Institute of Technology, Bandung, Indonesia

Abstract: Two important concepts in industrial engineering discipline are standard and sustainability. In any production system, standards to sustain the quality of products and the surrounding environment must be taken into consideration. To learn how the two concepts are executed in practice, an implementation of ISO 14001 in a milk industry is studied. Prior this study, the milk industry has already been certified by ISO 14001: 2004 to regulate the daily production and to maintain its environmental concern. In 2015, International Organization for Standardization (ISO) introduced a new standard for environmental management system by publishing ISO 14001: 2015, which revised the older ISO 14001: 2004. Consequently, to sustain the milk company's compliance with regard to the milk product and beverage processing standards, it must prepare itself to adapt to the new ISO 14001: 2015 standard. This research aims to design an environmental management system which refers to ISO 14001: 2015, and to draft the mandatory set of documents and records. The methodology used in this research firstly collects the data by interview and observation. Further, the collected data is analysed and assessed with respect to the compliance of ISO 14001: 2015. The result shows that there are 4 unfulfilled clauses and 1 partially-unfulfilled clause based on the standard. Thus, several transformations and adjustments need to be done within the milk industry if the company wants to acquire ISO 14001: 2015 standard.

Keywords: ISO 14001: 2015; environmental management system.

1. Introduction

Standards are well-studied aspect in Industrial Engineering curriculum in Indonesia. In accordance with the criteria of Accreditation Board for Engineering and Technology (ABET), environment becomes one key objective in engineering and design [1-2]. This research aims to study the implementation of standards within environmental boundary.

This research takes place in a milk industry which has been certified by ISO 14001: 2004 and ISO 22000 food safety standards. Further, the product's packaging is also certified by Forest Stewardship Council (FSC) and is sourced from recycled material. To further maintain the quality of its product and its market share, the company aims to update its ISO 14001 certification to the newest version.

This paper demonstrates how an industrial engineering student solves a certification preparation problem for a certain milk industry, so that the company is able to achieve ISO 14001: 2015 certification. This research also aims to increase the student's understanding in the field of standardization with regard to environmental aspects, such that the learning objective of industrial engineering curriculum is achieved.

*Corresponding author; e-mail: ajidarmap@itb.ac.id
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2. ISO 14001 environmental management system

ISO 14001: 2015 is the newest version of ISO 14001, which revise the previous version of ISO 14001: 2004 [3]. The certification is revised so that ISO remains relevant to the current trends and challenge that are currently faced by corporations. Further, the update also ensures the compatibility of ISO 14001 with other ISO standards. In the new ISO 14001: 2015, some key points are more highlighted compared to its previous version, particularly related to strategic approach, leadership culture, proactive nature, life-cycle thinking, communication strategy, and a comprehensive implementation of Plan-Do-Check-Action (PDCA) for the whole system [4].

This research reviewed every clause in the ISO 14001: 2015 along with the necessary corresponding documents for each clause. The 10 primary clauses of the standard are listed in Table 1.

Table 1. Clauses of ISO 14001: 2015 [5]

Code	Title	Sub-Clauses
1	Scope	N/A
2	Normative References	N/A
3	Terms and Definitions	N/A
4	Organizational Context	Understanding the organization and its context, the needs and expectation of interested parties; determining the scope
5	Leadership	Leadership and commitment; environmental policy; organizational roles, responsibilities, and authorities
6	Planning	Actions to address risks and opportunities; Environmental objectives and planning
7	Support	Resource; competence; awareness
8	Operation	Operational planning and control; Emergency preparedness and response
9	Performance Evaluation	Monitoring, measurement, analysis, and evaluation; internal audit
10	Improvement	General; Nonconformity and corrective action; Continual improvement

Moreover, the difference and similarity between ISO 14001: 2015 and ISO 14001: 2004 is compared and studied [6]. Further, step-by-step implementation procedure of ISO standards is also reviewed [7-8]. Lastly, SIPOC-based business process mapping and environmental impact mapping are also studied [9].

3. Methodology

There are five steps of methodology conducted in this research. First, prior literatures regarding environmental management system, business process mapping, and general concept on milk industry are reviewed. Upon retrieving the business process data from the milk industry, the second step is to map the business process specifically based on the environmental issues addressed by ISO14001. Further, the business process is mapped for each specific clause in ISO14001. The next step is conducting gap analysis between the two mappings. Lastly, the implementation of ISO14001 is designed based on previously-conducted analysis.

4. Analysis

Prior analysis, data collection is conducted. There are five primary data: company's environmental policy, internal and external issue of the company, scope of Environmental Management System, the defined stakeholders, and company's Business Process [10].

The company has its own vision to maintain its policy of preventing environmental pollution by operating under a specified environmental-based regulation and constitution. Further, this policy overlaps with both internal and external issues during its execution, which necessitate the data regarding company's issues as well. Further, the scope of environmental management system includes every operational, production, and service activity that occur within the company. The stakeholders are defined as top-tier management, employee, society, government, external party, and consumer; each stakeholder has its own concern and objective, for instance, top-tier management is mostly concerned with aggregate profit of the company while government is interested with issues related to permit and taxation. Moreover, the main business process of the milk industry that is to be standardized by ISO14001: 2015 includes the following business process: supply management from supplier, production process, packaging process, product sampling, warehousing and storage, and distribution to end-consumers.

Upon data collection, analysis is conducted. The analysis section consists of three key parts: clause fulfilment analysis, proposed improvement analysis, and assessment on managerial implications.

4.1. ISO140001: 2015 clauses fulfilment

To assess the preparedness of the company to recertify its environmental management system compliance, this research identifies the extent of company's fulfilment in ISO14001: 2015 clauses. An ISO clause is said to be fulfilled when the company has fully implemented the ISO clause during their daily operation, while also maintained the required records in accordance with ISO requirements. Furthermore, an ISO clause is partially-fulfilled when the company has operated in compliance with ISO clause, yet some records are incomplete. Based on our analysis in this subsection, some clauses of ISO14001: 2015 are found to be unfulfilled or partially-fulfilled; such clauses are elaborated on the following sub-sections.

4.1.1. Clause 6.2.1: environmental objectives

To fulfil the requirements of this clause, the milk industry has set its environmental objectives based on relevant environmental aspects, particularly those relating to strategic, tactical, and operational aspect of the company. This activity was in accordance with M.L.G.GR.01.00 document within the ISO 14001: 2015 Environmental Management System manuals. However, these objectives were never truly evaluated nor renewed, thus rendering them obsolete. Currently, the company merely attempted to comply with minimum environmental criteria that was constituted by the government. This effort barely helped the company in passing the annual audit conducted by government officials and left the clause 6.2.1 unfulfilled.

4.1.2. Clause 10.1: general

General improvement attempts have been conducted within every department in the company. However, the attempts were not defined properly in the quality manuals of the company, thus leaving the clause unfulfilled.

4.1.3. Clause 10.2: nonconformity and corrective action

To evaluate nonconformity within the company, the milk industry has utilized Non-Conformance Report (NCR) to document irregularities and had it sent to relevant department to develop root cause analysis and mitigation plan.

Even though this report is made continuously, it has not been formalized properly in the quality manuals. Further, this report is only made available for internal audit use only. This is mainly due to the lack of formal procedure that regulates the usage of such documentation, which consequently makes the clause 10.2 unfulfilled.

4.1.4. Clause 10.3: continual improvement

The milk industry has attempted to maintain work ethics, uniformity, and effectivity of the environmental management system of the company as means of continual improvement. However, these attempts are left undefined in the quality manuals. Thus, this certain clause is not fulfilled yet.

4.1.5. Clause 6.1.2: environmental aspects

In attempts to fulfill the clause, the company has defined M.L.G.GR.01.00 and S.L.G.GR.01.02 for environmental system management mapping and the identification of environmental impact, risk, and opportunity, as well as planning actions. The latter also includes an impact-based risk level analysis.

Despite these attempts, the record falsely includes the assessment of workplace health, safety, and welfare as one of the elements in environmental management system. This assessment should not be included and is considered irrelevant according to ISO14001. Furthermore, report still miss several key aspects that should have been considered based on the clause. Thus, Clause 6.1.2: Environmental Aspects is concluded to be partially-fulfilled.

4.2. Proposed improvements

In the previous subsection, five primary clauses that prohibit the milk industry from acquiring ISO14001: 2015 certification is analysed. In order to be certified, the company must fulfil the requirements of each clause may include the following: designing new documents, improving the quality of current documents, or adjusting the requirement of quality manuals. Based on the previous analysis, several suggestions of improvement for each clause is summarized in Table 2.

Table 2. Summary of the proposed improvements

Improvement Recommendations	Clause				
	6.1.2	6.2.1	10.1	10.1	10.1
Adjustment on quality manuals			✓	✓	✓
Designing the procedural documents		✓		✓	
Designing forms		✓			
Improving current procedures	✓				
Improving current records	✓				

4.3. Managerial implications

The previously-mentioned improvement suggestions must be verified by relevant stakeholders, particularly on managerial level. Upon verification, the recommendation must be further validated on a smaller scale before the policy is fully implemented. By doing so, every potential risk and outcome could be analysed and mitigated.

Upon fulfilling the standard of ISO14001: 2015, the company must enforce the implementation on every level of the company. An example of managerial policies that may help in this phase are obligating every employee to enroll in an ISO14001: 2015 socialization or training that will motivate them to sustain the values of environmental management system. Further, another example of good enforcement method is designing a department-based reward/incentive system. Thus, every department will compete with each other to ensure that their business process complies with ISO14001: 2015.

5. Conclusion

There are three key points that are concluded in this research. First, the fulfilment analysis concludes which clauses are unfulfilled and which ones are partially fulfilled. Second, potential improvements are recommended to the milk industry to help them to meet the requirement of every ISO14001: 2015 clause. Lastly, supporting documents are designed and revised to enforce the implementation phase of the environmental management system.

The milk industry has not fulfilled the following clauses of ISO 14001: 2015, which are Clause 6.2.1 – Environmental Objectives, Clause 10.1 – General, Clause 10.2 – Non-conformity and Corrective Action, and Clause 10.3 – Continual Improvement. Further, there is one partially-fulfilled standard of ISO14001 – 2015, which is Clause 6.1.2: environmental aspects.

Several improvements must be made by the milk industry to comply with the standard given by ISO14001: 2015. This research suggests the following actions: to improve environmental aspects mapping, to formalize a set of desirable environmental objectives, to define improvement attempts, non-conformity, and corrective actions, as well as continuous improvement actions, and lastly, to formalize nonconformity management and its corresponding corrective actions.

Several documents, including forms and Standard Operational Procedure (SOP), are newly-designed during this research, as follows: SOP of environmental objectives documentation, SOP of non-conformity management and corrective actions, and SOP of determining environmental objectives. Furthermore, some documents are improved or revised during this research, which are: quality manuals with requirements regarding improvement attempts, non-conformity, corrective actions, and continual improvements; SOP of environmental aspect mapping, and records of environmental aspect mapping outcome.

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