Evaluation of Environmental Management System status for Industrial Workplace in the State Of Punjab

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ABSTRACT

This paper identifies and evaluates the significant factors related to climate change vis-à-vis compliance of environmental management system in manufacturing units located in Punjab. A comparative study has been made by selecting ISO 14001:2004 units as well as non-ISO 14001:2004 units. The data collection has been done by designing a suitable questionnaire by personal interview method. Through this study an attempt has been made to observe the status between units following ISO 14001:2004 norms and units not following ISO 14001:2004 norms. The findings reveal that certified units have implemented environmental management system in much better way and are contributing in controlling the climate change.

INTRODUCTION

1.1 General

The climate change is by reason of global warming, the end product of global warming changes the climatic conditions and in view of global warming the earth is warming. The climate change is also due to the anthropogenic activities of the human beings which start from the manufacturing industries. Many times this source of clime change was ignored. But if these focal points will be focused, the climate conditions would be improved. The manufacturing industries are of small scale, medium scale and of large scale enterprises. The larger industries are managing their environment by implementing the EMS (environmental management system) ISO14001 and the medium and small scale enterprises are not implementing it by virtue of the financial problem. And the large scale industries which are ISO14001 certified, if they are implementing it properly then the environment of that industry would be balanced and will not cause the climate change, and if they have certification only for the completion in the market and incline the status and not implementing the EMS, then there is a check required. This research examine the status of ISO 14001 certified industries in Punjab state and for the comparison purposes the ISO14001 non-certified industries has also covered.

Environment protection is a continued process in which continuous improvement over the system is required. For the frequent development of the environment system, EMS ISO14001 is the implementation procedure for the environmental preservation of all. In the manufacturing industries who are implementing the EMS are following the combined method for all the measures i.e. health and safety, quality measures and environmental measures. They prepared the combined annual book which has been distributed to all the departments of the firm, and the responsibility for implementing and continuous checking has given to the head of the department, and has given the authority of changing the control measures, if that causing trembles on environment.

1.2 Terms, definitions and abbreviations

The following terms and definitions that are in this research are as follows:

IMS
Integrated Management system to direct and control an organization with regard to quality, environment, occupation safety and health.

Responsibility:
In this system documentation wherever the word "responsibility appears; to be read together with "authority" i.e. "responsibility and authority".

Weighted average score
WAS
Process of calculating the mean by using weights and frequencies of a value in a sample.

1.3 Environmental Management System

EMS objectives are being monitored and measured for fulfilment of desired standards as per their organizational norms stated in their manual and with reference to the state government norms. The various describe the details of this monitoring including the specifications, benchmarks, etc. to be achieved. Wherever the required parameters do not meet the specified criteria, correction and corrective actions was taken by those responsible. All the ISO14001 certified organizations follows the combined system of all i.e. quality management, health and safety management and environmental management, they integrate their management system, which is known as integrated management system. It has been evolved on the basis of company's purpose, their commitments to meet the requirements and continual improvements in the efficacy of IMS. The product requirements, significant environmental aspects, occupational risk of health and safety, relevant to legal and other requirements, with the view of integrated parties have been studied while preparing this policy. The enlightenment on the policy is generated within the organization through a wide publicity and training. The policy is outlined for continuing suitability through the management reviews. The policy is publically available and is delivered to the interested parties on request

1.4 Main elements of ISO-14001

> ➢ Define Environment Policy

➢ Identify Aspects/ analyze their impact

➢ Set targets and objectives

➢ Establish Operational control

➢ Identify and meet Legal Requirements

➢ Define Management Responsibility & Authority

➢ Create Competence through training & Awareness

➢ Internal & External communications

➢ Control of documents

➢ Emergency preparedness & response plan

1.5 EMS requirements in ISO-14001

Environmental management system, ISO14001 specifies the following requirements:

- Policy
- Plan
- Implementation and operation
- Check
- Review by the management

The correct operation of the EMS at the worksite is conditioned by a vast range of factors, i.e. the resources available to EMS personnel, the experience and training of these personnel, and the conditions in which their duties are performed regarding the environment. For this reason, the previously mentioned variables should be evaluated as a way of determining if EMSs in the production sector are currently being implemented as per ISO 14001.

Then the status of environmental management system from both ISO 14001 certified and non-certified manufacturing industries are collected. Both the details of ISO14001 certified and non-certified manufacturing industries are given below:

1.6 EMS non-certified industries selected for this study

- Friends engineering factory, focal point, Amritsar. Manufactures cutting and printing machines.
- Leela textile mill, Amritsar. this industrial unit is a dying industry
- Essma woolen mills pvt ltd, Amritsar, this industry manufactures woolen cloths and blankets.
- OCM private limited formally known as OCM India limited Estate, GT road, chhehata. Amritsar. The industry manufactures the cloths.
- SEL manufacturing CoLtd., Machiwara road , Nawanshahr. The industrial unit manufactures ready-made garments.
- M/s Ralson (India) Ltd, G.T. Road (NH-1), Ralson Nagar,Ludhiana (Punjab). The industrial unit manufactures bicycle hub with installed manufacturing expanse of ~20000 pieces/day.
- Freedom industry limited, Amritsar. This industry manufactures paints.
- H M textile industry, Amritsar. This industry manufactures clothes.
- Verka milk plant, Ludhiana, manufactures milk
- Automobile tyres range, G.T. Road, focal point, Amritsar. This industrial unit manufactures motor cycle tyres, e-bikes/scooters, three-wheeler, tractors and LCV. Company's annual turnover is US$ 65.27 Millions.

1.7 EMS certified companies selected for this study

Rail Coach Factory is one of the biggest railway coach manufacturer in India having manufacturing capacity of 1500 coaches per annum. RCF is certified IMS since May'2009 and the certification is valid up to Jul'2015. Its certification to ISO 14001:1996 by M/s DET NORSKE VERITAS, New Delhi since July 1999.

Rishab Spinning Mill

Rishab spinning mills limited is a spinning and hosiery unit located in the district of Ludhiana (INDIA). It includes the Quality & Environment Management System obsession as per ISO 9001: 2008 and ISO 14001: 2004 since sept, 2009 by bureau of Indian standards (BIS). Last recertification was occurred in 2012.

JCT Limited

JCT limited is a textile mill having spinning, weaving processing facilities located in Phagwara. JCT limited is certified to IMS and certified to ISO14001:2004 in 2007.

Hero Steels

Hero steels commenced its steal operations in 1976.The Ludhiana unit of hero steal is a composite steal unit. HERO Steels is certified to Quality Environmental Management System (QEMS) and certified to ISO14001:2004 in 2008.

1.8 Comparative study

All the ISO14001 certified manufacturing industries follows the EMS procedure in a continuous manner and follow their apex manual with the procedure manual, whereas in case of non-ISO14001 units follows the norms of the state government, but all the selected industries follow the legal compliances as per the government norms.

In the certified organizations, they have more numbers of supervisor's strengths, whereas in non-certified industries, they have very less number of supervisor's strength.

At last it can be concluded that all the manufacturing industries should follow ISO14001, and then only the climate change could be controlled. And need to be added with this that all the manufacturing industries should implement the ISO14001 standards. Because these manufacturing units are the main source of anthropogenic activities causes pollution in the climate, if they all will starts implementing the EMS then only the other hubs of pollution could be focused.

1.9 Objectives for thesis work

1. To collect the Environmental Management data from industrial workplaces located in the state of Punjab.
2. To analyze the results of the data of industrial workplaces in the state of Punjab.
3. Evaluate the comparison of EMS for certified and non-certified companies.

RESEARCH METHODOLOGY

The sample of this survey is from the state of Punjab.

 Researcher has covered only the manufacturing industries of Punjab and not the service units.

The manufacturing industries covered are ISO14001 certified as well as non-certified.

The data has been collected through the questionnaire and personal interview method:

1. Top Management commitments of the organization
2. Total strength of supervisors in both the ISO14001 certified and non-certified industries.
3. Then from their total strength, number of supervisors involved in environmental management system.
4. Supervisors experience in EMS implementation.
5. EMS supervisors responsibilities during Environmental measurements
6. The office location of the supervisors
7. The responsibilities which are assigned to the EMS supervisors.
8. Numbers of technical and non-technical supervisors
9. Supervisor's educational background.
10. What type of responsibilities they are having in the environmental protection.
11. For checking the proper operational method for control, type of section they select for measuring the effluent.
12. Does their company evaluate the environmental aspects and its subsequent impacts?
13. Has the responsibilities assigned to the supervisors been formally allocated in writing?

14. Environmental monitoring tools they use on-site?

> 14. (A) does their organization has requisite in-house testing facilities?
> 14. (B) if No, do they seek assistance from outside testing facilities?
> 14. C if yes, specify the organization

15. Document requirements
16. What measure benefits the certified organizations intend to derive by implementation of EMS in their company?
17. What steps have they taken by implementing EMS in their company?

4.1 Design and method of questionnaire

The questionnaire has been designed with the help of literature review to get an idea of the questionnaire techniques. The questions have been divided into five. Firstly, "scale" or strength of response, from that the respondent could choose one answer, then comes " second" type of questions with the range of pre-given answers beside which respondent could tick were involved. This type of questions appears simpler for the respondent to complete it and encourage the respondents to continue the rest questions. The " third' type of questions ,respondent could choose more than one answer, in this type of questions ,respondent has limit to answer more than one and is not bonded to tick one. The "fourth" type of question was yes/no type, in which the respondent could answer either yes or no. And the last type of question includes the comments or free writing, in which the respondent could give his/her comments.

4.2 Pilot testing

A pilot testing is an array referral of the full project, includes the questionnaire and interview. Questionnaire was filled by 5 to 7 respondents, then that responses were obtained, coded and analyzed. Questionnaire that was not providing useful data was put away (attached in annexure 1), and the final review of the questionnaire was made.

4.3 Improvement over the questionnaire

The questionnaire which was not providing useful data was replaced with the questionnaire which provides useful and relevant data; the revised questionnaire has been attached in annexure 2.

4.4 Final questionnaire

The new questionnaire was filled by the respondent and then the responses were obtained, coded and analyzed. This new questionnaire has provided useful data and as per the researcher's requirements.

4.5 Interview

With the questionnaire, it has been decided to add the interview of the respondent, which would help in gaining much more knowledge to the respondent about the status of EMS. Because sometimes respondent fails to explain it in writing, for those reasons interview helps in elaborating the things more clearly. The interviews are arranged at the same time as the questionnaires has issued to the respondent, because the interview we're not be used as a "check out". Like that of questionnaire design and procedure of interview session had referred from the literature sources. The types of questions that were used in the interview are unstructured type of interview, where there is a general theme to the interview but freedom in how the discussion develops.

4.6 Technique used for the data analysis

Weighted Average Score and Percentage Method

Weighted Average Score: The formula for computing a weighted arithmetic mean for a sample or a population is

$$\frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i}$$

Where w_i represents the weight associated with element x_i, this value of w_i equals the number of times that element appears in the data set.

The numerator (the top half of the formula) tells you to multiply each element in the data set by its weight and then add the results together, as shown here:

$$w_1 x_1 + w_2 x_2 + w_3 x_3 + \ldots + w_n x_n$$

The denominator (the bottom half of the formula) tells the addition of the weights together:

$$w_1 + w_2 + w_3 + w_4 + w_5 + \ldots + w_n$$

Therefore the weighted arithmetic mean is calculated by dividing the numerator by the denominator.

Percentage Method:- The percentage method is used for comparing certain feature

$$\text{Sample Percentage} = \frac{\text{Actual population}}{\text{Sample size}} \times 100$$

CHAPTER-5
RESULTS AND DISCUSSIONS

In this the questionnaire was designed on the basis of the status of environmental management system covering the top management commitments and the resources, roles and responsibilities of the supervisors involved in the ISO14001 certified and non certified manufacturing industries in the state of Punjab. The ISO14001 certified industries covered are Rail coach factory Kapurthala, Rishab spinning mil, Hero steels and JCT Ltd. Phagwara. And the non-ISO 14001 certified industries covered are Friends engineering factory, Amritsar; Leela textile mill, Amritsar; Essma woolen mills pvt ltd., Amritsar; OCM India limited Estate, GT road, chhehata, Amritsar; SEL manufacturing CoLtd., Nawanshahr; M/s Ralson (India) Ltd, G.T. Road (NH-1), Ralson Nagar, Ludhiana; Freedom industry limited, Amritsar; H M textile industry, Amritsar; Verka milk plant, Ludhiana; Automobile tyres range, G.T. Road, focal point, Amritsar. The results for both types of industries were analyzed and comparative study was done.

Question1. Top management commitments

Table 5.1 Top management commitments

S. No	Top management commitment	Certified industries	Non-certified industries
	Top management commitment for environmental management system	5	3.8
	Have EMS apex manual and procedure manual been prepared for guidance manual of all?	5	3.7
	Responsibility defined to take preventive measures against special/specific processes.	5	3.35
	Compliance environmental legal requirements	5	3.1
	Allocation of resources for the implementation of environmental management system	5	3
	Use of available advanced green technology for construction purpose	5	2.1
	Have managers and the staff equipped with requisite responsibility and authority to implement EMS	4.4	3.4
	Concern of staff members related to the environmental management system	4.6	2.95
	Are operational processes being monitored, evaluated and analyzed on monthly, six monthly and yearly basis	4.6	3.55
	Is production given priority over EMS implementation?	4.6	3.5

- It has been interpreted from this evaluation that the ISO14001 certified industries have demonstrated good practices in the following areas:
1) Top management commitment for environmental management system
2) EMS apex manual and procedure manual which have been prepared for guidance manual of all.
3) Responsibility defined to take preventive measures against special/specific processes.
4) Compliance environmental legal requirements
5) Allocation of resources for the implementation of environmental management system
6) Use of available advanced green technology for construction purpose
- The following have been identified as potential areas for improvement for the ISO 14001 certified industries:
1) Have managers and the staff equipped with requisite responsibility and authority to implement EMS
2) Concern of staff members related to the environmental management system

3) Are operational processes being monitored, evaluated and analyzed on monthly, six monthly and yearly basis

4) Is production given priority over EMS implementation?

- Interpretation for the non-ISO14001 units evaluates that these are the following activities, the researcher has given rank 1, on those activities the industries require improvement :

a) Top management commitment for environmental management system activities on which these companies require improvement.

b) EMS apex manual and procedure manual which have been prepared for guidance manual of all.

c) Operational processes are being monitored, evaluated and analyzed on monthly, six monthly and yearly bases.

d) Production given priority over EMS implementation.

Interpretation for the non-ISO14001 units evaluates that these are the following activities, the researcher has given rank 2, on those activities the industries require more improvement:

a) Responsibility defined to take preventive measures against special/specific processes.

b) Compliance environmental legal requirements

c) Allocation of resources for the implementation of environmental management system

d) Have managers and the staff equipped with requisite responsibility and authority to implement EMS

- Interpretation for the non-ISO14001 units evaluates that these are the following activities, Researcher has given rank 3, on those activities the industries requires more improvement:

a) Use of available advanced green technology for construction purpose

b) Concern of staff members related to the environmental management system

Question 2.Total strength of supervisors in the companies: -

Table 5.2 Strength of the supervisors

| Total strength of the supervisors	Certified	Non-certified
less than 100	0%	80%
Between 100 to 500	0%	20%
More than 500	100%	0%
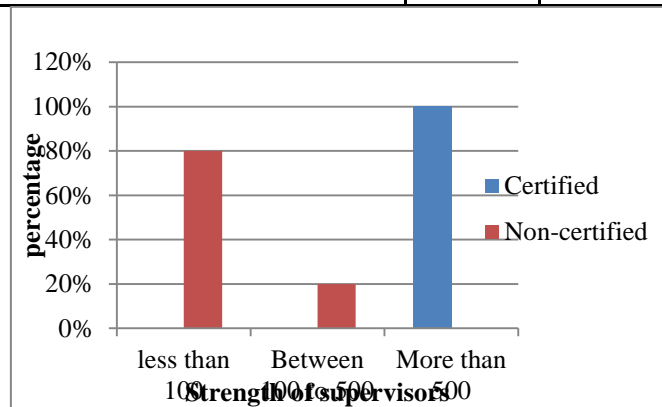
Graph 5.1 Strength of the supervisors

The evaluation of the total strength of the supervisors in the company shows that there 100% of the ISO14001 certified companies who are having more than 500 number of supervisors and 20% non-ISO14001 certified companies are having number of supervisors in between 100 to 500 and 60% non-ISO14001 certified companies are having their strength of supervisors more than 500.

Question3. Number of supervisors involved in environmental management system:-

Table 5.3 Number of supervisor involved in environmental management system

Number of supervisor involved in environmental management system	Certified	Non certified
< 10 %	25%	0%
10-30%	25%	0%
>30%	50%	0%
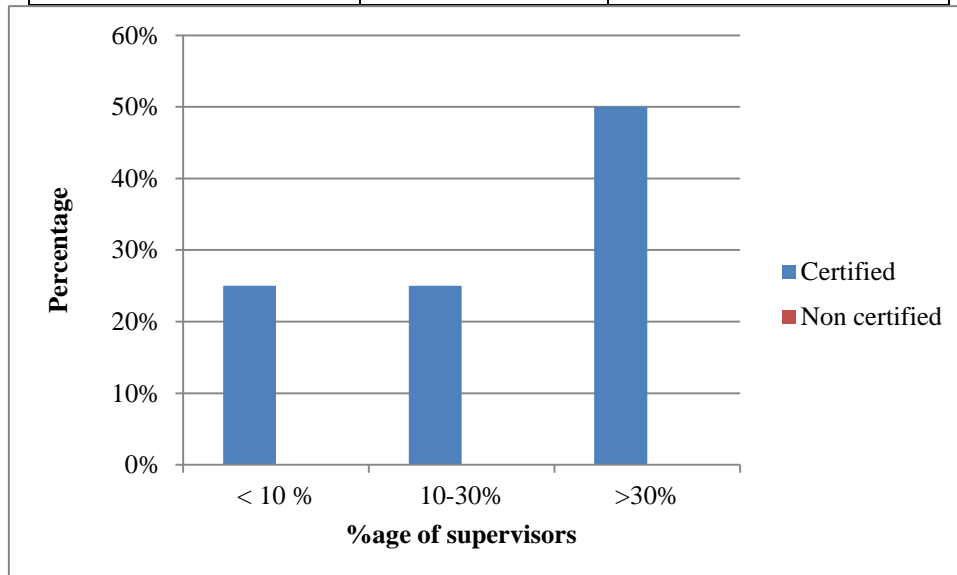
Graph 5.2 Number of supervisor involved in environmental management system

The valuation of the number of supervisors involved in environmental management system shows that 25% of the ISO14001 certified companies having less than 10% of the EMS supervisors, 25% of the ISO14001 certified companies having in between 10 to 30% of the supervisors and 50% of the ISO14001 certified companies having greater than 30% of the EMS supervisors in their companies. Whereas in case of non-ISO14001 units, the evaluation showed that there is no supervisor of non-ISO14001 involved in EMS.

Question4. Experience of supervisors involved in EMS implementation:-

Table 5.4 Experience of supervisors involved in EMS implementation

| Experience of supervisors involved in EMS implementation	Certified	Non certified
< 5 years	25%	40%
5-10 years	25%	0%
>10 years	75%	90%
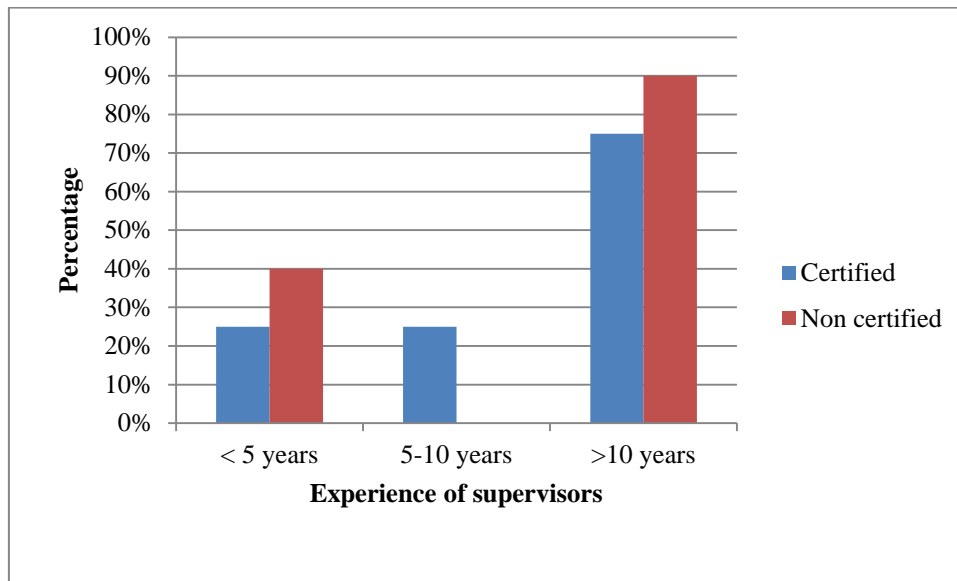
Graph 5.3 Experience of supervisors involved in EMS implementation

The assessment shows that in case of ISO14001 certified companies there are 25% of the supervisor having less than 5 years of experienced supervisors, 25% of the companies having their supervisors experience in EMS is in between 5 to 10 years and 75% of the companies having their supervisor's experience in EMS is more than 10 years. Whereas for non-ISO14001 40% of the companies having their supervisors experience in EMS implementation less than 5 years; no supervisor is having experience in between 5 to 10 years and the companies having their supervisors experience more than 10 years accounts for 90%; that means the non-certified units have EMS experienced supervisors, but not involved in EMS implementation.

Question5. EMS supervisor's responsibility during environmental measurements:-
Table 5.5 EMS supervisor's responsibility during environmental measurements

| EMS supervisors responsibility during environmental measurements	Certified	Non certified
On sites	100%	70%
In office	50%	30%
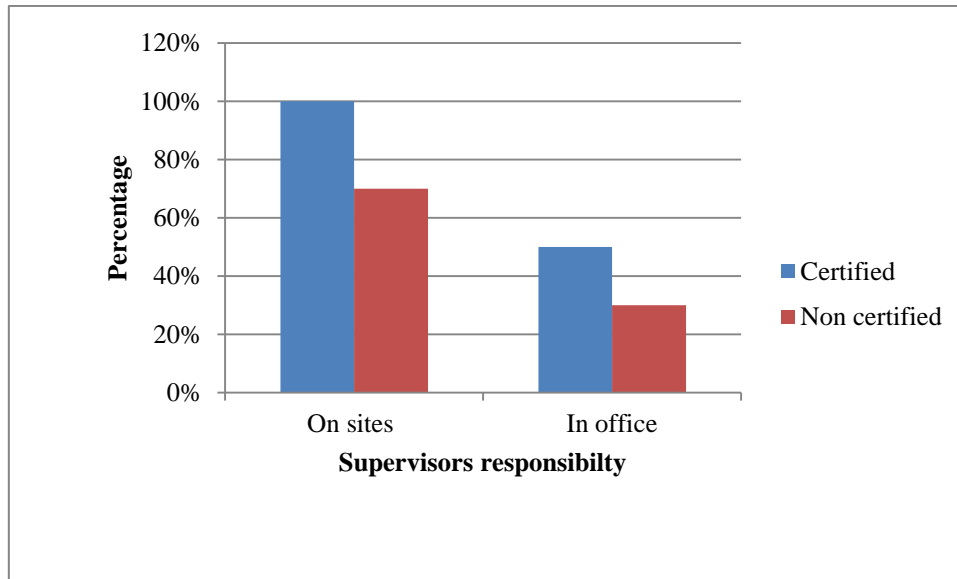
Graph 5.4 EMS supervisor's responsibility during environmental measurements

The results for ISO-14001 certified industries shows that there are 100% of the companies having their supervisor's responsibilities on-site and rest 50% of the companies is having their supervisor's responsibilities in-office only. The non-ISO industries evaluation for the EMS supervisor's responsibility during environmental measurements shows that there are 70% of the companies having their supervisor's responsibility on-site, and rest 30% of the companies having their supervisor's responsibility in office.

Question6. Their office location: -

Table 5.6 Office location

| Office location	Certified	Non certified
Office at the workplace	100%	60%
Office at the branch of company (remote control)	0%	40%
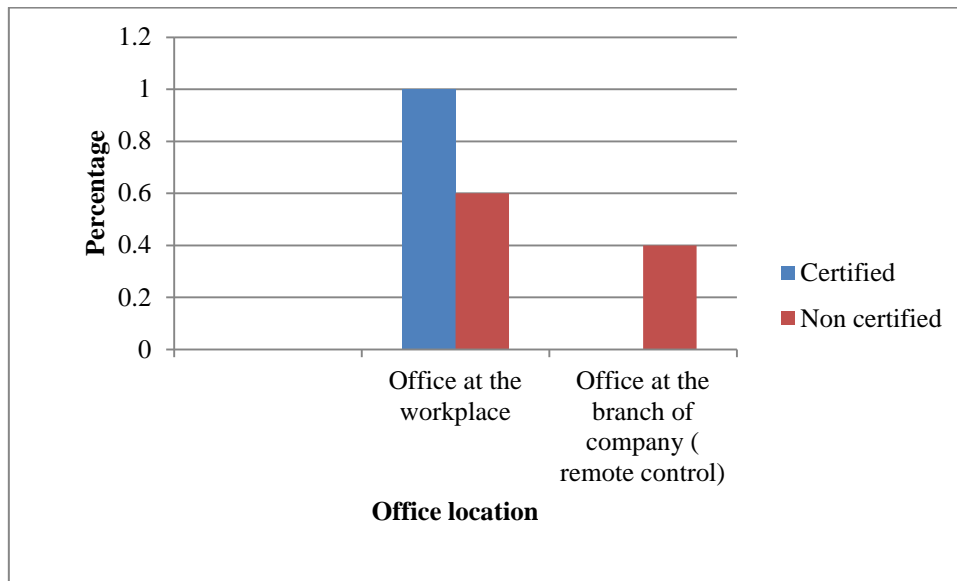
Graph 5.5 Office location

The assessment for office location shows that the 100% ISO14001 certified companies are having office at the workplace, no company having their office at the branch of the company. And for the office location of the supervisors for the non-ISO14001 company's shows that there are 60% of the companies having their supervisor's office location is at the workplace, rest 40% of the companies having their supervisor's office location is at the branch of the company (remote control).

Question7. Responsibilities assigned to the supervisors other than EMS:-

Table 5.7 Responsibility assigned to supervisors other than EMS

Responsibility assigned to supervisors other than EMS	Certified	Non certified
Technical office manager	100%	90%
Safety and health supervisor	100%	70%
Quality assurance supervisor	100%	80%
Production assistant	100%	60%
Supervisor involved in production works	100%	30%
No other role	0	0%
Others	0	0%
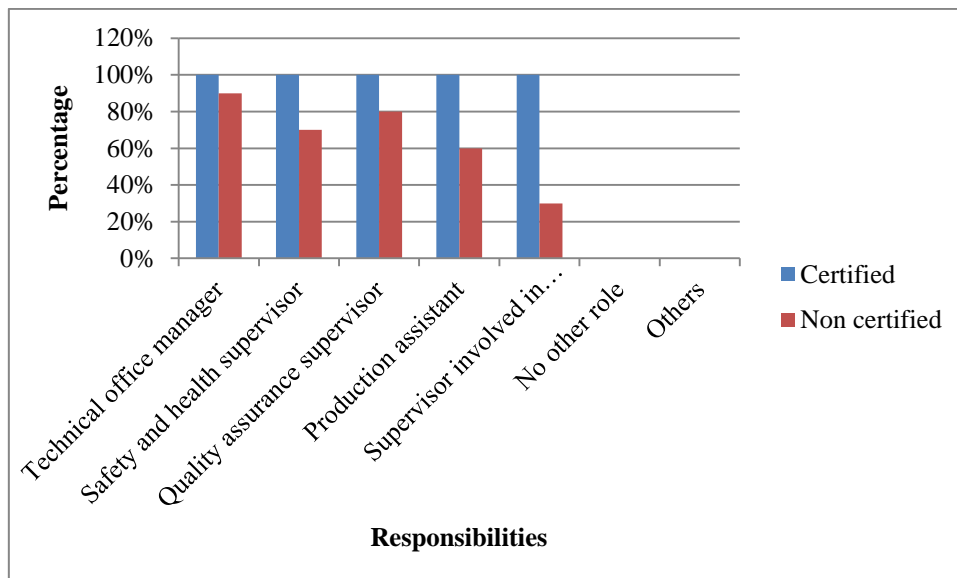
Graph 5.6 Responsibility assigned to supervisors other than EMS

The appraisal of the responsibilities assigned to the EMS supervisors showed that all the 100% of companies having their supervisors which took the responsibilities of technical health manager, safety and health supervisor, quality and health manager, production assistant, production works, other than EMS. Whereas the same pattern was not followed by non-certified companies. 90%, 70%, 60% and 30% of these non-ISO14001 companies have their supervisors which took the responsibility of technical health manager, safety and health supervisor, construction assistant and production works respectively.

Question8. Number of technical and non-technical supervisors:-

Table 5.8 Number of technical and non technical supervisors

| Number of technical and non technical supervisors	Certified	Non certified
Technical	60%	70%
Non Technical	40%	30%
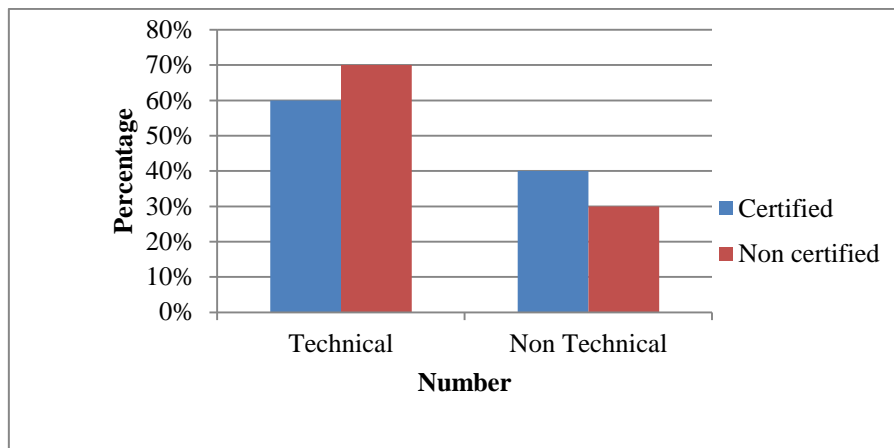
Graph 5.7 Number of technical and non technical supervisors

The valuation of number of technical and non-technical supervisors shows that there are 60% companies having the technical supervisors, and 40% of the supervisors are having non-technical supervisors. And the non-certified industries shows that there are 70% of the companies having technical supervisors, 30% of the companies having non-technical supervisors.

Question9. Supervisor's educational background: -

Table 5.9 Supervisor's educational background

| Supervisors educational background	Certified	Non certified
Engineering Degree	40%	20%
Any other Degree	30%	30%
Diploma	60%	70%
No degree, only practical experience	30%	50%
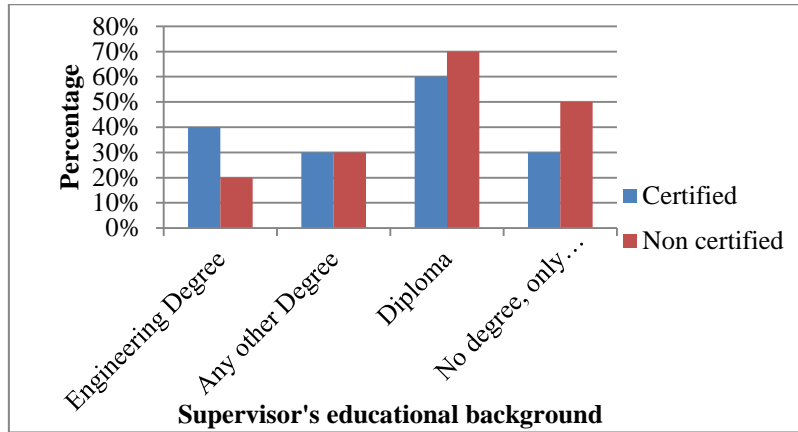
Graph 5.8 Supervisor's educational background

The valuation for the supervisor's educational background shows that there are 40% supervisors in the ISO14001 certified company having engineering degree, 30% of the supervisors having any other degree, 60% of the supervisors in the company having diploma, and there are 30% of the supervisors having no degree, only practical experience. And for the non-certified industries shows that there are there are 20% of the companies having their supervisors educational background is in engineering degree, are 30% of the companies having their supervisors educational background is in any other degree, are 70% of the companies having their supervisors educational background is in diploma, are 50% of the companies having their supervisors educational background is in no degree, only practical experience.

Question10. Responsibilities they are having in the environmental protection:-

Table 5.10 Type of responsibilities, supervisors having in environmental protection

| Type of responsibilities, supervisors having in environmental protection	Certified	Non certified
Checking and controlling the environmental rules as per ISO 14001 standards	100%	0%
Checking and controlling the proper operational machines for control and measurements of the effluent	100%	100%
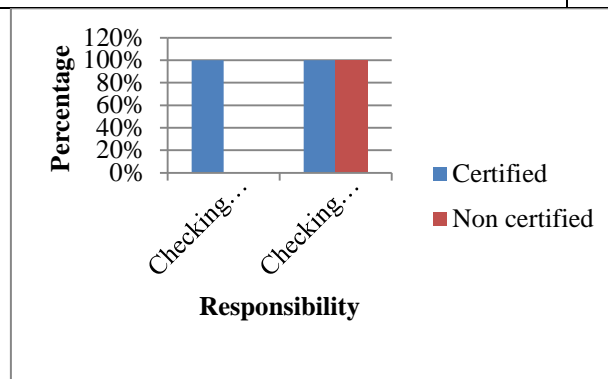
Graph 5.9 Type of responsibilities, supervisors having in environmental protection

The responsibilities of the supervisors shows that there are 100% of the ISO14001 certified companies checks and controls the environmental rules as per ISO 14001 standards and rest 100% checks the proper operational machines for control and measurement of the effluent waste in all the four companies Rishab spinning mill Ludhiana, Rail coach factory Kapurthala, JCT Ltd. Phagwara and Hero steels. And the non-certified industries show that there is no industry that checks and controls the proper environmental roles as per ISO 14001. 100% of the non-certified industries checks and controls the proper operational machines for control and measurement of the effluent waste.

Question11. For checking the proper operational method for control, type of section they select they select for measuring the effluent:-

Table 5.11 Type of section they select for measuring the effluent

| For checking the proper method for control, type of section they select for measuring the effluent:	Certified	Non certified
Air monitoring	100%	80%
Water testing	100%	40%
Noise monitoring	25%	90%
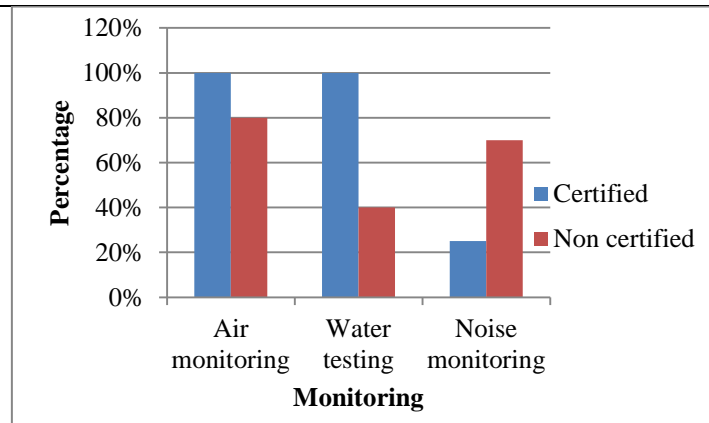
Graph 5.10 Type of section they select for measuring the effluent

For the evaluation of the proper operational method for control, all the companies monitors air and water, where as 25% of the companies monitor the noise. The results for non-certified industries shows that 80% of the companies monitor the air pollution, 40% of the industries monitor the water, 90% of the industries monitors the noise.

Question12. Does the company evaluate the environmental aspects and its subsequent impacts:-
Table 5.12 Company evaluate the environmental aspect and its subsequent impacts

| Company evaluate the environmental aspect and its subsequent impacts	yes	No
certified	100%	0%
non-certified	80%	20%
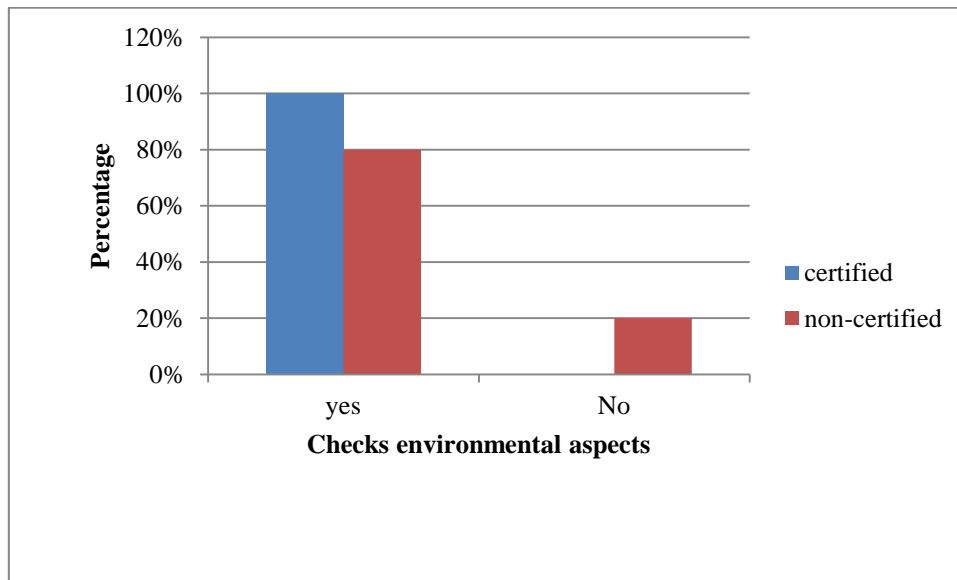
Graph 5.11 Company evaluate the environmental aspect and its subsequent impacts

All the ISO-14001 certified industries evaluate the Environmental Aspects and its Subsequent impacts. Whereas 80% of the non-certified industries evaluates the environmental aspect and its subsequent impacts, rest 20% of the industries does not evaluate the environmental aspect and its subsequent impacts.

Question13. Has the responsibility been formally allocated in writing:-

Table 5.13 Q13. Responsibilities allocated in writing

Responsibilities allocated in writing	Yes	No
Certified	100%	0%
Non-certified	80%	20%
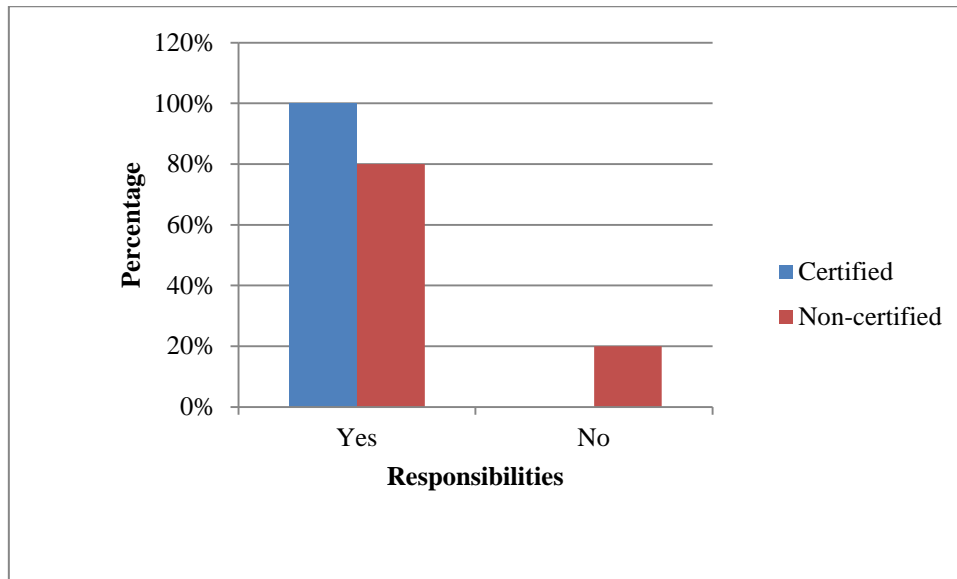
Graph 5.12 Responsibilities allocated in writing

The ISO14001 certified companies assigned the responsibilities to the supervisors in written form. 80% of the non-certified industries have allocated their supervisors responsibility in writing, and 20% of the non-certified industries have not allocated their supervisors responsibility in writing.

Question14. The environmental monitoring tools they use on-site:-

All the ISO-14001 certified industries use PPE (proposal protective equipments), SPM, PB meter; effluent is monitored on ETP which is computerized. Whereas the non-certified industries monitors with the STP, does not use PPE, rather they did not have more monitoring tools as compare to the certified industries.

Question 14 (i) Does their organization has requisite in-house testing facilities:-

Table 5.14 Organization has requisite in-house testing facilities

| Organisation has requisite in-house testing facilities?	Certified	Non certified
Yes	100%	40%
No	0%	60%
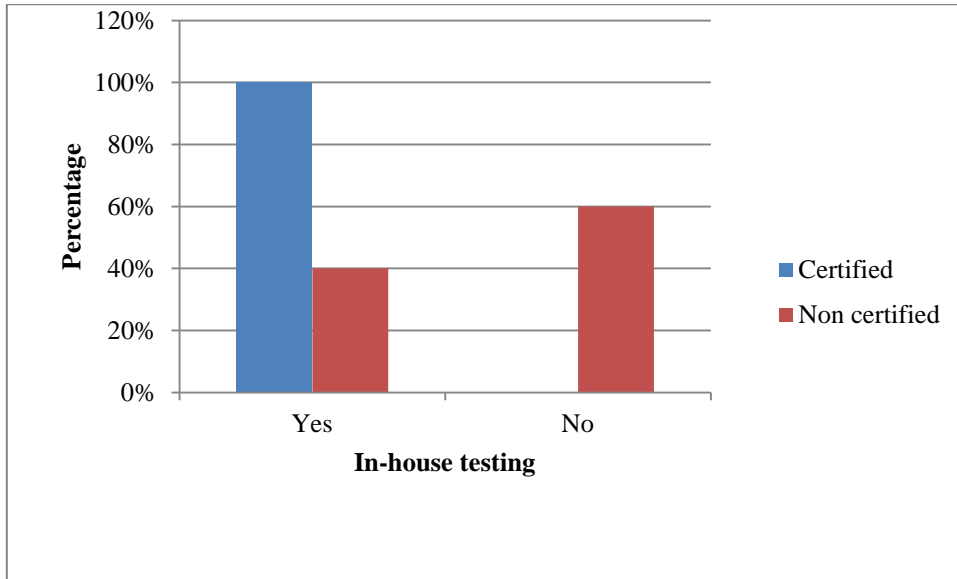
Graph 5.13 Organization has requisite in-house testing facilities

All the companies are having in-house testing facilities which are authorized. 40% of the non-certified industries have requisite in-house testing facilities, and 60% of the non-certified industries have not in-house testing facilities.

Question 14(ii) Do they seek assistance from outside testing facilities?

Table 5.15 Assistance from outside testing facilities

| Assistance from outside testing facilities?	Certified	Non certified
Yes	50%	100%
No	50%	0%
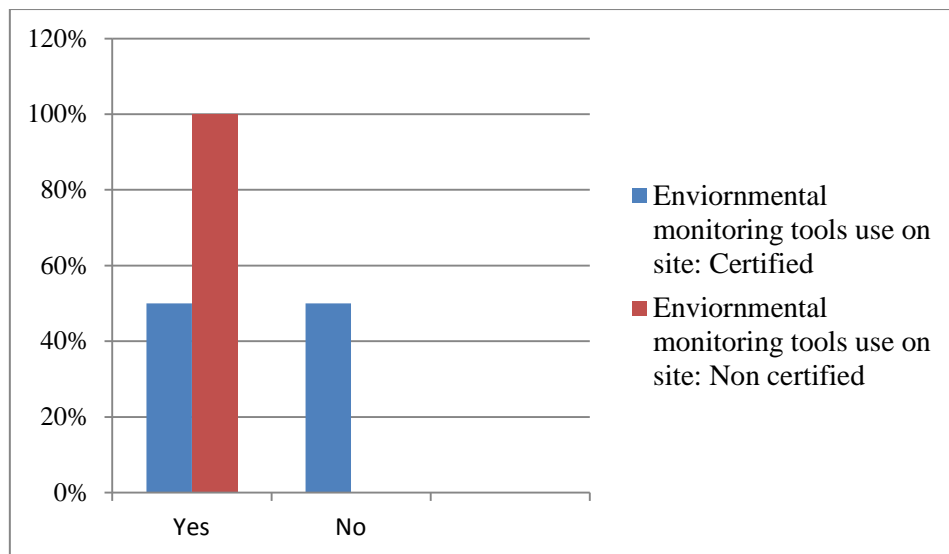
Graph 5.14 Assistance from outside testing facilities

All the ISO14001 certified industries goes for both in-house and outside testing facilities. Whereas all the non-certified industries seek their assistance from outside testing facilities.

Question 14(iii) Specify the organization from where they seek for testing:-

Table 5.16 Specify the organization from where they seek assistance

| Specify the organisation from where they seek for assistance	Certified	Non certified
Government Sector	60%	50%
Private Sector	40%	50%
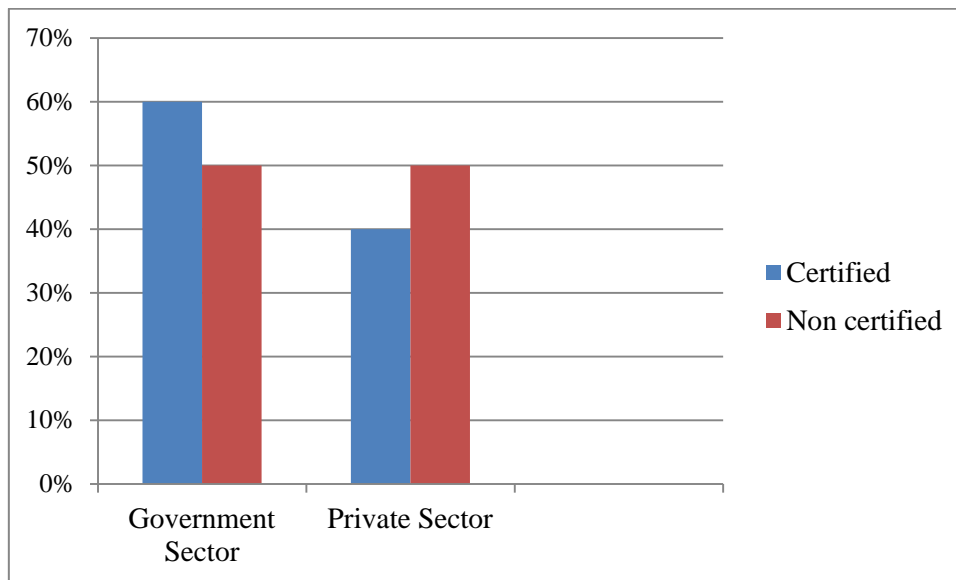
Graph 5.15 Specify the organization from where they seek assistance

Certified companies seek 60% assistance from government sector and 40% from private sector whereas non-certified industries take help from both government and private sector equally.

Question15. Documents requirements:-

Table 5.17 Document requirement

Document requirement	Availability of ISO14001	Other documents related to the ISO14001
Certified	100%	0%
Non-certified	0%	100%
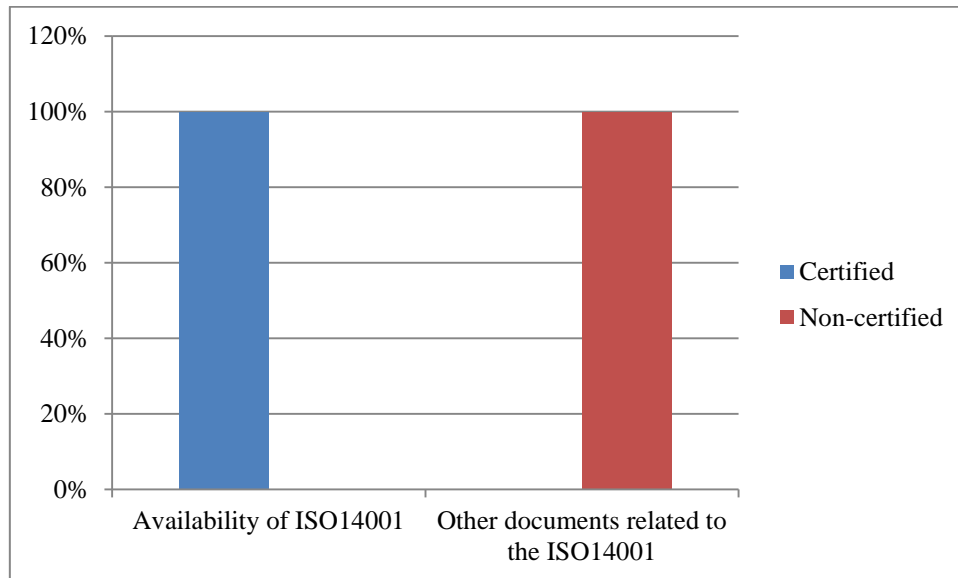
Graph 5.16 Document requirement

All the companies have both the EMS international standard ISO 14001; those are for the government specifications and their requirements. All the non-certified industries follows the other documents related to EMS requirements guidelines.

Question16. Measure benefits they intend to derive by the implementation of EMS in their company:-

Their energy is conserved, reuse of natural resources, employee safety, optimum production, environmental friendly campus, safety and health improvement. Where as in case of non-ISO14001 industries they use the latest technology which are fuel efficient and comply their equipments to meet all the stabilizing standards.

Question17. What steps have they taken by implementing the EMS in their company?

Table 5.18 Steps they take for implementing EMS in their company

Steps they take for implementing EMS in their company	Certified	Non-certified
in term effluent	100%	100%
noise control	100%	90%
land usage	100%	60%
recycling of waste water	100%	50%
oil spillage	100%	60%
proper calibration of measuring instruments	100%	70%
EMS training of all concerned	100%	0.00%
saving in material	100%	20%
E-Waste minimization	100%	0%
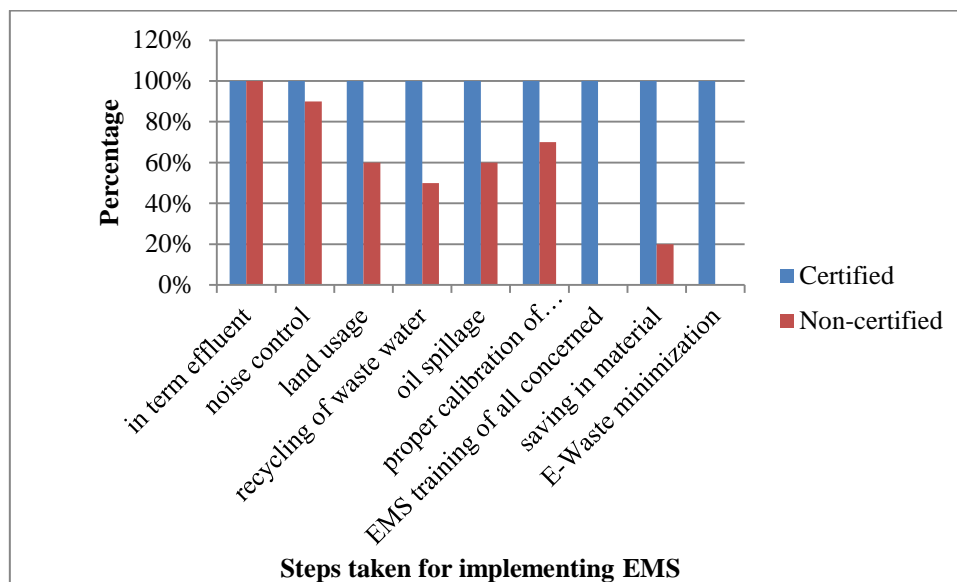
Graph 5.17 Steps they take for implementing EMS in their company

In term of effluent, noise control, land usage, recycling of waste water, oil spillage, proper calibration of measuring instruments, EMS training of all concerned supervisors, saving in material and E-waste minimization are being implemented by the ISO-14001 certified industries. Whereas in case of non-ISO14001 industries, steps implementing the non-ISO14001 industries are more in term effluent, noise control, land usage, oil spillage and proper calibration of measuring instruments as compare to the certified industries, and same in term case of recycling of wastewater. Non-certified lacks behind in case of saving in material and e-waste minimization.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 Conclusions

1) ISO14001 certified companies have more than 500 numbers of supervisors as compare to non-ISO14001 certified companies which mostly have less than 100 numbers of supervisors but Non-ISO14001 companies have more number of technical supervisors as compare to the ISO14001 certified industries.

2) In ISO14001 certified industries, supervisors responsibilities are more as compare to the non-ISO14001 companies but only 50% of the ISO14001 units are having more than 30% of the supervisors involved in Environmental management system.

3) In the ISO 14001 certified industries, 100% of supervisor's office location is at the workplace, whereas in case of non-ISO14001 industries, only 60% of supervisor's office location is at the workplace.

4) Among the rest of the management commitments, the non-certified companies only lack in green technology for production purpose and Concern of staff members related to the environmental management system.

5) Both ISO14001 certified and non-certified, they have supervisors with engineering and diploma background, but non-ISO14001 certified industries have more practical experienced supervisors, but their experience is not profitably utilized in environmental management systems, as compare to certified industries.

6) Apart from being non-certified from ISO14001, 80% of non-certified companies are monitoring the aspects as well as impact of air, water and noise.

7) ISO14001 certified industries have in-house testing facilities, but for some tests they seek assistance from outside testing facilities. Therefore in non-ISO14001 industries, 40% have in-house testing facilities and 60% take assistance from outside testing facilities, either from government or private sectors.

8) In terms of effluent disposal, noise control, land usage, oil spillage and proper calibration of measuring instrument the non-certified industries are doing well. They lack behind in saving of material and EMS training to the employees.

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