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Environmental gap analysis according to ISO 14001:2004 in mineral water bottling plant in Morocco

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Abstract

In order to keep themselves competitive and to protect their brands and reputation, food processing plants need to manage risks, show corporate responsibilities and abide by the demands of their clients. In this context, ISO 14001, in reference to environmental management, could contribute to the sustainable development of food industries activities. Before implementing a management system in a company, a diagnosis its initial situation is necessary to have the global view needed prior addressing implementation action plan. This study aims to show used method and results of an initial gap analysis according to ISO 14001:2004 -Environmental Management System- requirements in a company specialized in bottling of mineral water. This company is ISO 9001: 2008 certified and plans to get ISO 14001: 2004 certification. To conduct the initial diagnosis, a checklist, developed by Washington State Department of Ecology, gathering all requirements of the standard in the form of questions was used as a tool. The overall compliance rate was limited to 30%. This rate varies between 0 and 78% from an element to another. Explanation for this variation is given for each element of the standard.

Key words: ISO 14001:2004, Food industry, Environment Management System, Spring water, Checklist.

1. Introduction

Most environmental regulations are based on the assumption that the pursuit of profit leads firms to pollute the environment, and therefore governments must impose mandatory regulations. However, new instruments such as voluntary programs are increasingly important [1]. Among these voluntary programs, environmental management system is noted. It is somewhat unique from other ISO standards in that it was not developed to facilitate international trade, as was ISO 9001, but rather as a response to international concerns for the environment. The principle behind the development of ISO 14001 is that organizations in general and industry in particular, need to move beyond regulatory compliance toward sustainable development [2]. The ISO 14001 process standard is one of several structures within which a facility may develop an Environmental Management System (EMS). The main purpose of the EMS is to organize environmental work in such a way that an organization's environmental performance improves continuously [3]. It allows organizations to be systematic in the evaluation of their processes and activities with regard to interaction with the environment. Hence, the EMS controls these activities and ensures that established objectives and targets are being met. It follows the Deming's well known Quality Management approach of ''Plan, Do, Check and Act''. ISO 14001 is a process standard and accordingly it specifies the characteristics of the components of a management system. It requires that adopting organizations create an environmental policy, set objectives and targets, implement a program to achieve those objectives, monitor and measure the program's effectiveness, correct problems and conduct reviews aimed at improving the EMS. As such, the EMS is a tool that allows the continual improvement of the environmental behavior and performance [4, 5, 6]. Environmental management helps to avoid environmental problems while simultaneously benefiting the companies that adopt it [7]. It must have the

commitment of top management to be effective. Without a formal commitment, the system will have neither credibility nor effectiveness [8].
The number of firms that have voluntarily adopted ISO 14001 is steadily increasing and spreading: such firms in turn have also encouraged their suppliers to be ISO 14001 certified as a prerequisite in selecting them [9]. The benefits and the drawbacks of ISO 14001 have been the subject of analysis and discussion from both an academic and an organizational standpoint [10, 11, 12].). ISO survey of 2013, table 1, shows this evolution of certification number.

Table 1: Global overview of certification number from 1999 to 2013 (http://www.iso.org/iso/iso-survey, 2015)

Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
TOTAL	**13994**	**22847**	**36464**	**49440**	**64996**	**90554**	**111163**	**128211**	**154572**	**188574**	**222974**	**251548**	**261926**	**285844**	**301647**
Africa	129	228	311	418	626	817	1130	1079	1096	1518	1531	1675	1740	2109	2538
Central / South America	309	556	681	1418	1691	2955	3411	4355	4260	4413	3748	6999	7074	8202	9890
North America	975	1676	2700	4053	5233	6743	7119	7673	7267	7194	7316	6302	7450	8573	8917
Europe	7253	10971	17941	23305	30918	39805	47837	55919	65097	78118	89237	103126	101177	113356	119107
East Asia and Pacific	5120	8993	14218	19307	25151	38050	48800	55428	72350	91156	113850	126551	137335	145724	151089
Central and South Asia	114	267	419	636	927	1322	1829	2201	2926	3770	4517	4380	4725	4946	6672
Middle East	94	156	194	303	450	862	1037	1556	1576	2405	2775	2515	2425	2934	3434

As shown in table 1, certification's numbers vary from a continent to another. Africa comes with the lowest number of certifications with 2538 certificates. 75% of them issued in South Africa, Egypt and Tunisia. In Morocco only 92 registered certificates are counted at the end of 2013, although the first certification was delivered in 1999 as well as in Tunisia. This situation can be explained by the fact that national governments have actually adopted differing approaches to the promotion of quality standards within their countries' organizations, or to the latter's relationships with the environment [13].
The company subject of this study is already certified according to ISO 9001:2008 and aims to be certified ISO 14001:2004. It is specialized in mineral water bottling since 2006. Complying with this standard, is strategic decision made by its leadership in the purpose of establishing a real environment management system which could improve environmental performance, enhance company's image and differentiate it from other competitors on the market. Organizations already registered to ISO 9001 will have no difficulty in recognizing the model, but ISO 14001 has two important additional features organizations must identify the environmental aspects inherent in their activities and define the impacts they have on the environment, and they must identify and obey any environmental legislation which applies to them [14]. Due to the increasing awareness among people on environmental issues and to survive in the global market, it is mandatory for the firms to find ways to incorporate environmental aspects into their supply chain management [15]. Also, with the growing threats of environmental degradation, controlling industrial pollution has been an urgent regulatory task [16]. An enterprise that until now has paid little attention to environmental matters, or has not paid attention in any organized way, will want to carry out an initial environmental review (IER) of itself before it does much else. One purpose of an IER is to bring together, for the first time, available information on the enterprise's environmental interactions, its environmental performance, its regulatory compliance status, its environmental programs, and the overall way that it manages the environmental aspects of its operations [17]. In this work, we

tried to conduct an environmental diagnosis to have a global view about the situation of this company against ISO 14001:2004 requirements before starting implementation process.

2. Materials and methods

Diagnosis was conducted in a Mineral water plant located in Atlas Mountains in Morocco. It is one of the leaders of its field. During it, interviews were done with managers including administrative, human resources, quality management, supply and sales departments. Employees who were in direct contact with food processing were also interviewed.

ISO 14001 Gap Analysis Tool Kit edited by Washington State Department of Ecology (WSDE) (http://www.ecy.wa.gov/, 2015) served as questionnaire (table 2 below). It presents the 17 elements of ISO 14001:2004 in 85 questions. For each requirement, a rating from 0 to 2 points was given. 0 means that the requirement is not in place. 1 point is given for a partially implemented requirement & 2 points when it's fulfilled. The highest score possible, 172, indicates all components of the 17 elements are in place. Using the ISO 14001 Gap Analysis Tool Kit, all 85 questions were answered together with concerned staff during 2 working days. A visit of one hour of the facility was agreed immediately after the opening meeting with management stuff.

Question Category: Environmental Policy						
EMS Element 1: Environmental Policy (ISO 14001:2004(E), Paragraph 4.2)						
		Status			**Finding / Corrective Action**	**Notes**
		Not in place	**Partially in place**	**In place**		
1.	Has top management defined the organization's environmental policy?					
2.	Does your procedure (process) for the environmental policy ensure that the policy is appropriate to the nature, scale and environmental impacts of its activities, products, and services that are within the defined scope of your environmental management system?					

Table 2: Environmental check-list

3. Results and discussion

The aim of this diagnosis is to have a clear vision about the situation of the company before starting implementing an environmental management system according to ISO 14001:2004 requirements. Figure 1 below presents complying percentages resulted from this gap analysis.

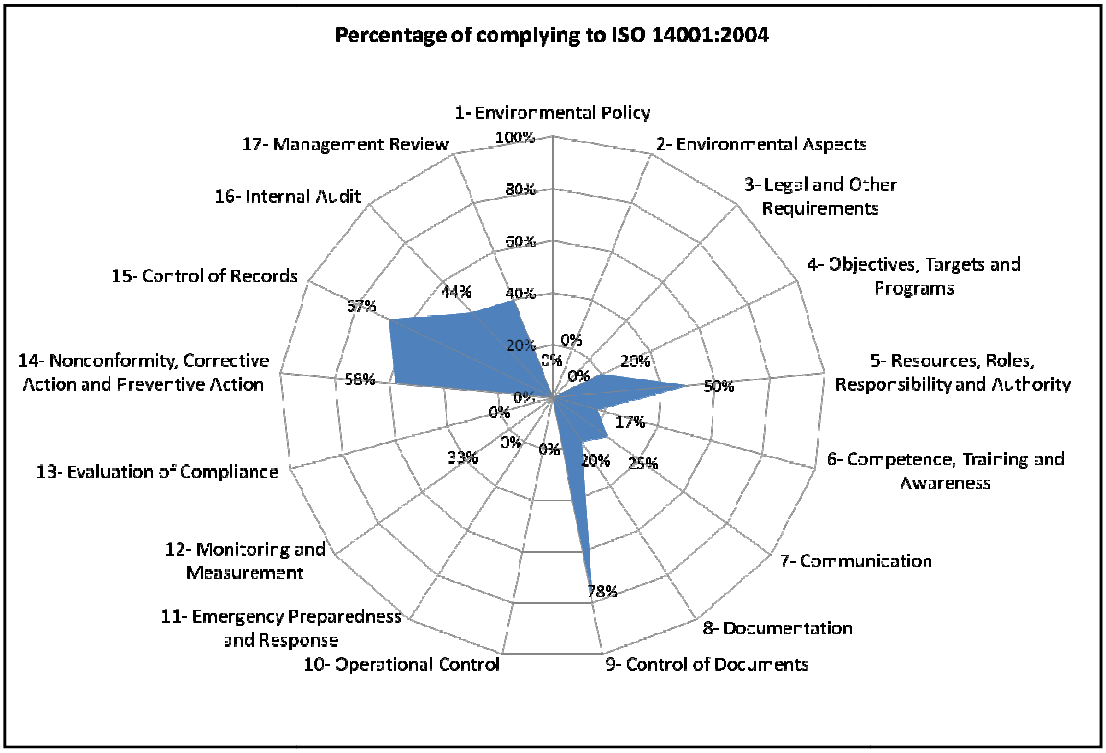

Figure 1: Percentage of complying with ISO 14001:2004

It has been noted that percentages vary from an element of the standard to another. This could be explained by the fact that some elements of ISO 14001:2004 contain almost the same requirements as specified in ISO 9001:2008, and the organization, subject of this study, has a certified quality management system. Other elements are typical for environment management system for this reason complying percentages are too low.
Globally, complying percentage of this company with ISO 14001:2004 using WSDE Gap Analysis Tool Kit is 30%. It is calculated by dividing total programs score by total points available as mentioned in table 3 and figure 2.

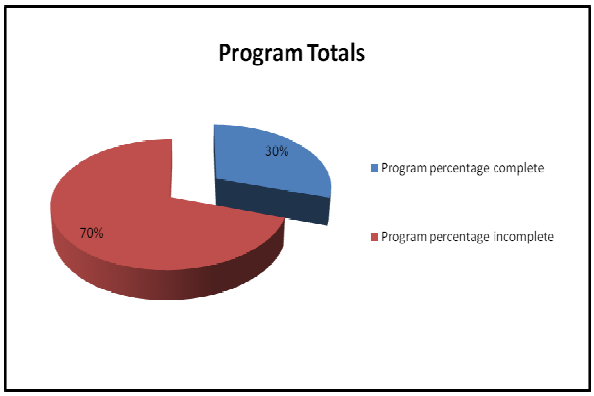

Figure 2: Program Totals: complete and incomplete

	Not in place	Partially in place	In place	
Element subtotals	0	13	38	
Program Total		51		172 points available
Total Program percentage complete		30		

Table 3: Totals Program complete

3.1 Environmental policy

Percentage of complying: 0%

The ISO 14001 standard is developed around W. Edwards Deming's famous Plan-Do-Check-Act model of improvement. Its planning elements consist of the development of an environmental policy that must include the organization's commitments to the environment [2]. Commitment is required from top management before the organization begins to implement an EMS [18]. In the case of this company, a documented environmental policy does not exist. The current quality policy (version 2 of December 2013) is not appropriate to environmental impacts of the company's activities and products within environmental management system defined scope. Also the commitment to continual improvement and prevention of pollution is absent. These two points were verbally formulated by top management during the opening meeting. Only complying with product legal requirements is taken into consideration. It provides a framework for setting and reviewing quality objectives and targets but not environmental ones.

3.2 Environmental Aspects

Percentage of complying: 0%

An initial environmental review (IER) is the first action taken before an organization can plan and implement its environmental policy [8]. It is important to find out what within the organization´s activities, products and services has a significant environmental impact [19].

The absence of an available procedure or process for identifying environmental aspects and determining those with significant impacts during the diagnosis period is the reason for which all requirements of this element are not met.

3.3 Legal and Other Requirements

Percentage of complying: 0%

The current procedure "Regulation update" (PS-QSE-PR-05 Version 1) and record associated "Register of regulation" are specific for identifying and updating applicable product and food safety regulation. Environment legal and other environmental requirements are not included.

3.4 Objectives, Targets and Programs

Percentage of complying: 20%

Environmental objectives and targets, including the commitments to prevention of pollution, compliance with legal and other environmental requirements and continual improvement are not yet established. Therefore, environmental programs are not defined. Only quality objectives, targets and programs are implemented and followed. Actions plans used in quality management system could be kept since objectives and targets with time-frame at relevant functions and levels of the organization are included.

3.5 Resources, Roles, Responsibility and Authority

Percentage of complying: 50%

From the opening meeting, top management has shown commitment for implementing and providing necessary resources required to environmental management system. An organization chart defining roles inside the organization is available (Organization chart version 2.0). Job description forms are determined for all position, but do not include environment management responsibilities.

Quality manager was appointed by top management as Environment manager too with responsibilities and authorities required by the standard. Job description of this position is not yet up-dated after the nomination.

3.6 Competence, Training and Awareness

Percentage of complying: 17%

Some trainings and awareness related to environmental aspects (e.g. ISO 14001 requirements, Environmental management internal auditors qualification and Environmental performance) are included in 2014 training plan but not yet performed.

Since environmental policy and procedures are not yet established, organization stuff and persons working in its behalf are not aware of them (policy and procedures), of significant environmental impacts and of roles and responsibilities in achieving compliance with the requirements of the environmental management system.

3.7 Communication

Percentage of complying: 25%

Communication process established allows internal and external communication between various levels and functions of the organization and with external parties. Tools used are emails via internal intranet, meeting reports (daily, weekly, monthly and yearly), notice boards and company's website. Communication content is limited to quality aspects and lean manufacturing KPI's and does not include organization's environmental aspects and environmental management system. Decision related to externally communicating about significant environmental aspects is not taken.

3.8 Documentation

Percentage of complying: 20%

Environmental policy, objectives and organization's targets are not in place. The scope of environmental management system is determined verbally and not documented. Common documents and records between ISO 14001 and ISO 9001, as specified in "Informative annex A.2 of ISO 9001:2008 Correspondence between ISO 14001:2004 and ISO 9001:2008" (part of it is mentioned in table 4 below), are available but need some changes to comply with ISO 14001 requirements. Example of these documents:

- Job descriptions for key on site staff,
- Organizational charts,
- Training records,
- Resumes of staff responsible for key programs,
- Communication procedure,
- Register of documents and records,
- Preventative maintenance plan for equipment,
- Operational controls,
- Records of monitoring and measurements,
- Reports of progress toward meeting objectives and targets,
- Monitoring equipment calibrations,
- Reports of identified nonconformance, corrective action plans and corrective action tracking,
- Equipment maintenance records,
- Internal audit reports,
- Management review reports.

Table 4: Correspondence between ISO 14001:2004 and ISO 9001:2008

ISO 14001:2004		**ISO 9001:2008**	
Documentation	4.4.4	4.2.1	(Documentation requirements) General

3.9 Control of Documents

Percentage of complying: 78%

Anyone who has a quality management system will be familiar with the practice of document control [14]. ISO 14001:2004 requirements in Document control procedure are the almost the same as in 9001:2008. This explains the high percentage of complement in this element. The actual procedure "Management of documents and records version 2 of December 2012" specifies control of documents modalities according to chapter 4.2 of ISO 9001:2008. However, external documentation considered as necessary for the planning and operation of the environmental management system are not identified.

3.10 Operational Control

Percentage of complying: 0%

Since identification of environmental aspects and determination of significant impacts is not yet carried out, documented procedures and work instructions needed to ensure compliance with the requirements of the EMS are not in place.

3.11 Emergency Preparedness and Response

Percentage of complying: 0%

Emergency preparedness and response process, in which identification of potential emergency situations and potential accidents, response to actual emergency situations and accidents are addressed, is not established and reviewed periodically.

3.12 Monitoring and Measurement

Percentage of complying: 33%

Operations that can have a significant environmental impact are not determined. Accordingly, key characteristics of these operations are not monitored and measured on a regular basis.

Measurements equipments procedure version 1 of 2011 defines main rules to be respected in order to monitor these equipments. Proofs of annual calibration by external laboratory, as required by internal procedure, are available. All equipments are identified.

3.13 Evaluation of Compliance

Percentage of complying: 0%

As mentioned in element 3 of EMS, the procedure "Regulation update" and the record "Register of regulation" do not include applicable environmental legal requirements and other environmental requirements. Consequently, evaluation of compliance with these requirements is not in place.

3.14 Nonconformity, Corrective Action and Preventive Action

Percentage of complying: 58%

Among the six mandatory procedures required by ISO 9001:2008, treatment of nonconformities and corrective action and preventive action are noted. During this diagnosis Corrective and preventive actions procedure (version 2 of 2013) and nonconformities treatment (version 1 of 2012) were available. Although it is taken into consideration while preparing these procedures the necessity of investigation and elimination of nonconformities or potential nonconformities causes, their scope of application is limited to product and costumer's satisfaction. However, this element requires corrective and preventive actions to identify, correct, mitigate, prevent or eliminate environmental nonconformities impacts.

3.15 Control of Records

Percentage of complying: 67%

Description of how the records are identified, stored, protected, retrieved, retained and disposed of, is clearly specified in Management of documents and records (version 2 of 2012) available procedure. In which all records (whether in paper or electronic form) shall be legible, identifiable and traceable. Nevertheless, necessary records that demonstrate compliance with the EMS and conformance to the requirements of the ISO 14001 standard are absent.

3.16 Internal Audit

Percentage of complying: 44%

Internal audit procedure states responsibilities for planning, conducting and reporting audits results. Quality qualified internal auditors are aware of the necessity of maintaining their objectivity and impartiality during the audit process. All internal audits done before were focused on quality management system and food safety aspects. Environmental management system was not taken into consideration.

3.17 Management Review

Percentage of complying: 40%

According to the quality management system established, two management reviews were done before. It is planned once a year in December or January. Inputs and outputs are documented and complying with ISO 9001 requirements but not with ISO 14001 ones. Some specific requirements of element 17 are not in place; e.g. ensuring the suitability, adequacy and effectiveness of the environmental management system. Also, inputs related to results of environmental management system audits, communication from external interested parties and the performance of the environmental management system are not taken into consideration in previous reviews.

Conclusion

1. It is true that with a QMS in place, staff become more familiar with some "new" vocabulary as documentation, internal audits, processes and procedures, objectives, KPIs and management review.
2. Such aspects let ISO 9001 standard to be considered by many as a framework, not mandatory, for compliance with other management standards.
3. It can be seen, in this work, that a certified company according to ISO 9001:2008 didn't mean that it can pass easily to ISO 14001:2004.
4. Diagnosis showed that compliance with EMS requirements is limited to 30% for this case.
5. Other similar studies could confirm or not this rate.
6. A major work still should be done to be certified with ISO 14001 series.
7. This conclusion is in contradiction with the idea said that companies with an ISO 9001 certification could easily be certified with other management standards too, since each standard has its particular principals, different from QMS, that should be respected.
8. Carrying out an initial environmental review with adapted tools could be considered as necessary to have a global view of the organization's situation before starting implementation process.
9. Diagnosis outputs are useful for establishing a correct action plan taking into consideration all standard requirements;

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