

IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT SYSTEMS IN CONSTRUCTION INDUSTRY

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ABSTRACT

Environmental factors are crucial element of Construction management. In particular, it was increasingly recognised that, the construction industry has significant impact on the environment. Environmental assessment, environmental audits, and management systems may be used more strategically to prevent pollution at source. International standards covering environmental management are intended to provide organizations with the elements of an effective environmental management system (EMS) that can be integrated with other management requirements and help organizations achieve environmental and economic goals. ISO 14000 Environmental Management System (or ISO 14000 EMS) has become the international environmental performance standard that was introduced in 1996. While ISO 14000 refers to the whole series of environmental management standards, ISO 14001 is the EMS standard. It is a tool that enables organisations to achieve and systematically control their objectives aimed at resolving the environmental problems. Implementation of such environmental management systems is usually hindered by many obstacles, here originated our enthusiasm to formulate our research to send a spot revealing a clear image about this integral aspect of construction industry. A structured questionnaire was conducted to review the major problems in the implementation of ISO 14000 EMS in the Egyptian construction industry. The questionnaire was divided into two main sections. The first section contained questions seeking information on their attitudes towards ISO 14001 EMS, such as participation and use of resources in EMS, etc. The second section contained a list of potential factors that may contribute to the barriers to implementing ISO 14001 EMS. Answers were requested on a five-point Likert scale (from “1” to “5”) to measure the importance of each factor where “1” reflects the least important, and “5” reflects the most important factor. The firms were asked to rank the importance of these factors based on this scale. A set of statistical methods were used to analyse the survey results. The statistical analysis packages SPSS 22 and Microsoft Excel 2013 were used to analyse the survey results. The results revealed that, only 3.1 per cent of respondents in contractors group already certified with ISO 14001EMS, but 40.6 per cent of them didn't have any stated environmental management policy, objective and procedure and 3.7 per cent of respondents in consultants group already certified with ISO 14001EMS, but 40.7 per cent of them didn't have any stated environmental management policy, objective and procedure. The four major obstacles to ISO 14001 implementation in contractors group are: lack of government pressure, EMS establishment expenses, lack of client requirement/supports, expensive implementation costs in descending order of frequency. The four major obstacles to ISO 14001 implementation in consultants group are: EMS establishment expenses, lack of government pressure, lack of client requirement/supports, expensive implementation costs in descending order of frequency.

EMS implementation and adoption in the Egyptian construction industry is very poor according to findings of questionnaire first section, EMS establishment expenses was ranked as significant obstacles in both contractors and consultants group according to findings of questionnaire second section. Hence was our intent to develop Applicable procedures and software which consists of two sections, the first part of software explains all construction activities and how ISO 14001 EMS requirements implemented through these activities and the second section is a guidance for users to conduct self-assessment of implementation ISO 14001 EMS, this can cancel third party expenses related to EMS establishment and save such expenses to finance external auditing to award firm ISO 14001 EMS certificate.

Keywords:

Environmental management systems; ISO 14001; Construction management; and Construction Industry.

1. INTRODUCTION

Construction management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Enterprise environmental factors refer to both internal and external environmental factors that surround or influence project's success. Enterprise environmental factors include, but are not limited to: (1) Organizational culture, structure, and processes; and (2) Government or industry standards (e.g., regulatory agency regulations, codes of conduct, product standards, quality standards, and workmanship standards). (PMBOK Guides, 2008). Environmental management systems in industry have their origins in voluntary codes of environmental conduct and "eco-auditing" (or "compliance auditing") programs adopted by various industries in response to increasing regulatory pressures that began in the 1970s. (Culley, William C, 1998). In particular, it was increasingly recognised that the construction industry has significant impact on the environment. Atkinson (1999) suggests that environmental assessment, environmental audits and management systems may be used more strategically to prevent pollution at source. The findings by Nitz and Holland (2000) suggest that improved environmental management must be facilitated by government agencies, rather than relying upon industry innovation. As a result, many environmental protection organisations have tried to propose legislative control, policies, campaigns and other activities for protecting our environment. In general, environmental management addresses the environmental impact of an organisation (Stapleton, P.J. and M.A. Glover, 2001). International Standards covering environmental management are intended to provide organizations with the elements of an effective environmental management system (EMS) that can be integrated with other management requirements and help organizations achieve environmental and economic goals. These standards, like other International Standards, are not intended to be used to create non-tariff trade barriers or to increase or change an organization's legal obligations. (ISO 2004). ISO 14000 Environmental Management System (or ISO 14000 EMS) has been the international environmental performance standard that was introduced in 1996. While ISO 14000 refers to the whole series of environmental management standards, ISO 14001 is the EMS standard. It is a tool that enables organisations to achieve and systematically control their objectives aimed at resolving the environmental problems. The ISO 14000 series emerged primarily as a result of the Uruguay round of the General Agreement on Tariffs and Trade (GATT) negotiations and the Rio Summit on the Environment held in 1992.

At that time, GATT concentrated on the needs of reducing non-tariff barriers to trade and the Rio Summit made a commitment to the protection of the environment across the world. Thus, the environmental field has seen a steady growth of national and regional standards. For example, the British Standards Institution had BS 7750 standard, the Canadian Standards Association has environmental management, auditing, eco-labelling and other standards.

The European Union has all of these, plus the eco-management and audit regulations. In addition, other countries such as the USA, Germany and Japan have introduced eco-labelling programme. Wide acceptance of ISO 9000 can induce the organizations to accept the concept of ISO 14000 more easily since they share the same management technique and principles of ISO 9000. Kein et al. (1999) found that companies which were in the first year of their implementation of ISO 9000 were more interested in ISO 14000 issues.

The ISO 14000 EMS intends to provide and establish the basic systems which lead to effective environmental management for any organisation. These systems can be integrated with other management requirements. The primary objective of the ISO 14000 EMS is to help companies to reduce their environmental impact through a systematic control system. Such systems can also help reduce product costs and enhance the competitiveness of products in the international. The Implementation of EMS in Construction Firms market, and thus increase the profit margin of the company. Cagno et al. (1999) argue that companies are increasingly involved in managing the environment as an opportunity for competitive advantage that is required to highlight the relationships between environmental impact of their processes and company strategy and objectives. (Cagno, E., Giulio, A. D. I. & Trucco, P,1999)

This paper aims to review the major problems in the implementation of ISO 14000 EMS in the Egyptian construction industry. This study surveyed major construction firms in Egypt to uncover the hindrance factors contributing to the low adoption of ISO 14000. Based on the findings, this paper identifies and ranks the perceived order which hinders the construction firms' adoption of ISO 14000. The case study in Egypt serves as a reference point for understanding the problems in the implementation of ISO 14000 in other countries. Other aim of this study that how can interpret ISO 14000's general requirements to applicable procedures which can be implemented in construction organization.

2. MATERIALS AND METHODS

The data required for achieving the first aim of this study were collected from the construction firms in Egypt through a structured questionnaire. The questionnaire was divided into two main sections. The first section contained questions seeking information on their attitudes towards ISO 14001 EMS, such as participation and use of resources in EMS, etc. The second section contained a list of potential factors that may contribute to the barriers to implementing ISO 14001 EMS. In this part, answers were requested on a five-point Likert scale (from "1" to "5") to measure the importance of each factor where "1" reflects the least important, and "5" reflects the most important factor. The firms were asked to rank the importance of these factors based on this scale.

The data required for achieving the other aim of this study is Study Thoroughly ISO 14001 EMS general Requirements and interpret every item of these requirements to applicable procedure which include applicable forms can be implemented in construction industry.

Conduct applicable software which consist of two sections, first of them explain all construction activities and how ISO 14001 EMS requirements implemented through these activities and the second section is guidance of users to conduct self-assessment of implementation ISO 14001 EMS.

3. STATISTICAL ANALYSIS

A set of statistical methods were used to analyse the survey results. The statistical analysis packages SPSS 22 and Microsoft Excel 2013 were used to analyse the survey results.

4. RESULTS

The results of the first part of the survey presented in Table (1) indicate that only 3.1 per cent of respondents in contractors group already certified with ISO 14001EMS, but 40.6 per cent of them didn't have any stated environmental management policy, objective and procedure and 3.7 per cent of respondents in consultants group already certified with ISO 14001EMS, but 40.7 per cent of them didn't have any stated environmental management policy, objective and procedure.

Based on Monte Carlo test, comparing between contractors studied group and consultants studied group was conducted and illustrated in Table (1):

Where: p: p value for Monte Carlo test for comparing between the two studied groups

*: Statistically significant at $p \leq 0.05$

TABLE (1): Comparison between the two studied groups according to different parameters

Question	Contractors		Consultants	
	No.	%	No.	%
Does your company have any stated environmental management policy, objective and procedure?	n=32		n=27	
Company already certified with EMS	1	3.1	1	3.7
Company apply all EMS Requirements and still seeking Certificate with EMS	4	12.5	2	7.4
Company committed with legal, other requirements, Developing objectives, targets and programs	5	15.6	5	18.5
Company committed with legal and other requirements (clients requirements) only	9	28.1	8	29.6
Company don't have any stated environmental management policy, objective and procedure	13	40.6	11	40.7
p	0.972			
If you choose one of first four choices in Q1, is your company focus of Energy saving?	n=19		n=16	
Strongly focus	2	10.5	2	12.5
Focus	8	42.1	5	31.3
Neither focus nor neglect	7	36.8	6	37.5
Neglect	2	10.5	3	18.8
Strongly neglect	0	0.0	0	0.0
p	0.958			
If you choose one of first four choices in Q1, is your company focus of Air pollution control?	n=19		n=16	
Strongly focus	3	15.7	1	6.2
Focus	7	36.8	4	25.0
Neither focus nor neglect	9	47.3	7	43.7
Neglect	0	0.0	3	18.7

Strongly neglect	0	0.0	1	6.2
p	0.208			
If you choose one of first four choices in Q1, is your company focus of Material recycling?	n=19		n=16	
Strongly focus	0	0.0	0	0.0
Focus	2	10.5	2	12.5
Neither focus nor neglect	3	15.7	4	25.0
Neglect	4	21.0	4	25.0
Strongly neglect	10	52.6	6	37.5
p	0.893			
If you choose one of first four choices in Q1, is your company focus of Noise control?	n=19		n=16	
Strongly focus	6	31.6	1	6.2
Focus	7	36.8	3	18.7
Neither focus nor neglect	5	23.3	6	37.5
Neglect	1	5.3	6	37.5
Strongly neglect	0	0.0	0	0.0
p	0.031*			
Question	Contractors		Consultants	
	No.	%	No.	%
If you choose one of first four choices in Q1, is your company focus of Waste disposal control?	n=19		n=16	
Strongly focus	2	10.5	2	12.5
Focus	6	31.6	4	25.0
Neither focus nor neglect	8	42.1	8	50.0
Neglect	3	15.7	2	12.5
Strongly neglect	0	0.0	0	0.0
p	0.958			
Have your clients enquired about environmental management system status of your company?	n=32		n=27	
All clients	1	3.1	2	7.4
Major of clients	3	9.3	3	11.1
Some clients	9	28.1	4	14.9
Minor of clients	17	53.1	16	59.3
No clients	2	6.25	2	7.4
p	0.783			
Has your company considered environmental impact of your suppliers as an important selection factor?	n=32		n=27	
In all projects	1	3.1	1	3.7
In major of projects	4	12.5	1	3.7
In some of specific projects	7	21.9	2	7.4
Rare considered	17	53.1	10	31.2
Not considered	3	9.3	13	40.6
p	0.008*			
Do you have a separate division which specializes in	n=32		n=27	

handling EMS?				
In all projects	1	3.1	1	3.7
In major of projects	3	9.3	2	7.4
In some of specific projects	10	31.2	3	11.1
Rare considered	16	50.0	11	40.7
Not have in all projects	2	6.25	10	31.2
p	0.008*			
Has your staff participated in any training or programs concerning ISO 14000 in the past?	n=32		n=27	
All staffs	1	3.1	1	3.7
Concerned staffs	4	12.5	5	18.5
EMS handling staff only	7	21.9	4	12.5
Manager of EMS handling staff only	8	25.0	8	29.6
No body	12	37.5	9	28.1
p	0.916			

Question	Contractors		Consultants	
	No.	%	No.	%
Suppose that your company is going to establish EMS based on ISO 14000 standards, is the expenses would you expect to spend in it affect in company decision? (Excluding maintenance cost)	n=32		n=27	
Strongly effect	19	59.3	17	62.9
Effect	6	18.7	6	22.2
Neither effect nor negligible	5	15.6	3	11.1
Negligible	2	6.2	1	3.7
Strongly negligible	0	0.0	0	0.0
p	0.946			
Do you see lack of government pressure as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	n=32		n=27	
Strongly effect	18	56.2	13	48.1
Effect	11	34.3	8	29.6
Neither effect nor negligible	3	9.3	6	22.2
Negligible	0	0.0	0	0.0
Strongly negligible	0	0.0	0	0.0
p	0.457			
Do you see lack of client requirement/supports as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	n=32		n=27	
Strongly effect	15	46.8	10	37.0
Effect	13	40.6	7	25.9
Neither effect nor negligible	3	9.3	7	25.9

Negligible	1	3.1	3	11.1
Strongly negligible	0	0.0	0	0.0
p	0.181			
Do you see expensive implementation costs as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	n=32		n=27	
Strongly effect	13	40.6	10	37.0
Effect	12	37.5	6	22.2
Neither effect nor negligible	5	15.6	6	22.2
Negligible	2	6.2	5	18.5
Strongly negligible	0	0.0	0	0.0
p	0.362			
Do you see subcontracting system creates difficulty to manage the EMS as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	n=32		n=27	
Strongly effect	12	37.5	9	3.7
Effect	11	34.3	6	22.2
Neither effect nor negligible	7	21.8	7	25.9
Negligible	2	6.2	5	18.5
Strongly negligible	0	0.0	0	0.0
p	0.441			

The results are presented in Table 2, the findings show that the four major obstacles to ISO 14001 implementation in contractors group are: lack of government pressure, EMS establishment expenses, lack of client requirement/supports, expensive implementation costs.

TABLE (2): Distribution of studied cases according to different parameters in contractors group

	Strongly effect		Effect		Neither effect nor negligible		Negligible		Strongly negligible		Mean	Coefficient of variations	Rank	Response	χ^2 (p)
	No.	%	No.	%	No.	%	No.	%	No.	%					
Suppose that your company is going to establish EMS based on ISO 14000 standards, is the expenses would you expect to spend in it affect in company decision? (Excluding maintenance cost)	19	59.3	6	18.7	5	15.6	2	6.2	0	0.0	4.31	0.22	2	Effected	21.250* (<0.001)
Do you see lack of government pressure as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	18	56.2	11	34.3	3	9.3	0	0.0	0	0.0	4.47	0.15	1	Effected	10.563* (0.005)
Do you see lack of client requirement/supports as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	15	46.8	13	40.6	3	9.3	1	3.1	0	0.0	4.31	0.18	3	Effected	18.500* (<0.001)
Do you see expensive implementation costs as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	13	40.6	12	37.5	5	15.6	2	6.2	0	0.0	4.13	0.22	4	Effected	10.750* (0.013)
Do you see subcontracting system creates difficulty to manage the EMS as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	12	37.5	11	34.3	7	21.8	2	6.2	0	0.0	4.03	0.23	5	Effected	7.750 (0.051)

The results are presented in Table 3, the findings show that the four major obstacles to ISO 14001 implementation in consultants group are: EMS establishment expenses, lack of government pressure, lack of client requirement/supports, expensive implementation costs.

TABLE (3): Distribution of studied cases according to different parameters in consultants group

	Strongly effect		Effect		Neither effect nor negligible		Negligible		Strongly negligible		Mean	Coefficient of variations	Rank	Response	χ^2 (p)
	No.	%	No.	%	No.	%	No.	%	No.	%					
Suppose that your company is going to establish EMS based on ISO 14000 standards, is the expenses would you expect to spend in it affect in company decision? (Excluding maintenance cost)	17	62.9	6	22.2	3	11.1	1	3.7	0	0.0	4.44	0.27	1	Effected	22.630* (<0.001)
Do you see lack of government pressure as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	13	48.1	8	29.6	6	22.2	0	0.0	0	0.0	4.26	0.27	2	Effected	2.889 (0.236)
Do you see lack of client requirement/supports as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	10	37.0	7	25.9	7	25.9	3	11.1	0	0.0	3.89	0.34	3	Effected	3.667 (0.300)
Do you see expensive implementation costs as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	10	37.0	6	22.2	6	22.2	5	18.5	0	0.0	3.78	0.37	4	Effected	2.185 (0.535)
Do you see subcontracting system creates difficulty to manage the EMS as barrier in implementing EMS in your company on the basis of ISO 14000 standards?	9	3.7	6	22.2	7	25.9	5	18.5	0	0.0	3.70	0.38	5	Effected	1.296 (0.730)

5. DISCUSSION

RAYMOND Y.C study which published in Journal of Environmental Assessment Policy and Management June 2001 and he was sent to 55 major contractors which were selected from the Hong Kong Builder Directory found that 62.5 per cent of respondents had an intention to pursue ISO 14001, but only 12.5 per cent would establish their own EMS in the near future. The remaining 25 per cent of respondents did not have any plan to pursue the ISO 14001 registration. Quite a large proportion of respondents took a “wait and see” attitude. They wanted to see their competitors take the first step.

JOSHUA AYARKWA study which published in International Journal of sustainable Developments 2010 and he was sent to 55 contractors and 40 consultants in Ghana found that only 17% of contractor-respondents and 33% of consultants-respondents stated their corporate mission in the survey. However, none of the mission stated included environmental aspects. Some of the missions stated by contractors were: (1) To build high quality buildings for public sector; and (2) To build high quality, good value buildings to agreed duration and satisfaction of clients. Missions stated by consultants could be summarized into one; To provide high quality multi-disciplinary services to the private and public sectors. Whereas 30% of contractors stated their environmental records, only 17% of consultants did so. However, none of records stated had anything to do with environmental performance.

The results are presented in Table 2, the findings show that the four major obstacles to ISO 14001 implementation in contractors group are: lack of government pressure, EMS establishment expenses, lack of client requirement/supports, expensive implementation costs.

The results are presented in Table 3, the findings show that the four major obstacles to ISO 14001 implementation in consultants group are: EMS establishment expenses, lack of government pressure, lack of client requirement/supports, expensive implementation costs.

Raymond Y.C study found that four major obstacles to ISO 14001 implementation are: lack of government pressure; lack of client requirement/supports; expensive implementation cost; and subcontracting system creates difficulty to manage the EMS.

It is apparent from previous results that EMS establishment expenses was the first major obstacle to ISO14001 implementation in consultants group but it was the second major obstacle in contractors group. Therefore Applicable procedures and software have been prepared in an attempt to reduce expenses and finance needed for EMS establishment.

Software consists of two sections, the first part of software explains all construction activities and how ISO 14001 EMS requirements are implemented through these activities. It is designed using applicable procedures derived from ISO 14001 EMS general requirements. These applicable procedures proposed are covering almost all aspects of construction industry activities. The second section is guidance for users to conduct self-assessment of implementation ISO 14001 EMS.

In following section software windows will be presented and discussed.



Figure 1: first window in software which uses to navigate to first section



Figure 2: window enables you to choose which activities are involved in your organisation activities

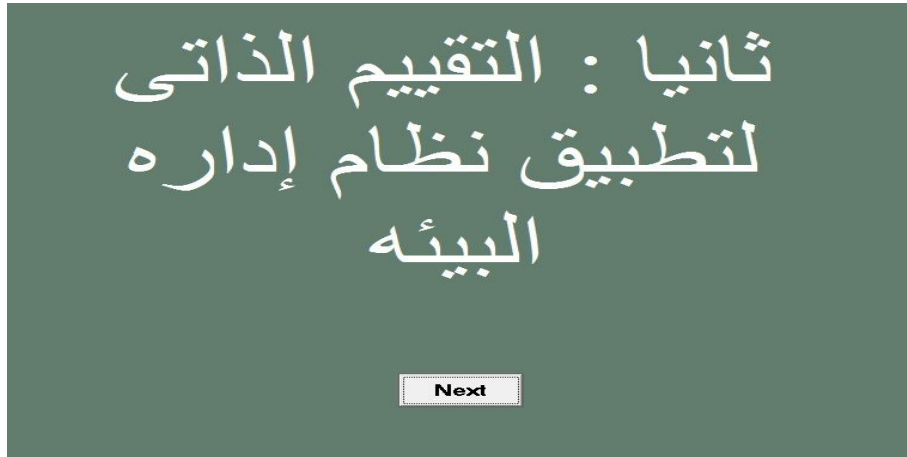


Figure 5: second section first window which uses to navigate to second section

التقييم الذاتي لتطبيق نظام إدارة البيئة

4.2 السياسة البيئية			
المطابقة			المتطلبات
غير مطلوب	لا	نعم	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	١ - هل قامت المؤسسة بتحديد وكتابة سياساتها البيئية الخاصة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢ - هل السياسة البيئية مبنية على : المظاهر البيئية الهامة التي تنتج من أنشطة المؤسسة ؟ سياسة المؤسسة ذات الصلة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣ - هل السياسة مخصصة لأنشطة المؤسسة والأداء البيئية الكاملة التي تنتج من أنشطة المؤسسة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤ - هل السياسة تشمل الإلتزام بـ : التحسين المستمر ؟ منع التلوث ؟ التطبيق مع الشركاء البيئية والمتطلبات الأخرى التي تشترك فيها المؤسسة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥ - هل توفر السياسة إطار لوضع الأهداف والبرامج البيئية ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦ - هل السياسة موثقة ومحفظة ومتصلة بجميع العاملين أو من ينوب عن المؤسسة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧ - هل السياسة متاحة للعملاء ؟

Next

Figure 6: window presents questions to answer to can assess item 4.2 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Back	4.3.2 القوانين والمتطلبات الأخرى			
	المطابقة			المتطلبات
	مطلوب	لا	نعم	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	١٨ - هل إجراء القوانين والمتطلبات الأخرى تم إعداده وتنفيذه لتحديد النظم المطبقة والقوانين والمتطلبات الأخرى ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	١٩ - هل نسخ النظم المطبقة وكذلك القوانين والمتطلبات الأخرى متاحة للعاملين عند الإحتياج لها ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٠ - هل جميع الإقتراحات الإضافية التي تحتاجها المؤسسة لإستيفاء متطلبات نظام إدارة البيئة مشتملة في الإجراء ؟ الإقتراحات المنطقية بالعميل الإقتراحات مع السلطات الحكومية الإرشادات بخلاف القوانين مثل: (سياسة المؤسسة - أكواد وأصول الصناعة إلخ)
Next	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢١ - هل التراخيص والتصاريح والموافقات الأخرى متاحة للتوافق الكامل مع القانون ؟ رخص مسئول مجمع المخلفات تصاريح لإنبعاثات الهواء تصاريح صرف مخلفات المياه الرخص والتصاريح المتعلقة بلبضائع ذو الطبيعة الخطرة على البيئة المصاريح البيئية الأخرى مثل : مصاريح صرف مخلفات المياه الإشتراك مع السلطات مثل : (صرف مخلفات المياه - فحص إنبعاثات الهواء)

Figure 8: window presents questions to answer to can assess item 4.3.2 of ISO 14001 standard requirements to measure the applicability range of this item in company.

المطابقة		المتطلبات		4.3.3 الأهداف والبرامج البيئية	
				نعم	لا
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٢ - هل تم إعداد الأهداف والبرامج البيئية لكل وظيفة ذات صلة ومستوى من مستويات المؤسسة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٣ - هل الأهداف والبرامج موثقة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٤ - هل الأهداف والبرامج متخصصة وقابلة للتطبيق وأفعلة ومفهومة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٥ - هل تأخذ الأهداف والبرامج في الاعتبار الأثر ؟ التطبيق مع التشريعات والقوانين ذات الصلة بنشاط المؤسسة المظاهر البيئية الهامة معايير اختيار التكنولوجيا المناسبة والدابير المالية ومتطلبات العمل وجهات نظر الأطراف المعنية
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٦ - هل الأهداف والبرامج تتماشى مع البنود الأخرى ؟ السياسة البيئية الالتزام بمنح الطوت الالتزام بالتحسين المستمر للأداء البيئي (كلما كان ممكنا)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٧ - هل نظام تقييم الأداء البيئي تم إعداده ويتم مراجعة الوصول للأهداف والبرامج دوريا ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٨ - هل معيار التقييم أو سجلات الاجتماعات متاحة لتحديد ما هي المظاهر البيئية الهامة والتي ستصبح أهداف وبرامج ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٢٩ - هل يوجد برامج لإنجاز الأهداف والبرامج البيئية تم إعدادها وتطبيقها ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٠ - هل تم تحديد المسؤوليات لتنفيذ الأهداف والبرامج لكل وظيفة ومستوى من مستويات المؤسسة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣١ - هل تشمل البرامج على العناصر الأخرى ؟ تحديد المسؤولية لإنجاز الأهداف والبرامج لكل وظيفة ذات صلة ومستوى من مستويات المؤسسة الوسائل والسقف الزمني المطلوب لإنجاز البرامج
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٢ - هل البرامج وكلما أمكن يتم مراجعتها وتحسينها لكي تتماشى مع التحسينات الجديدة وتحديات الأنشطة والأنشطة الجديدة والمنتجات والخدمات ؟

This window presents questions to answer to can assess item 4.3.3 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Figure 9: window presents questions to answer to can assess item 4.3.3 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Back	4.4.1 الموارد والأدوار والمسؤوليات والسلطات			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٣ - هل الهيكل التنظيمي للمؤسسة متوفر ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٤ - هل المسؤوليات والسلطات للإدارة البيئية محددة وموثقة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٥ - هل ممثل الإدارة محدد ومعروف ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٦ - هل الأدوار والمسؤوليات والسلطات لممثل الإدارة محددة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٧ - هل الموارد المطلوبة مثل : (الأفراد - التكنولوجيا - الموارد المالية) لتطبيق والتحكم في نظام إدارة البيئة توفرها الإدارة ؟
Next	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٨ - هل الأفراد المعينون في إدارة البيئة لديهم التأهيل الكافي ؟

	4.4.2 التأهيل والتدريب والتوعية			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٣٩ - هل إحتياجات التدريب محددة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٠ - هل الأفراد العاملين يستطيع إحداث الأثار البيئية الهامة والتأهيل بنهاى على الدراسة والتدريب والخبرة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤١ - هل تم إعداد الإجراءات للتأكد من أن جميع العاملين أو من بنوب عن المؤسسة على دراية بالسياسة البيئية والأثار البيئية الفعلية والكامنة وكذلك مسؤولياتهم ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٢ - هل تتحقق المؤسسة من أن الأفراد التى تؤدي الأعمال البيئية المتخصصة لديها المعرفة الكافية مثل : (التعليم - التدريب - الخبرة) ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٣ - هل عملية الإتصالات تتحقق من أن شركاء العمل والموردين والمقاولين على دراية بالمتطلبات ذات الصلة بنظام إدارة البيئة الخاص بالمؤسسة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٤ - هل المقاولين العاملين بالموقع لديهم المعرفة والمهارات الضرورية أو تدريباً لكي يؤدوا العمل بأسلوب مسئول بيئياً ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٥ - هل سجل التدريب والشهادات والرخص مناحة لإظهار التأهيل المطلوب للعاملين ؟

Figure 10: window presents questions to answer to can assess item 4.4.1 and 4.4.2 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Back		4.4.3 الإتصال			
		المطابقة			المتطلبات
		غير مطلوب	لا	نعم	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٦ - هل يوجد إجراءات موقفة للإتصال بخصوص المسائل الدبئية بين المستويات المختلفة داخل المؤسسة ؟
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٧ - هل الإجراءات موقفة لإستقبال ونوئيق والرد للإتصال بالجهات المعنية الخارجية ؟
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٨ - هل المؤسسة تحفظ سياساتها وعمليات الإتصال الخارجية بخصوص مظاهرها الببئية الهامة ؟
Next		4.4.4 الوثائق			
		المطابقة			المتطلبات
		غير مطلوب	لا	نعم	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٤٩ - هل الأجزاء الرئيسية لنظام إدارة الببئية والملفات ذات الصلة مكتوبة كورقات أو صورة إلكترونية ؟
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٠ - هل الوثائق الخاصة بلب نظام إدارة الببئية توفر التوجبه اللازم للوثائق ذات الصلة ؟
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥١ - هل وثائق نظام إدارة الببئية الأتية موقفة ؟ السياسة - الأهداف والبرامج - نطاق تطبيق نظام إدارة الببئية
		4.4.5 مراقبة الوثائق			
		المطابقة			المتطلبات
		غير مطلوب	لا	نعم	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٢ - هل الإجراءات موقفة للتأكد من المراجعة الدورية والمراجعة الملائمة لجميع الوثائق المطلوبة ؟
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٣ - هل الإصدارات الحالية لجميع الوثائق المطلوبة متاحة في الأماكن الأناسبية ؟
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٤ - هل الوثائق القديمة يتم إزالتها فوراً أو بخلاف الإستخدام الغير مقصود لها ؟
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٥ - هل جميع الوثائق يمكن قرأتها وقابلة للإسترجاع بسهولة وتحديثها ويمكن مراجعتها والتعرف على ما بها من ببانات ؟
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٦ - هل الإجراءات تم إعدادها لكي يمكن عمل تحديث إبتكاري بها والإعتمادات المناسبه للأنواع المختلفة من الوثائق ؟

Figure 11: window presents questions to answer to can assess item 4.4.3, 4.4.4 and 4.4.5 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Back	4.4.6 مراقبة العمليات			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٧- هل الأنشطة المتعلقة بالمظاهر البيئية الهامة بخطط لها وتنفذ تحت ظروف خاصة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٨- هل هناك إجراء موثق تم إعداده وتنفيذه وحفظه للعمليات المتعلقة بالمظاهر البيئية الهامة والسياسة والأهداف والبرامج ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٥٩- هل أثناء إعداد الإجراء الموثق تم أخذ العناصر الأتية في الاعتبار ؟ الأنشطة التي سيؤدي غيابها عن حيود عن السياسة البيئية والأهداف والبرامج مجان التشغيل المشروطة والحدود للتحكم في الخصائص الهامة للأنشطة عملية التحكم في المورثات البيئية الهامة للمنتجات والخدمات إطلاق العمليات الجديدة أو المعدلة والمنتجات
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٠- هل أثناء إعداد الإجراء الموثق تم الأخذ في الاعتبار الآثار الغير المباشرة الأخرى ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦١- هل تم عمل إجراء خاص بالمظاهر البيئية الخاصة بالخدمات والمنتجات المشتراه والمستخدمه من جانب المؤسسة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٢- هل تم عمل الإجراء لكي يضمن بالإجراءات ذات الصلة وأو المتطلبات والمظاهر البيئية المتأخوذة في الاعتبار للمنتجات والخدمات المشتراه للموردين ومقاولي الباطن ؟

Next

Figure 12: window presents questions to answer to can assess item 4.4.6 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Back	4.4.7 الإستعداد والإستجابة للطوارئ			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٣- هل الإجراء منفذ لتحديد والتصرف على الحوادث وسيناريوهات الطوارئ، الكفاءة والإستجابة لها ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٤- هل تم إعداد الإجراء لمنع والحد من اثار الحوادث وحالات الطوارئ ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٥- هل إجراءات الطوارئ تُعتبر كلما أمكن ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٦- هل خطط الطوارئ، متاحة ؟ وهل الإجراء محدد للتأكد من أن الآثار البيئية الناتجة عن الحوادث أو حالات الطوارئ، يمكن الحد منها ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٧- هل المسؤوليات محددة للمراجعة عند الضرورة لإجراءات الإستعداد والإستجابة للطوارئ ؟
Next	4.5.1 المراقبة والقياسات			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٨- هل تم توثيق وتنفيذ الإجراء بحيث يراقب الخصائص المميزة للعمليات والتي قد ينتج عنها الآثار البيئية الهامة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٦٩- هل تم ذلك المؤسسة مقياس الأداء البيئي المتعلق بإعداد الأهداف والبرامج ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٠- هل السجلات المطلوبة للتأكد من الأداء والتطبيق مع الأهداف والبرامج متاحة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧١- هل أجهزة القياس يتم حفظها ومعايرتها ؟
4.5.2 تقييم التطبيق مع القوانين والتشريعات				
المطابقة				المتطلبات
غير مطلوب	لا	نعم		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٢- هل هناك إجراء موثق تم إعداده وتنفيذه لتقديم الدورية للتطبيق مع التشريعات البيئية والمتطلبات الأخرى ذات الصلة بنشاط المؤسسة ؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٣- هل نتائج القياسات والمراقبة يتم حفظها لتقديم التطبيق مع التشريعات البيئية والمتطلبات الأخرى ذات الصلة بنشاط المؤسسة ؟

Figure 13: window presents questions to answer to can assess item 4.4.7, 4.5.1 and 4.5.2 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Back	4.5.3 حالات عدم المطابقة والإجراءات التصحيحية والوقائية			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٤- هل تم إعداد الإجراءات لبيد المسؤلية عن تداول والنقصى والتحكم والحد من حالات عدم المطابقة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٥- هل الإجراءات التصحيحية والوقائية محددة زمنيا وملائمة ومؤثرة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٦- هل يتم تعييب وتحديث الإجراءات بناء على نتائج الإجراءات التصحيحية والوقائية ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٧- هل يشمل الإجراءات على الحقيقة بأن شكاوى الأطراف المعنية ينبغي إدراجها فى العمل ؟
Next	4.5.4 حفظ السجلات			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٨- هل يوجد إجراء منفذ لتوضيح كيفية ومدى حفظ السجلات والتخلص منها بعد مدة الحفظ المقررة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٧٩- هل السجلات البيئية سهلة التداول وقابلة للإسترجاع بسهولة ومحفوظة ضد التلف ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٠- هل مدة حفظ السجلات محددة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨١- هل السجلات البيئية تشمل على الأتى : سجلات التدريب نتائج المراجعات سجلات مراجعات الإدارة المعلومات المطلوبة للفرانين والمتطلبات الأخرى المطبقة الخاصة بالبيئة سجلات الفحص والصيانة والمعايرة معلومات وسجلات الإستعداد والإستجابة بالطوارئ معلومات وسجلات المظاهر البيئية الهامة والأثار الناتجة عنها التصاريح بيانات المراقبة تفاصيل حالات عدم المطابقة والحوادث البيئية والشكاوى والمنازعات سجلات المقولين والموردين معلومات العمليات والمنتجات

Figure 14: window presents questions to answer to can assess item 4.5.3 and 4.5.4 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Back	4.5.5 المراجعة الداخلية			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٢. هل تم إعداد وتنفيذ الإجراء الخاص بالمراجعة الداخلية ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٣. هل معدلات المراجعة وموضوعاتها مبنية على الأهمية البيئية الخاصة بالأنشطة المعنية ونتائج المراجعات السابقة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٤. هل يغطي إجراء المراجعة الداخلية كيف يتم كذبة تقارير نتائج المراجعة وكيف يتم تقديمها للإدارة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٥. هل يحدد الإجراء معدلات ومجال وطرق والمسؤوليات الخاصة بالمراجعة ؟
Next	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٦. هل نظام المراجعة مطبق بالكامل وبفاعلية المطلوبة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٧. هل تقارير المراجعة تمكن مصدريه النظام المعطى والتي يمكن استخدامها كأداة في عملية مراجعة الأطراف الأخرى ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٨. هل ينفذ المراجعين المراجعة بمهنية ومن موضع تحقيق أهداف المراجعة وبشكل غير متحيز ؟

Figure 15: window presents questions to answer to can assess item 4.5.5 of ISO 14001 standard requirements to measure the applicability range of this item in company.

Back	4.6 مراجعة الإدارة			
	المطابقة			المتطلبات
	غير مطلوب	لا	نعم	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٨٩. هل تُنفذ مراجعة الإدارة دورياً للتأكد من استمرار تنفيذ وفاعلية نظام إدارة البيئة ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٩٠. هل تدخل نتائج مراجعة الإدارة تعديلات جديدة على السياسة والأهداف والبرامج ،..... إلخ ؟
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٩١. هل يتم حفظ سجلات مراجعة الإدارة ؟
Next	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	٩٢. هل المراجعات تُنفذ بناءً على المعلومات والوثائق التالية ؟ تقارير نتائج المراجعات تقديم التقارير مع الغايات والمتطلبات الأخرى التي تحثي بها المؤسسة إنجاز أهداف وبرامج نظام إدارة البيئة الإتصالات وشكوى الأطراف المعنية ذات الصلة الأداء البيئي للمؤسسة موقف الإجراءات التصحيحية والوقائية متابعات متطلبات إحصاءات الإدارة السابقة حالات التغير مشتملة على تحديث الغايات والمتطلبات الأخرى ذات الصلة بالمظاهر البيئية وتوصيات التحسين والتطوير

Figure 16: window presents questions to answer to can assess item 4.6 of ISO 14001 standard requirements to measure the applicability range of this item in company.



Figure 17: window show final result and score of assessment of all previous items and decision whether or not you can obtain ISO 14001 certificate.

6. CONCLUSIONS

Environmental Management Systems are crucial elements for construction industry standards which have common consensus throughout the world.

This study presents EMS models and explains that ISO 14001 is an EMS dominant standard worldwide.

Because of difficulty in the implementation of ISO 14001 EMS in construction industry, an independent survey was conducted in construction industry in Egypt.

The results of the first part of the survey indicate that, only 3.1 percent of respondents in contractors group were certified with ISO 14001EMS, but 40.6 percent of them didn't have any stated environmental management policy, objective nor procedure, and 3.7 percent of respondents in consultants group were certified with ISO 14001EMS, but 40.7 percent of them didn't have any stated environmental management policy, objective nor procedure.

The results of the second part of the survey showed that, the four major obstacles to ISO 14001 implementation in construction industry in Egypt were: lack of governmental pressure, EMS establishment expenses, lack of client requirement/supports, and expensive implementation costs.

Statistical analysis of our results on the questionnaire conducted has revealed, EMS establishment expenses were ranked as the first major obstacle in consultants group. While it came second major obstacle to ISO14001 implementation in contractors. Hence was our enthusiasm to develop Applicable procedures and software which consists of two sections, the first part of software explains all construction activities and how ISO 14001 EMS requirements implemented through these activities and the second section is a guidance for users to conduct self-assessment of implementation ISO 14001 EMS, this can cancel third party expenses related to EMS establishment and save such expenses to finance external auditing to award firm ISO 14001 EMS certificate.

7. RECOMMENDATIONS

Promoting Governmental role in encouraging the adoption of the EMS in all government units, developing a culture of environmental protection in construction industry and following this periodically.

Preparing periodic seminars to Identify EMS Requirements and how these requirements implemented through construction activities to contractors and consultants in Egyptian Union of construction contractors and Engineers Syndicate branches.

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