



Information and communication technology and its contribution range to the application of the environmental management system ISO 14001 a field study of the opinions of managers in the Badush Cement Factory altawsie

Ali Miyasar Baker Al-Sabawi

Technical College of Management/Mosul Northern Technical University

Email: ali-miyasar@ntu.edu.iq

Majed Mohammed saleeh

Technical College of Management/Mosul Northern Technical University

Received: December 20, 2022; reviews: 2; accepted: January 27, 2023

Abstract

The current study aimed to determine the extent to which information and communication technology contributed at the Badoush Cement Plant tawse, where the questionnaire was used as the primary method of data collecting as part of the implementation of the ISO14001 environmental management system. A total of (80) firm administrators were surveyed, and their responses were analyzed with the use of the statistical software SPSS 26. Many descriptive and analytic statistical approaches were used to examine the data. The statistical findings provide definitive proof that the studied company's administrative officials comprehend the dimensions expressing each of the changes in information and communication technology and the requirements of the environmental management system ISO 14001 too. The study also presented a set of proposals, including the need to pay attention to information and communication technology in the researched organization because of its significant impact on the environmental management system ISO 14001.

Keywords

Information and information technology, ISO 14001 Environmental Management System

Introduction

The last decade of the twentieth century and the beginning of the twenty-first century witnessed tremendous development in the realm of data analysis and

communication technology, and it is still growing to this day, and developing faster than before. information and communication technology Represented motivating evident in individuals and refining their expertise to achieve the best performance, It has become necessary for a business company to have the dimensions of exchange of data and word-of-mouth technology to achieve a range of benefits including the application of the ISO 14001 environmental management system, As a result of the massive developments in the means of modern technology that requires better use to Explanation its costs and contribute to achieving the goals it, and benefit from it in different fields works carried out by economic and units . The introduction of environmental management systems has become an essential requirement to preserve the environment and natural resources, as it is a modern approach that helps management in companies improve their performance and achieve economic, social, and environmental goals. and contribute to the development of society and access to a safe and clean internal and external work environment. And based on the importance of information and communication technology for organizations and their endeavor to implement the requirements of the environmental management system ISO 14001, This study came to provide a theoretical and practical framework to clarify the relationship of correlation and influence between information and communication technology represented by (hardware and equipment, software, human resources, communications, applications) and the requirements of the environmental management system ISO14001 represented by (Organization context, leadership, planning, support, operations, performance evaluation, improvement) In addition to dealing with the current reality of it in the Badoush Cement Factory tawse, which requires the putting two hypotheses.

The first axis: the methodology of the study

First, the problem of the study

The information revolution witnessed by business organizations led to wide developments in the field of information and communication technology, so it was necessary to shed light on the actual contributions of this technology in a wide field represented by the environment through its management. Therefore, it was necessary to put these components when thinking about managing the environment, which required the adoption of environmental management systems, including ISO 14001, It is considered a contemporary trend that organizations have used in their field of work, to serve their environment, And as a result, reduce the volume of waste resulting from their production processes. This is what motivated the researchers to move towards studying this subject, through the foregoing, a set of questions can be formulated that express the nature of the problem under study, which has been identified through:

- 1- Is there a good understanding by the management of the researched company about information and communication technology in its basic dimensions?

- 2- Do employees have consciousness in the researched company about the environmental management system ISO 14001?
- 3- What is the type of correlation and impact relationships between information and communication technology and the environmental management system ISO 14001 in the researched company?

Secondly-study hypothesis

The study can be explained through the following two hypotheses

The first main hypothesis

There is a correlation between information technology and communication and the requirements of the ISO 14001 environment management system in the researched company.

The second main hypothesis

There is a positive effect of information and communication technology on the requirements of the environmental management system ISO 14001 in the researched company

Third -The study population and its sample

The sample is managers consisting of the board of directors, heads of departments, their assistants, and officials of the divisions and units in the Badush Cement Factory tawse, as (80) questionnaires, and a questionnaire form were distributed to all researchers, so they were fully retrieved to benefit from them for scientific analysis

Materials and methods

The first axis: is information and communication technology

First: *the concept of information and communication technology and its importance*

ICT has not had a unifying concept like other modern terms. The researchers differed in defining a specific concept for it according to the vision of each them. Information and communication technology can be defined as a set of modern technological tools and resources used by workers in processing data, converting it into information, storing it, and disseminating it to the beneficiaries, and it includes computers, software, the Internet, and networks. (Elsaadani,2015,2)

(Rony,2017,18) Describe it as a tool for obtaining data and information with the facilities provided by modern devices, equipment, and programs that help individuals to make appropriate decisions.

(Lucero et al, 2019, 2) Describe it as consisting of digital and analog technologies and tools, including software, hardware, equipment, networks, and media that facilitate data collection, processing, conversion into information, display, retrieval, and transfer to beneficiaries when needed.

Through the researchers' review of the concepts that have been revealed, information and communication technology can be defined as a set of modern technologies that include software, applications, hardware, equipment, communication networks, and human resources that collect, process store, and convert data into information and send it promptly to the beneficiaries to make decisions more Efficiency and effectiveness to achieve the goals of the organization.

The importance of information and communication technology is evident, according to what many writers and researchers have stated (Turban & Volonino,2010,13);(Gray,2011,6);(Belvedere et al, 2013,410); (Mohammed&Nzelibe,2013,43); and as follows:-

- 1- Enabling workers to provide all the information they need with less time and effort and less cost, such as digital television. and mobile phones.
- 2- Information and communication technology works to determine the outstanding performance of operations which enhances the competitiveness of organizations.
- 3- Information and communication technology helps the effective flow of information in organizations at any time and achieve goals.
- 4- The lies role of information and communication technology is in improving the quality of work by adopting modern technological tools to achieve high accuracy in work and reduce cost and time.

Secondly: *the dimensions of information and communication technology*

The opinions of writers and researchers differ in defining the dimensions of information and communication technology, each according to his point of view and intellectual trends. The dimensions most unanimously agreed upon by the majority and appropriate for the current study were chosen, and they will be dealt with according to the following:

1. Devices and equipment

Hardware and equipment are the main operators of information activities in organizations such as input, processing, and output in any information system, and they also need storage means to store the information that has been processed (Teryima & Sunday,2015,112).

2. Software

Organizations need to balance their business goals with software development strategies and translate them into effective tools for managing their projects and enhancing their positive impact on their strategies at the higher levels of management, Accordingly, the software serves the organizations by reducing the errors associated with their work (Tam et al,2020, 167).

3. Applications

Computers and their peripherals as materials will not give the desired benefits unless various software is available to run them or control their work and work on directing them and assisting users to obtain information through modern computer applications (Castillo,2021,3).

4. Communication

Communication consists of hardware and software that connects different parts of hardware and transfers information from one physical location to another. For example, computers and other communications equipment can be linked in a network to share voice, image, data, and video such as (Intranet, Extranet, and Internet) (Muhammad and Muhammad,2021,430)

5. Human Resources

The personnel involved in the steps of ICT activities are most likely to determine the success or failure of information systems (Taiwo & Agwu,2016,4).

The second axis: environmental management system ISO 14001

First: *The concept of the environmental management system ISO 14001 and its importance*

Many researchers, writers, and specialists have dealt with the concept of the international standard for the ISO14001 Environmental Management System. For example, we present a number of them. The ISO 14001 Environmental Management System can be defined as an international standard that relies on the idea of achieving better environmental performance when environmental aspects are identified and managed systematically. Organized and documented (Martins,2018,451).

(Lee,2019,25) Describe it as a standard that an organization uses to ensure that it does what it can to protect the environment and that it complies with all laws related to the environment.

It is a standard process carried out by organizations and is used to implement environmental goals, policies, and responsibilities as well as provide auditing of environmental aspects. (Heras,2021,4)

By reviewing the concepts revealed by the researchers, the ISO 14001 Environmental Management System can be defined as a set of procedures, rules, tools, and principles that can be used by the organization to protect the environment from the expected negative impacts of products and increase operational efficiency.

Through the foregoing, the application of the ISO 14001 environmental management system in organizations is of utmost importance through the following: (Maghrawa et al,2021,610)

- 1- Preparing and inspecting pollution sources is one of the tasks of one department represented in the Environmental Department.
- 2- Work to protect the internal environment and ensure the development of hygiene guidelines.
- 3- EMS allows savings in capital costs, and operating costs of processing units.
- 4- The ability to involve specialized external competencies in the implementation of cleaner production programs.

Second: *Requirements Environmental Management System (ISO 14001)*

The International Organization for Standardization has identified a set of requirements for the successful Environmental Management System Certification to ISO 14001: 2015, according to which several researchers and writers have mentioned these requirements in their writings(Ranne, M.,2019,23-31); (Kaushal, H,2020,10 _17);(Nilsson,2020,14); (Marin, D. 2021,14) as follows:

1- Scope

This document defines the requirements for the environmental management system and provides guidelines for its use, allowing organizations to improve their environmental performance. It is intended for organizations that seek to manage their environmental responsibility in a methodical way that helps maintain a healthy ecosystem.

2- Normative references

There are no established standardized references in this ISO 14001:2015 document.

3- Number Three: Vocabulary and Terms

In this article, we use the language and concepts defined in ISO 14001:2015. Organizational setting.

4-Aspects of the Organizational Context

4.1- Acquiring Knowledge about the Company and Its Environment

The organization should take into account the external and internal challenges related to its aims that may impact its potential for success and the desired results of the environmental management system.

4.2- Understand the needs and expectations of stakeholders

It requires the organization to identify stakeholder needs and expectations internal and external to the company that is connected to Normative references the company's environmental management system.

4.3- The first step in developing an EMS is defining its boundaries.

The group's goal is to specify the range of use for environmental management, and the extent to which it can be applied to determine its scope. When defining this field, the organization must take into account the external and internal challenges mentioned in 4.1.

4.4- System for managing the environment

An environmental management system must be established, implemented, maintained, and constantly improved by the company, to achieve customer satisfaction, including enhancing its environmental performance.

5- Leadership

5.1- Effective leadership and dedication

Responsibility for the success of the environmental management system rests squarely on the shoulders of upper management, who must show initiative and dedication to the EMS.

5.2- Environmental legislation

Environmental policy should be established at the top level of management, and then implemented and maintained within the scope of Scope.

5.3- Organizational roles, responsibilities, and authorities

Higher management must ensure that responsibilities and authority for relevant roles are assigned and communicated within the organization.

6- Planning

This requirement focuses on how the organization's planning process is used and developed to take action, addressing both the identified risks and opportunities.

6.1- Procedures for facing risks and investing in opportunities

It requires the organization to create, implement, and maintain the processes necessary for successful environmental management

6.2- Goals for the environment and strategies for achieving them

The company must establish environmental goals, at functional levels while taking care of the basic environmental aspects of the organization associated with responding to requirements, taking into account risks and opportunities.

7- Support

An environmental management system cannot be effective in preserving or improving it without adequate resources. This requirement includes the following items:

7.1- Resources 7.2- competencies 7.3- Awareness 7.4-

Communication 7.5- Documented information

8- Operation

8.1- planning and control in Operation

The organization shall establish, implement, monitor, and maintain the required processes to meet the requirements of the EMS and implement the activities by establishing operating standards for the processes.

8.2- Response and emergency preparedness

The business must plan for and react to any risks by developing, implementing, and maintaining the appropriate procedures. emergencies.

9- Performance evaluation

9.1-Monitoring, measuring, analyzing, and evaluating

It is necessary to define the scope of monitoring and measurement required for those processes and activities that relate to significant environmental aspects, environmental objectives, and key areas of operational control and operations.

9.2-Internal Audit

The organization shall conduct internal audits at planned intervals to provide information on whether the organization's environmental management system complies with the requirements of this international standard.

9.3-Management review

Senior management should review the organization's environmental management system at planned intervals to ensure its continued suitability, adequacy, and effectiveness.

10- Improvement

10.1- General

The organization shall identify opportunities for improvement and implement the actions necessary to achieve the desired results from the environmental management system.

10.2- Corrective action for nonconformity

When cases of non-conformity occur, the organization must respond and take measures to control and correct them and take responsibility for their consequences including mitigating negative environmental impacts.

10.3- Continual improvement

The organization must continuously work to improve the efficiency and effectiveness of the environmental management system to enhance its environmental performance.

Results

To determine the relationships between information and communication technology and the ISO 14001 environmental management system at the organizational level, statistical analysis was used by (SPSS .V26) to find out the correlation and then determine the effect through the use of regression analysis, which will be explained as follows:

First: *The relationship between information and communication technology with environmental management system ISO 14001*

Table (1) indicates that there is a high positive significant correlation between the dimensions of information and communication technology and the requirements of the environmental management system ISO 14001, as the correlation coefficient between them is equal to (0.863) at a significant level (0.05),

which explains to the researchers that the more the researched organization cares about information and communication technology, that leads to the access of the requirements of the environmental management system ISO 14001.

Table (1) the results of the correlation between ICT and the environmental management system ISO 14001 at the macro level

independent variable	dependent variable	ICT
ISO14001 Environmental Management System		0.863*
Source: Prepared by the two researchers in light of the results of the SPSS program		

Second: *The effect of ICT on the requirements of the environmental management system ISO14001*

The results of the statistical analysis in Table (2) showed that there is a significant impact of information and communication technology in the requirements of the environmental management system ISO14001, as the calculated (F) equals (228.316), which is greater than the tabular value that equals (3.96) at a significant level (0.05). and a degree of freedom equals (1,78), and the value of (R2) that determines the ratio of effect equals (0.745), which means that (74.5%) of differences in adopting the requirements of the environmental management system ISO 14001 was the cause of information and communication technology, while the remaining percentage of (25.5) % of the effect is due to other factors, outside the scope of the current study, or random variables that cannot be controlled, The value of the regression coefficient (Beta) equals (0.750), and it is a significant value in terms of the (t) calculated that equals (15.110), it's greater than its tabular value (1.664) at a significant level (0.05). and these results show that the researched company was dimensions of information and communication technology have an impact on adopting the requirements of the environmental management system ISO 14001.

Table (2) the results of the impact of ICT In the environmental management system ISO14001 at the macro level

independent variable	dependent variable	ICT			
		Beta	R ²	T	F
ISO14001 Environmental Management System		0.750	0.745	15.110	228.316
Source: Prepared by the two researchers in the light of the results of the SPSS program Tabular t-value = 1.664, Tabular F value = 3.96, df=(1,78)					

Conclusions

Based on what was stated in the results of the current study, two types of conclusions were reached, the first type of conclusion pertains to the researched

organization, while the second type of conclusion included the results of the study and according to the following:

- 1- Information and communication technology is a vital concept that can be applied in industrial organizations as one of the main subjects of competitive superiority.
- 2- Increasing global interest in the concepts of information and communication technology, and the requirements of the environmental management system ISO 14001, because of their importance in achieving the needs and desires of customers, which leads towards green products, and are considered a necessity for human health and safety and preserving the environment.
- 3- There is a positive significant correlation between the dimensions of information and communication technology and the requirements of the environmental management system ISO 14001, which indicates that increasing the attention of the researched company in information and communication technology and increasing developments and updating it, contributes arriving to the requirements of the environmental management system ISO 14001.
- 4- The results of the study showed that there is a significant effect of information and communication technology in the requirements of the environmental management system ISO14001, which means that the organization under study is based on information and communication technology in applying the requirements of the environmental management system ISO14001.
- 5- The necessity of informing the administrative leaders and employees of the researched organization about the expertise and experiences of the leading factories and laboratories in adopting the ISO14001 environmental management system and information and communication technology.

References

- Belvedere, Valeria &Grando, Alberto& Bielli, Paola, (2013), "A quantitative Investigation of the Role of Information and Communication Technologies in the Implementation of A product Service System", International Journal of Production Research, vol:51, No:2.
- Elsaadani, Mohamed, 2015, Information and Communication Technology Skills: Sufficiency of Egyptian Accounting Graduates, International Journal of Advanced Information Technology (IJAIT), Vol.5, No.1, Department of Information Systems, University of The West of England, pp.1-11.
- Gray, Iain. (2011). "Information and Communication Technology Strategy Board",www.innovateuk.org.
- Heras-Saizarbitoria, I. (2021). ISO 9001, ISO 14001, and new management standards. Springer.
- KAUSHAL, H. (2020). HOW DOES ISO 14001: 2015 STANDARD IMPACT OF LIFE

CYCLE PERSPECTIVE OF AN ORGANIZATION?

- Lee, Shiu Chuen, (2019), "Development of an Environmental Management System Framework for Hong Kong Higher Education Institutions", Thesis submitted in fulfillment of the requirement for the degree of Doctor of Philosophy at Western Sydney University.
- Lucero, R. J., Fehlberg, E. A., Patel, A. G., Bjarnardottir, R. I., Williams, R., Lee, K., ... & Mittelman, M. (2019). The effects of information and communication technologies on informal caregivers of persons living with dementia: a systematic review. *Alzheimer's & Dementia: Translational Research & Clinical Interventions*, 5, 1-12.
- Maghrawa, Fathia Ben Haj Jilali, Hafifi, Saliha, Falaq, Saliha (2021), "The environmental management system and its impact on the performance of the enterprise, a case study of the Cement and Derivatives Corporation in Chlef (ECDE) during the period (2010-2017)" *Journal of the New Economy*, Vol. 12), Issue (1), pg. 607-.626.
- Marin, D. (2021). *Sustav upravljanja okolišem u organizacijama-primjena niza norma HRN EN ISO 14000 u Hrvatskoj s fokusom na rudarske gospodarske subjekte* (Doctoral dissertation, University of Zagreb. Faculty of Mining, Geology and Petroleum Engineering. Department of Mining and Geotechnical Engineering).
- Martins, F., & Fonseca, L. (2018). Comparison between eco-management and audit scheme and ISO 14001: 2015. *Energy Procedia*, 153, 450-454.
- Mohammed, Umaru Danladi& Nzelibe, chinelo Grace Obeleagu, (2013), "Information and Communication Technology and The Performance of Small and Medium Enterprises in Nasarawa State, Nigeria", *International Journal of Research in Commerce, IT Management*, vol:3, No:09, pp:43-49.
- Muhammad, Qusay Jassim, Muhammad, Muntasir Hassan (2021), "Information and Communication Technology and its Role in Enhancing Outstanding Performance _ An Exploratory Study of the Opinions of a Sample of Administrative Leaders in the Colleges of Science and Agriculture at the University of Tikrit." *Tikrit Journal of Administrative and Economic Sciences*, University of Tikrit, Vol. (17), No. (55).
- Nilsson, J., & Sundholm, A. (2020). Effectivization of ISO 9001 and implementation of ISO 14001 in a manufacturing industry.
- Pérez-Castillo, R., Serrano, M. A., & Piattini, M. (2021). Software modernization to embrace quantum technology. *Advances in Engineering Software*, 151, 102933.
- Ranne, Malla. ,(2019), "The upgrade of an environmental management system in a wind energy company." Master's Thesis, Lappeenranta University of Technology.
- Rony, M. R. (2017). Information Communication Technology to support and include Blind students in a school for all An Interview study of teachers and students' experiences with inclusion and ICT support to blind

students (Master's thesis).

- Taiwo, J.N. (2016). Effect of ICT on accounting information system and organizational performance: The application of information and communication technology on accounting information system. *European Journal of Business and Social Sciences*, 5(2), 1-15
- Tam, C., da Costa Moura, E. J., Oliveira, T., & Varajão, J. (2020). The factors influencing the success of ongoing agile software development projects. *International Journal of Project Management*, 38(3), 165-176.
- Teryima, Sev Joseph. & Sunday, Ayegba., 2015, The Role of Information Communication Technology (ICT) in Enhancing Productivity in Local Government Administration in Benue State, Nigeria, *International Journal of Business and Economic Development*, Vol.3, No.1, Benue State University, Nigeria, PP: 110 – 124.
- Turban, Efraim & Volonino, Linda & Pollard, Carol & Siper Janice, (2010), "Information Technology for Management Transforming Organization in The Digital Economy International Student version", 7th ed., John Wiley John, Sons, INC.