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Barriers Analysis to Certification of 'ISO 14001' in Small Scale Plastic Water Tank Manufacturing Industry Using Interpretive Structural Modeling

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ABSTRACT

The purpose of this paper is to find out the barriers in the certification of "ISO 14001' in small scale industry and the data related to the research work is gathered from Utkarsh Polyworld Water Tank manufacturing industry. Basically today environmental concern is increasing very rapidly in customer and also in most of the developed country legally. In India small scale industries are growing very rapidly and today's they also need to focus on present scenario of the environmental concerns. Therefore "ISO 14001" is a very effective certificate for this purpose but most of the SME's are not take interest to get this certificate because they have so many issues in the certification process of it. Therefore, in this research work the barriers are find out that affect the certification of the "ISO 14001" and at same time to get the weight age of the barriers those are helpful for the industrialist and have ease to the process of certification. For this purpose, in this paper with the help of the literature survey barriers are collected and shortlisted by the owner and experts as per the industry nature. After that an interpretive structure modeling tool is used for the prioritization of the barriers and also get the MICMAC analysis by which owner of the industry can get the nature of the barriers.

Keywords:— *Small Scale industry, ISO 14001, Environment Management System, Interpretive Structure Modeling tool and MICMAC analysis.*

I. INTRODUCTION

ISO defined the environment as - the surroundings in which an organization operates, including air, water, land, natural resources, flora fauna, humans and their interrelation (ISO, 1996).Environmental Management (EM) defined it as - management of an organization's or company's impact on the environment. Therefore, in this research work is mainly focused on the Small, Medium enterprise adoption of EM that will reducing the environmental impact of an organization or people's activities through the control of all aspects of their operation that can cause or lead to an impact on the environment. The ISO 14001 standard defines EMS as - that part of the overall management system which includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing implementing, achieving, reviewing and maintaining the environmental policy (ISO, 1996).

Environmental Management System (EMS) is the systematic attempt by companies to identify measure, document and reduce their environmental footprint by integrating these functions with the day to day affairs of management and decision making. The presence of EMS may indicate environmental friendliness of a company, the uncertainty of measurement related to indicators and indices may yield an unreliable picture of the environmental performance of the company (1).

5S is a basically developed in Japan and has generated substantial results in industrial and service sectors. These results are briefly known as incidents prevention, delays 'education and productivity enhancement in work environment. The ultimate goal of 5S is to prevent losses. Despite seeming simplicity of 5S in concept and implementation, organizations have great difficulty in its execution. In fact, managers and executive personnel are not well aware of goals of 5S. Therefore, it is quite difficult to set appropriate ground for implementing 5S, unless its principles are well comprehended. These principles are known in form of five Japanese words, beginning with letter which later formed the term 5S.

II. ISO 14001 METHODOLOGY

The benefits of the "ISO 14001" and then understand the low interest of the small industry owner in the certification of "ISO 14001". To solve the above issues ISM methodology is used, in which brainstorming and literature study will provide the barriers and with the help of this researcher get the weight age of the barriers. Therefore, in this paper with the help of literature survey 14 barriers are received and after the brain storming session of the industry owner and expert's final 11 barriers are selected for the further analysis. This barrier analysis of certification of "ISO 14001" was implementing in Utkarsh Polyworld Water Tank manufacturing industry situated in Maneri district Mandla.

Practical implications

This research work is very useful for owner because this will make the implementation process easy and no need of special resources required selecting important barriers in the implementation process. ISM provide a very simple block diagram by which every person from top to bottom in industry can easily understand the most and less important barriers.

ISO14001

ISO stands for International Standards Organization which is based in Geneva, Switzerland. The short form "ISO" is not an acronym, but instead is derived from the Greek "isos", meaning "equal" (implying "standard"). ISO was founded in 1947. It promotes the international harmonization and development of manufacturing, product and communications standards. ISO has laid down more than 8000 standards ranging from paper sizes to film speeds. More than 120 countries are full ISO voting members, while several other countries serve as observer members. India is a founder and a full voting member of ISO and is officially represented by the Bureau of Indian Standards (BIS). ISO produces internationally harmonized standards through various Technical Committees.

The ISO 14001 standard was promulgated in 1996, benefiting from the success enjoyed by the ISO 9000 family of standards. ISO 14001 was based on

the model of various national environmental management standards, and in particular on the British BS 7750 standard.

The first environmental management system standard, BS 7750, was published in 1992 by the BSI group. In 1996, the International Organization for Standardization (ISO) created the ISO 14000 family of standards. ISO 14001 underwent revision in 2004. The current revision of ISO 14001 was published in September 2015.

In the Years 2007, ISO has celebrates its 70 Years completion from the years 1947 and now in 2017 ISO have 165 members and total of 21584 standards. From the years 1947 and now in 2020 ISO have 165 members and total of 21584 standards.

ISO 14001 requires an organization to commit to the prevention of pollution and continual improvement as part of the normal management cycle (Ammenberg, 2003). According to Hillary (2001) it can be used for all types and sizes of organizations and accommodates diverse geographical, cultural and social conditions. The Environmental Management System (EMS) is a continuous cycle that follows the model "Plan, Do, Check, Act"- the Deming circle (figure 1):

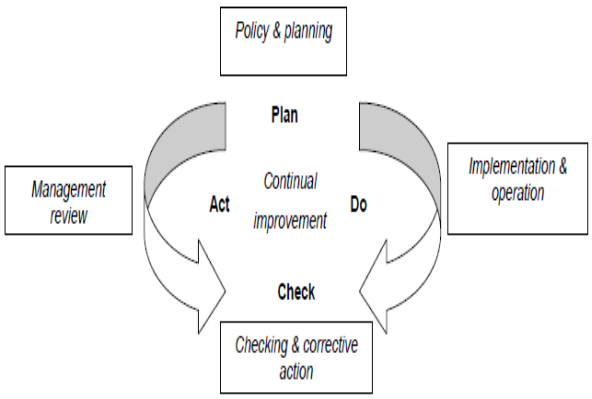


Figure 1: "Plan, Do, Check , Act" model (1).

According to Hillary (2004), the benefits of an EMS can be classified into two types: internal benefits and external benefits. Internal benefits and external benefits are again sub divided in three categories. The categories of internal and external benefits are shown in below block diagram:

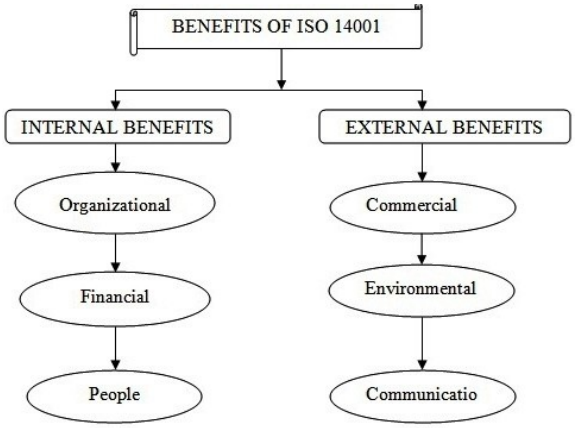


Figure 2: Benefits of ISO 14001 "Hillary 2004"

III. Drive of the Research

From the above literature facts, it's very clear that in today's scenario environment factors in the new business or in old is become very important to become successful and for sustainable growth. If any industry don't have concern with the carbon foot print and environment safety will not remain in market for long time hence every industry owner or entrepreneur should have keen interest in ISO 14001.Therefore following is the drive of the research:

To recognize the barriers that become obstacle in the certification of ISO 14001 in SME's (Utkarsh Polyworld Water Tank Manufacturing industry).

Prepare the model of barriers as per their importance and priority. Here priority means that which barrier strictly affect the certification of International organization for standardization 14001 in SME's at Jabalpur, Madhya Pradesh.

To calculate the driving and driven power of the barriers in the certification process of International organization for standardization 14001.

Find out the interrelation between the barriers in the certification of ISO 14001.

III. Problem Statement

The small and medium scale industries are playing big role in economy in INDIA as well as in Madhya Pradesh. Especially from last 10 years Madhya Pradesh government is focusing very strongly in industrialization with the help of SME's because at Madhya Pradesh GDP is 9.62 lakh crore in 2019-2020 in which industrial sector GDP is 20% only and human development index rank is 32 because of those environmental factors are lacking in the industrialization policy making by SME's because at Madhya Pradesh government. Opposite of that now a day's environment awareness are increasing day by day in people all over the world. For example people are searching organic food, ecofriendly products and at the same time developed country also focused of green development in industrialization. Hence to compete in local as well as in international market Indian industries also need to reduce carbon foot print and improve environment performance.

To find out the solution of above problem "environment management system" is now become an important part of industries, but most of the SME's are not very much aware of that and those are aware about it are not able to understand how to proceed. Therefore, in this research work "ISO 14001" is selected to provide the guidance to the industry for improving environment performance. Actually, the implementation procedure of ISO 14001 will help to full fill the "environment management system" of the organization. Therefore, to understand the importance of the "ISO 14001" will lead the research work to the implementation part of that but literature survey and interviews result shows that the barriers which affect the implementation process should be prioritize.

Therefore, in this paper work prioritization of barriers in the implementation of "ISO 14001" is taken into consideration for a plastic water tank and tube manufacturing industry.

IV. Research Structure

The goal of this paper is to find out the barriers in the implementation process of "ISO 14001" at plastic water tank and tube manufacturing industry and at the same to arrange the barriers as per their weight age. To make it easy for owner of the industry a block diagram is shown below which will give the clear picture of the research design.

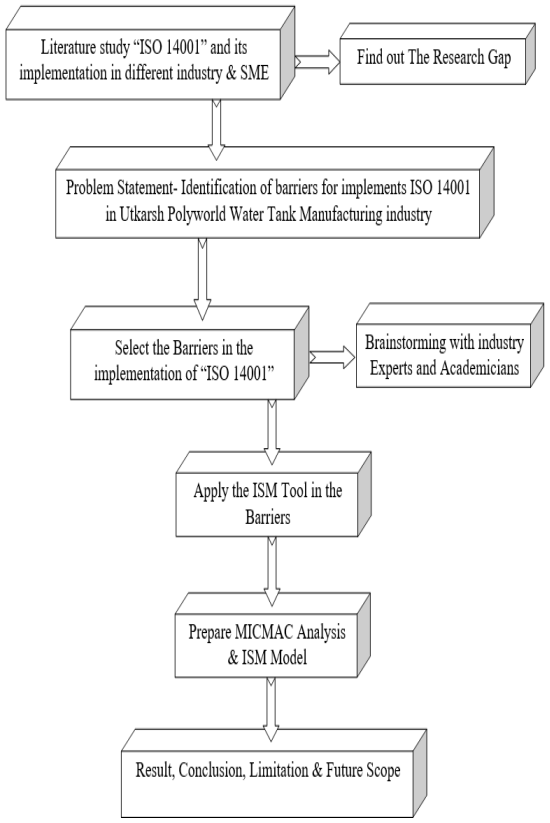


Figure 3: Research Flow Chart

Barriers to implement "'ISO14001" in Plastic Water Tank And Tube Manufacturing Industry

With the help of literature analysis and discussion with various expert from industries and academicians following 11 barriers were find out for implementation of "ISO 14001" in small scale plastic water tank and tube manufacturing industry. All The barriers are given clarification in the following paragraphs: -

- Lack of Resources.
- Consultant high fees
- Lack of understanding and awareness
- Lack of Implementation zeal
- Mind-sets and working culture
- Lack of time
- Not enough people
- Lack of vision and specific goals of the leadership
- No Government support
- Customer demand
- ISO 14001 is not a legal obligation

Data for Selecting Barriers in the Implementation of "ISO 14001" in Utkarsh Polyworld Water Tank Manufacturer

To conduct this paper work number of meetings and interview were organize with the owner of Utkarsh Polyworld Water Tank Manufacturer and academician of relevant areas. To gather the data for this case study work following procedure has been taken:

Study the research journal relevant to SME's, EMS and ISO 14001 implementation.

Select the Base paper from research journals and paper work done by previous research scholars.

Separate the appropriate barriers from all research papers and talk about the barriers with the expert from industry and academic.

Note down the all barriers and converse with the owner of UtkarshPolyworld and academician from different colleges.

All this brainstorming work is summarized and 11 most appropriate barriers are taken apart for further research work.

Calculation of Data Collected from Brainstorming

After the selection of appropriate 11 barriers next step is to apply the Interpretive structure modeling method in which a matrix is prepared which represent the interrelation between the barriers with the help of that interrelation is converted into binary matrix and after that iteration is followed and finally the level of all barriers is receive. Further MICMAC analysis and ISM model will be prepared those are described in later chapter in details.

V. DEVELOPMENT OF SSIM

All the experts are having barriers list in the form of structural self intersection matrix and to fill the relationship between the all matrixes they are provided with the VAXO sheet which represent the following full form:

In this above given SSIM four symbols are used V, A, X and O, these symbols notations are given below:

Table 1: VAXO Analysis

Symbols	Meaning
V	Barrier i will drive to Barrier j;
A	Barrier j will drive to Barrier i;
X	Barrier i and j will drive to each other;
O	Barrier i and j will not drive to each other;

Table 2: Structural Self Intersection Matrix (SSIM)

Barrier Number	Barrier Description	11	10	9	8	7	6	5	4	3	2
1	Lack of Resources	O	O	A	A	X	O	V	V	A	V
2	Consultant high fees	A	O	A	A	O	A	O	X	A	
3	Lack of understanding and awareness	A	O	A	A	A	A	A	V		
4	Lack of Implementation zeal	A	O	A	A	A	A	A			
5	Mind-sets and working culture	V	A	A	V	O	X				
6	Lack of time	O	X	O	O	O					
7	Not enough people	A	O	O	A						
8	Lack of vision and specific goals of the leadership	A	A	X							
9	No Government support	X	O								
10	Customer demand	O									
11	ISO 14001 is not a legal obligation										

Table 3: Initial Reachability Matrix

Barrier Number	Barrier Number									Driving Power
	D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	
D1	1	0	0	1	0	0	1	1	0	4
D2	1	1	1	0	1	0	0	1	0	5
D3	0	1	1	0	1	0	1	0	0	4
D4	0	1	1	1	0	0	0	0	1	4
D5	0	0	1	1	1	0	1	0	0	4
D6	1	0	1	1	1	1	1	1	0	7
D7	0	0	1	1	0	0	1	0	0	3
D8	0	0	0	0	0	0	1	1	0	2
D9	1	1	1	0	0	1	1	1	1	7
Dependence Power	**4**	**4**	**7**	**5**	**4**	**2**	**7**	**5**	**2**	**40**

From the SSIM all the barriers interrelation is received and this relation is very useful to find out the driving and driven power of the barriers. With the help of VAXO analysis the inter relation received of all barriers that is "barrier 1" will drive barriers 2, 4, 5; will not drive barriers 6, 10, 11; barrier1 is drive by barriers 3, 8, 9 and barrier 1, 7 drive to each other. As per the meaning shown of the "VAXO" analysis anybody can easily understand the relation between the all barriers.

Iteration Summery

In this research work iteration summary is prepared because this is very useful for industry owner as well as other those want to understand the barriers behavior in one view. To divide the barriers as per there level it is preferred to take more numbers of barriers in most important level and then less number in medium and less important.

Table 4: Iteration Summary

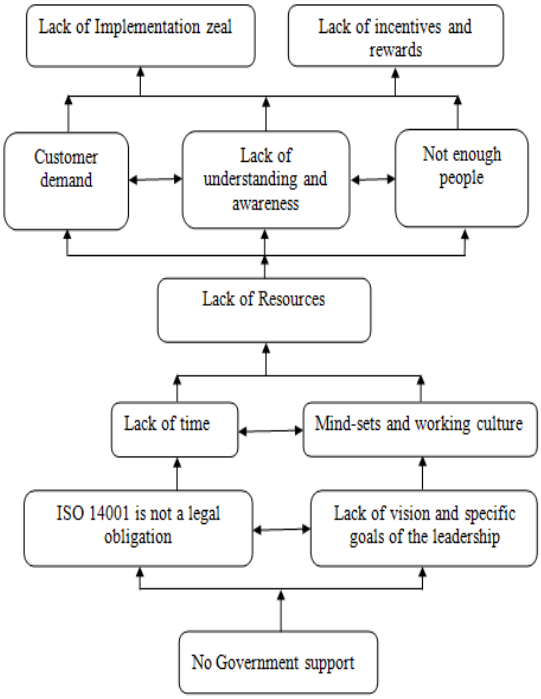
Criterion Number	Level	BARRIERS NUMBER	LEVEL OF IMPORTANCE
2	I	Consultant high fees	LESS IMPORTANT
4	I	Lack of Implementation zeal	LESS IMPORTANT
3	II	Lack of understanding and awareness	LESS IMPORTANT
7	II	Not enough people	MEDIUM IMPORTANT
10	II	Customer demand	MEDIUM IMPORTANT
1	III	Lack of Resources	MOST IMPORTANT
5	IV	Mind-sets and working culture	MOST IMPORTANT
6	IV	Lack of time	MOST IMPORTANT
8	V	Lack of vision and specific goals of the leadership	MOST IMPORTANT
11	V	ISO 14001 is not a legal obligation	MOST IMPORTANT
9	VI	No Government support	MOST IMPORTANT

Development of ISM Model

The ISM is a very useful block diagram because this will provide the level and weightage of the barriers in at a glance. This research work interpretive structure model is divided in 6 levels. The arrows direction are towards the upward side it means the model is going from most important to less important side of the barriers. It means barriers importance and weightage will increase from bottom to top. Continuous arrow with both side head is shows the interrelation between the barriers, it means both will drive to each other.

Figure 4: ISM

VI. RESULTS



This research work is mainly considered the problem faced by the Utkarsh Polyworld Water Tank manufacturing industry in the implementation of "ISO 14001" in their organization. Hence to solve the implementation problem brainstorming and interview with owner have been done by considering the Utkarsh Polyworld Water Tank manufacturing industry work culture and environment. In this research work brainstorming and ISM tool are become

very useful because this tool provides the following results:

This research work has 11 important barriers those are affect the implementation of "ISO 14001' in Utkarsh Polyworld Water tank manufacturing industry.

ISM tool is providing the level of all barriers and also give the interrelation, priority and weightage of the barriers.

Interpretive Structure modeling diagraph has been providing the importance of all barriers by at a glance.

The reachability matrix complete iteration is done in 6 levels. The barriers in the implementation of "ISO 14001" have been identified into 6 levels. The sixth level of iteration has one barrier "No government support"; it means this barrier has most important in the implementation of "ISO 14001" in Utkarsh Polyworld Water Tank manufacturing industry.

Similar above level 5, 4 and 3 have medium important it means barriers "ISO 14001 is not a legal obligation", Lack of vision and specific goals of the leadership, Lack of time, Mind-sets and working culture and Lack of Resources are important but have less importance than level 6. Level 2 and 1 have less important for SME owner in the implementation process of "ISO 14001"in Utkarsh Polyworld manufacturing industry.

VII. CONCLUSIONS

This paper work is very valuable to most of the relevant SME's because by this research work SMEs knows the priority and importance of the barriers in the implementation process of" ISO 14001'in their organization.

TABLE 5: BARRIERS LEVEL OF IMPORTANCE

Level	BARRIERS NUMBER	LEVEL OF IMPORTANCE
I	Consultant high fees	LESS IMPORTANT
I	Lack of Implementation zeal	LESS IMPORTANT
II	Lack of understanding and awareness	LESS IMPORTANT
II	Not enough people	MEDIUM IMPORTANT
II	Customer demand	MEDIUM IMPORTANT
III	Lack of Resources	MOST IMPORTANT
IV	Mind-sets and working culture	MOST IMPORTANT
IV	Lack of time	MOST IMPORTANT
V	Lack of vision and specific goals of the leadership	MOST IMPORTANT
V	ISO 14001 is not a legal obligation	MOST IMPORTANT
VI	No Government support	MOST IMPORTANT

VIII. LIMITATION

This paper work methodology is basically based on the brainstorming and interview with the academician and industry owner; hence the data collected is totally based on the working experience of the persons and also depends on the local area issues. Therefore some of the barriers are not appropriate for all the SME's or may be some extra barriers must be involved as per the case requirement. The above limitation is not much serious because nature of approach will not change for other SME's.

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