LEAN ENVIRONMENTAL MANAGEMENT INTEGRATION SYSTEM FOR SUSTAINABILITY OF ISO 14001:2004 STANDARD IMPLEMENTATION

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CHAPTER 1: INTRODUCTION

AIM, OBJECTIVES, AND MAIN THEME OF THE STUDY

According to Puvanasvaran et al. (2011), the organizations are undergoing a rapid transformation in their manufacturing processes to enhance their performance and productivity. The lean systems, ISO 14001, and Environment management system (EMS) have been implemented by the organizations to achieve sustainability by improving the business processes. This study focuses on the model "Lean Environment Management Integration system," which is based on the integration lean principle with the ISO 14001. Thus, the researcher intends to study literature on lean systems, lean principle, environment management system, and ISO 14001.

The Environment Management Systems

The Environment Management system can be defined as important part of the organisation's management systems that involves the practices, procedures, structure, resources, and processes (Puvanasvaran, 2011). An Environmental Management System (EMS) is referred to be one of the significant tools that any organization can utilize to undergo concrete implementation of an environment policy. It has such several inter-connected elements that help to measure, manage, and improve the different environmental aspects of any company's operations by functioning together (Delmas, 2002). The EMS ensures the effective utilization of organizational resources, with best practices, eliminating the wasteful processes, and achieving continuous improvement. The EMS integration in the management system evaluates the true potential of the current practices and resources (Puvanasvaran, 2011). According to Steger (2000), EMS can be defined broadly as a systematic and transparent process which is known corporate-wide, having the core objective of recommending and

executing environmental goals, responsibilities, policies as well as consistent auditing of its elements. The line of such an environmental management system which is driven by compliance rules and actions is usually not clear. Thus this gives an idea about the broad range of EMS applied in different companies globally (Steger, 2000). Waste reduction and compliance goals can be achieved by applying EMS in corporations which helps in implementing, developing, managing, monitoring and coordinating environmental activities. For a particular company, sanctions can be avoided by simply applying compliance in order to maintain and reach the minimum regulatory and legal standards for acceptable pollution range. For example, if compliance fails in a company, it results in increasing external involvement in daily based operations and increasing costs in form of fines and also results in ceasing and cancellation of orders in case of extreme situations. Thus waste reduction goes outside compliance and the main focus of the company goes towards dramatic reduction of bad environmental impact. The level to which EMS usually meets the convincing goals is relatively unfamiliar. The characteristics of an EMS which are fundamentally required to reach these goals are particularly not researched. The adoption of formal ISO 14001 standards is the basic reality and concept of EMS. The definition and study of these systems have been limitedly considered by the researchers. The international standards of organization released books condensing and standards nearby 1996 (Melnyk et al., 2003). Politically and broadly the standardised EMAS and EMS of ISO According to ISO 14001 (2004), the implementation of EMS in the organization is to develop, achieve, review, and maintain the environmental policy by improving the organisational system that comprises of its activities, practices, structure, and resources.

The environmental reports of some good companies are reviewed by the certified accountants after their allowance. For example, Green consultancy was asked to write the

environmental report of Shell Germany. This development can be contributed by environmental management system in three ways:

1. The third-party assessment of environmental statements (professional qualifications and independence of the standards, scope, verifier and methodology of audits and review) is standardized by the EMAS regulations which are fundamentally required to be matched with other initiatives as well.
2. The information required by all types of external and internal requests is provided by environmental management systems in a systematic and transparent way. (It has been observed that there is a room for improvement in environmental management systems)
3. Readiness and good integrity strongly correlate with each other for open communication. The companies are not at risk of nasty surprises as insured by EMS. An undiscovered 'skeleton in the closet' can cause such surprises (Steger, 2000)

Two things are expected by a good EMS. Firstly, it will help in uncovering the ways to reduce the environmental impact of a company along with increase in its productivity or reduction of cost. Secondly, it will help in increasing the corporate's efficiency and effectiveness. The compromises done in the implementation of an EMS have been thoroughly discussed. The main element of an EMS cost reduction which ultimately leads to source reduction, waste reduction and process intensification. The arguments are raised that the cost of EMS exceeds with the cost reduction discussed previously in order to create win-win situation for the environment and the firms. Such situations allow to speak out good economy is good ecology. Reducing opposing environmental impacts reduces the cost of project or process to a great extent providing a circumstantial evidence. For example, large corporations using ISO 14001 in their systems include Dow and 3M. Since 1975 after the launching of program, 3M claimed that its 4,700 plus projects have reduced costs by $827 million and reduced 807,000ton of wastage. Dow estimated that after an investment of $3.1 million in

Michigan produced a saving of $5.4 million using source reduction strategy. But such numbers can be condemned due to four reasons of naïve approach. First of all, the benefits and costs of an organization's total environmental effort are rarely combined. Thus, Dow's remote projects such as reduction of source may be successful while the whole system may not be. Secondly, to obtain 'win-win' results on a complete and regular basis does not explain a manager how the structures and systems should be constructed. It's quite difficult to produce a similar result every year as compared to capture a low hanging fruit once. Thirdly, the creation of wastage or pollution is less delicate than the scope of the environmental impact for a given plant or product. The outcomes may not be impressive and may be difficult to identify when measured against a harder standard of total environmental effects. Fourthly, the environmental risks are unavoidably exposed when engaged in a comprehensive environmental management system. An environmental management system can create financial difficulties rather than reducing them if a firm is not able to afford cleaning up (Bansal & Bogner, 2000). With such necessities in mind, it can be stated the cost approximation for EMAS range from 15,000 to 2 million Euro, with a group around 50,000 to 100,000 Euro. Between 10,000 and 45,000 Euro, the estimated cost of environmental declaration varies. The investment cost centres around 50,000 to 100,000 Euro for companies to acquire ISO 14001 certification. The branch and size of industry are the main determining factors but pre-standard of environmental management are highly considered as well. As compared to companies with routine responsible care program implemented, contrarily some corporations had to close big gaps to live according to the necessities of a standardised environmental management system. To set up environmental management systems cost effectively, some companies experience standardised management systems like the quality insurance norm ISO 9000 series (Melnyk et al., 2003). This provides an overview that the importance is given to the on-time cost savings from an environment management rather than the value of the on-going internal systems that are obtained through environmental

management and the plunders from being responsive to outdoor agents. Convincingly, Corporates don't get projected gains by applying environmental projects like other capital investments. Projects provided by a good EMS can help in making huge gains if continued, such as implementation of continuous source reduction strategy in a firm. A large impact of environment observed in a firm, after applying an EMS, is not liked by the managers. A good environmental management system that regularly runs in a firm, explores new areas where environmental impact hasn't considered in the past can be valuable in notifying management to reduce obligations (Bansal & Bogner, 2000).

The ISO 14001

In 1996, a new international standard of for EMS (ISO 14001) was adopted by International Organization of Standards to reduce trade hurdles and to facilitate trade along with the intent of raising opportunities for environmental practices globally (Melnyk, 2003; Delmas, 2002; Zhu et al., 2013). The worldwide importance of developing an ISO 14001 as an international standard for environmental management system is crystal clear. The main logic behind creation of ISO 14001 was that its global acceptance should accelerate international business by consistency otherwise diffuse EMS and by providing a globally accepted blueprint for pollution inhibition, supportable development and compliance assurance (Delmas, 2002). The general areas included in ISO 14001 are auditing, life cycle assessment, labelling, EMS, product standards and performance evaluation. These standards are divided into two general groups (see figure 9 appendix). The first category consists of organizational evaluation or the auditing and environmental management system and performance standards which are used to evaluate an organization. Theoretically performance standards and the auditing help in ensuring and evaluating successful implementation of an environmental management system while the environmental management system standards help in providing the structure for the

management system. The second category consists of product and process evaluation which includes environmental aspects in product standards, environmental labelling and life cycle assessment (Melnyk, 2003).

ISO 14001 has appeared as the largest structure of environmental management system globally and consists of almost common requirement of accessing markets with certifications provided by 112 countries (Stalley, 2009). As compared to 110,000 facilities available globally, over 12,000 were certified in China by December 2005 to encourage market based tools such as tradable emission and ISO 14001 permits by the central government in Beijing. The number of facilities certified by ISO 14001 reached 35,416 by the end of 2009. In developed countries the parent or partner firms could strive to obtain ISO 14001 capabilities in their affiliated firms like in China, boosting up their environmental performance (Zhu et al., 2013). The first series of ISO 14001 standards was issued by ISO 14001 in September 1996. The criteria for an EMS (environmental management system) are set by ISO 14001. Organizations take the responsibility of establishing corporate environmental management when an environmental management system describes the organizational requirement such as, responsibilities, processes, structure, practices, procedure and resources. There are several bodies of environmental management systems available which provide certifications currently and include, European standard (EMAS), a worldwide standard (ISO 14001), a British standard (BS 7750) (Hillary, 2004; Bansal and Bogner, 2002), and several trade specific standards such as Responsible Care designed by the American Chemistry Council. In any environmental management system, ISO 14001 covers the broadest industrial and geographical area. The requirements are less stringent and more flexible, if the application of standard is wide. For example, disclosure of the organization's environmental policy is the only requirement of ISO 14001 whereas publicity of programs and environmental policy is the requirement of EMAS (Bansal & Bogner, 2002). In 1996, the publication done was the first and only edition which

focused on the Environmental Auditing standards (ISO 14010-14012) and on the environmental management system standards of ISO 14001. In ISO 14000 series, ISO 14001 is the only admirable standard. All other standards in the series serve to maximize elective chances of the ISO 14001 environmental management system and define supporting functions. However, ISO 14001 certification don't require the implementation of these supporting standards. The five requirements of ISO 14001 are: (a) development of a company environmental strategy and assurance of an environmental management system, (b) creation of an idea for execution, (c) operation and application of the environmental management system, (d) probable corrective action and observation, and (e) frequent improvement and top management review (Delmas, 2002).

According to ISO (2003), 35% certified companies have implemented the environmental management practices and ideas of EMS. Busse (2004) emphasizes on the integration of ISO 14001, as the system addresses the environmental challenges of commercial and legal aspects for the organizations (see figure 8 appendix). Darnall et al (2000) has also identified competitive advantage, cost reduction, maintaining public relations, and customer demand as the non-environmental factors that influence organizations to adopt the certification of ISO 14001. According to Bansal and Bogner (2002), the pressure of institutional and economic challenges determines the adoption of ISO 14001 standards in the companies (see table 2). An example of consistent practical standards is ISO 14001 where all countries should ultimately adopt same procedures and EMS. However, across different countries, the level of understanding of ISO 14001 varies. In Asia and Western Europe, a large number of organizations have developed ISO 14001. 36% of the facilities were from Asia while 52 % from Europe out of 14,106 ISO 14001 certified organizations in December 1999. Only 4.5% i.e. 636 facilities were certified by ISO 14001 out of total certified facilities in 1999 (Delmas, 2002).

	VALUE		VSM	FLOW		PULL		PERFECTION	
ISO 14001 CLAUSE	Enhanced product / service package value	Time based competition	High value adding in the extended enterprise	Dense, regular, accurate and reliable flow	Standard work	JIT production and delivery	Flexible resources	Learning	Common focus
4.2 Environmental policy									
*Define environmental policy or commitment statement	-Establishes goals for environmental performance against which the effectiveness of the management system will be judged. -As a guidance for an organization toward achieving its commitment to environment -Important as an marketing strategy tool for an organization	- Minimize the environmental policy development time by benchmarking on the principles or commitments to which the organization subscribes currently	-Development of simple, clear, verifiable and effective policy which is appropriate to the nature and scale of its operations ease the system establishment -Declaration of policy must be appropriate to the nature and scale of its operations. -Set out clear commitments and act as a springboard when setting environmental objectives and targets.	-Environment policy must be brought to life through plans and actions. -Environmental policy should be communicated to everyone working for or on behalf of the organisation	-Environment policy must be in simple format and easy to understand by all the interst parties	-Delivering proper and adequate information at right time and at right place to ease the EMS implementation process	- Involvement from all levels of employees provides flexibilities for the organization to drive the system	-Educate all the interest parties, for them to understand the environmental policy and what is expected from them in order to achieve the objectives and targets established later on	-It should provide a unifying vision for the organization, because the policy statement can have a significant impact on the Organization's image, it should be clear and verifiable

Table 2: Integration uses Cross tabulation method

The Lean Systems

The lean system aims to drive the performance and productivity of the company. The implementation of lean system is based on its principles that identify the potential processes and resources, required by the organization to manufacture the products, considering the customers' demands (Sroufe, 2003; Montabon et al., 2007). The model of lean manufacturing arose in the automobile industry from the study of Japanese manufacturing techniques. Almost every aspect of an organization's processes relate to lean production through a number of

practices. The most essential practices that relate to lean production are human and technical competences and to work place management. A major issue in an organization is the management of rework barriers and inventory and the decrease of these barriers gives rise to the lean production (King & Linox, 2001). Figure 2 describes the lean production system relatively in a brief manner (Katayama and Bennet, 1996). A dynamic system of lean manufacturing brings better output, i.e. variety, safety, quality and cost in order to add value but requires lesser resources such as labour, overhead and material, etc. Developing improvements is possible via lean system but the question arises that how this system works to achieve high performance (see figure 10 appendix) (Paez et al, 2004).The principles of lean model are Kaizen or continuous improvement. It is the responsibility of employees to find out the quality issues on the manufacturing line and to stop such problematic line in contrast to bulk manufacturing (Rothenberg et al., 2001). In order to increase the efficiency and effectiveness of a manufacturing system in a particular firm, there are several common views for the models to implement Lean Production. To authorize employees to take part in system improvement along with continuous improvement of firm's culture, it is quite necessary that top management commit on Lean Production System according to majority. All agree that improved business metrics can be achieved by giving serious devotion to such a Lead Program (Bergmiller & McCright, 2009).

The lean production is achieved through mapping of the value stream in the organizational processes. The ISO 14001 standard, when integrated with the lean principles ensures that the organization effectively deals with the environmental impacts of environmental impacts and leads the production, demanded by the customers (Sroufe, 2003; Montabon et al., 2007). This helps the organization in achieving the higher environmental performance (see Figure 2 appendix). Waste reduction methods, business outcomes and management systems are the main foundations of Lean Production observed by the Researcher. Almost same

elements are suggested in the stages of Lean Production with minor difference (Bergmiller & McCright, 2009).

According to Puvanasvaran et al. (2011) the Lean and EMS, when integrated into the organizational system, provides effectiveness by the adoption of lean processes and procedures that are designed for eliminating the wastes. The implementation of Lean and EMS facilitates the organization with economically production, thus, providing cost efficiency and sustainable working environment (see figure 5 appendix). Thus, lean systems accelerate the success for the organization. To understand the concept of lean systems, it is essential to understand its principles. It principles focus on the elimination of wastes, increase the product quality, and boost the organizational productivity (Sedjo, 2007). The five fundamental principles of lean systems as derived by Womack and Jones (1996) are mentioned below (also see table 1):

- Defining Value for the organisational system
- To Identify the Value Stream within the organisational system
- Achieving flow in Value-Creation
- Integrating the Pull Principle
- Achieving perfection

• **Objectives**	**Principles**	**Core elements**	
	VALUE	Enhanced product / service package value	Solution that enhances value for the client
			Product variety
		Time based competition	Production lead time (order to delivery)

Permanently improve company's competitiveness by: - eliminating waste - consistently attending client's requirements in variety, quality, quantity, time, price			Product development lead time
	VALUE STREAM	High value adding in the extended enterprise	Value stream redesign eliminating waste
			Suppliers involvement in production and product development systems
	FLOW	Dense, regular, accurate and reliable flow	Dense flow , with hight adding value time, clear pathways and communication
			Regular flow - paced by client / next process demand
			Accurate and reliable flow
		Standard work	Work standardization
			Transparency
			Low level decision
	PULL	JIT production and delivery	Pull versus push system
			No overproduction, WIP (Work In Process) reduction

			Demand smoothing : harmonizing market variations and production flexibility
			Reflecting product variation in short periods of production
		Flexible resources	Information flexibility
			Equipment flexibility
			Workers flexibility
	PERFECTION	Learning	Fast problem detection
			Fast problem solving in lower level and solution retention
			Evolutionary learning
		Common focus	Leadership and strategy
			Structure
			Client and production focus diffusion
			Human respect
			Total employee involvement
			Total system diffusion

Table 1: Lean Principles and its elements

Research Aim and Objectives

The researcher aims to propose a model of Lean Environmental Management Integration System, with the integration of ISO 14001:2004 standard with the lean principles that ensures the continuous improvement and sustainability for the organization in the current environment. The study will be focusing on the below mention objectives.

- To examine "the Environmental Management Systems" and their integration in the organisational system
- To analyse the five lean principles and their integration with the ISO 14001 standards
- To anticipating the barriers and challenges in the effective implementation of lean principles for the sustainability of ISO 14001 standard
- To provide recommendations for the efficient assimilation of "Lean Environmental Management Integration System" in the organizations for the sustainability of ISO 14001 standard

Research Questions

The study will be seeking the answers of the following questions

- What are the potential benefits of implementing the Environmental Management Systems in the organizations?
- How the lean principles address the organizational system's requirement, with respect to the environment, when integrated with the ISO 14001?
- What are the major challenges that organizations may face in the effective implementation of "Lean Environmental Management Integration System," for the sustainability of ISO 14001 standards?

SIGNIFICANCE OF THE STUDY

The sustainability of the business organization is crucial, considering the rapidly increasing competitiveness in the environment, where the product quality and customer demand are critical factors (Sambasivan and Fei, 2008). Therefore, the organizational systems should improve to ensure that customer demands are achieved. The organizational systems consists of the resources (either time, human, and finance), processes, and procedures of the company that need to facilitate the customers with quality product. Since, the business environment is surrounded by continuously increasing competition, the organisations need to adopt a system that certainly improves, accelerates, reviews, and evaluates the organizational system for sustainability and continuous enhancement.

PROBLEM STATEMENT & PURPOSE OF THE STUDY

Problem Statement

"To measure environmental performance is becoming important for the organizations, in order to identify potential successes and failures as well as for assessing the environmental goals be achieved."

The organizations are rapidly taking measures to integrate the environmental measurement systems for evaluating their performance, with respect to the environmental conditions. The organizations need to focus not only on the regulatory compliance of the various organisational processes but, its environmental performance as well. Thus, efficiency of manufacturing processes is crucial. Therefore, Lean principle to achieve lean manufacturing is applied, which eliminates the waste from the processes and provides value-added products to the customers. The integration of Lean principles with the standards of ISO 14001 will result in more sustainability and customer-focus (Simpson and Power, 2005; Shah and Ward, 2007).

Purpose of the study

The purpose of this study is present a model that provides an Environmental Management System by integrating the Lean Principles with ISO 14001. This model is known as "Lean Environmental Management Integration System (LEMIS)." The model is designed and developed to create the standards for measuring and evaluating the organization's performance. The model makes the environmental efforts of the organisation more focused and its goal attainable by the adoption of realistic approach. This model aims to eliminate wasteful processes encountered in the implementation of the ISO 14001 standard, which leads to progress the environmental performance of the organisation. The integration of the ISO 14001 standard with the Lean principles using the LEMIS model will assist the organisation in specifying its standard and performance measures to achieve continual improvement (see figure 6 appendices).

Structure of the Thesis

This study comprises of six chapters. A brief description of these chapters has been given below:

Chapter 1

The chapter is "introduction." This is focusing on the following points.

- Defining the aim, objectives, and main theme of the study
- Highlighting the significance of the study
- Providing introduction to the problem and describing the purpose of this study

Chapter 2

This chapter is "literature review." The major objectives of this chapter have been given as follows:

- Describing the concept of lean manufacturing, environmental management system, and ISO 14001
- Proposing the model for Lean Environment Management Integration system
- Providing the conceptual framework of the study based on the past literature relevant to the topic
- Explaining the various variables of the conceptual framework and their role in the proposed model
- Analysing the benefits of the model for the sustainability of ISO 14001 standards.

Chapter 3

This chapter is "Methodology." It has the following goals in the study.

- Providing an explanation of the research design and method
- Analysing the data collection tools and procedures
- Describing the research instruments and participants
- Explaining the reliability, ethics, and validity as the matters of consideration
- Elaborating the limitation of the study

Chapter 4

This chapter is "Results and finding." It has the following goals in the study

- The collected data will be analysed using the statistical tools and SPSS software
- The tables and graphical representation will be provided with the explanation of the results

- The qualitative data will be analysed critically examining the results with the past researchers on the topic.

Chapter 5

This chapter is "Discussion." It has the following goals in the study

- The main findings of the study will be evaluated for their consistency with the literature, conceptual framework, and proposed model.
- The results will be assessed, with respect to the ideas and point-of-views of various authors

Chapter 6

This chapter is "Conclusion." It has the following goals in the study

- The major points highlighting the benefits of the proposed model will be given
- The major challenges for the integration of the proposed model will be provided
- The recommendations for the effective implementation of Lean Environment Management Integration system will be provided

CHAPTER 2: LITERATURE REVIEW

Puvanasvaran suggests that the EMS of ISO 14001 was designed to initiate the environmental deriving approach for the operations of organisations in every aspect. The EMS of ISO 14001 provides the companies an organized approach for dealing with the environmental problems and it can be recognized as tool that administers the organisation's environment management. The adoption of ISO 14001 standards has provided various benefits to the companies and its certification are voluntary, while its integration in the organisational systems is derived by its external environment that aspire companies due to the benefits of ISO 14001.

THE CONCEPT OF LEAN MANUFACTURING, ENVIRONMENTAL MANAGEMENT SYSTEM & ISO 14001

In 1992, ISO 14001 Environment Management System BS 7750 was published, which is currently known as 14001:2004 environmental management standards and describes the need of organization's certification. It has been observed that the organizations interested in the application of Environmental Management System mainly focus on the challenge of business besides decreasing of indirect and direct effect on the environment. The concerns of clients, controlling bodies and other shareholders have increased towards development of environmental compliance along with improvement in environmental performance by the organizations. A structure is provided to an organization to improve its environmental performance, including opportunity identification and threat, target setting, analysis and measurement and to manage its legal compliance in order to be helpful for the environment as per firm's commitment of establishing it. Additional cost benefits are delivered in terms of waste minimization, increased efficiency and conserving resources. The focal items adopted

are; environmental strategy, scheduling, application and actions, checking and remedial action and management review. The environmental strategy can be applied and developed by using different tools provided by this system in order to control the impact of organizational products, activities and services on the environment.

There were thirteen companies of the UK that were demonstrated for the accreditation and its assistance to their environmental management system. Holt (1998) found some of these benefits as the reduction in the risk factors, costs, and insurance premiums. The companies also achieved the retrieval of existing and new customers, followed by the wide range of competitive advantages. Busse (2004) found that the adoption of ISO 14001 facilitated the companies by addressing their issues in the corporate business environment, with respect to commercial and legal means. The EMS of ISO 14001 can be described as systematic approach for managing the organisational problem, considering the corporate environment.

This systematic approach is based on the process of identifying the potentials and opportunities of the company by the conversion of inputs or resources into the efficient process with reduction in wastes (Hillary, 1999). The cost saving has been a prominent benefit of ISO 14001 adoption in the companies, which is achieved with the removal of wastes. The researchers including Bansal and Bogner (2002) found that the reasons for adopting the ISO 14001 environmental management system are the economic competition and institutional pressure. Few studies indicated that the earlier adoption of standard was derived by lower competitiveness, commercial pressure, and regulation (Welch, Mori, and Aoyagi-Usui, 2002). According to these studies the companies were focusing on new environmental initiatives for investing their resources. The integration of ISO 14001 requires a commitment from the organisation, in order to achieve its successful implementation.

According Quazi and Wee (2005), the participation of top management in the process of ISO 14001 plays a significant role. Since, the integration of EMS in the company's processes

and activities depends on the measures taken by the top management; therefore a strong commitment is essential to ensure the implementation is successful. The researchers including De Medeiros and Da Silva (2004) conducted the studies that points out the support and commitment of top management for the integration of environmental system in the organisation determines the improvement in the organisation's regulation, resources allocation, and prevention from pollution. These key factors are important for the company and they can be achieved only with the involvement of leadership and top management in integration of EMS.

Different human activities could harm Mother Nature but Environmental Management System (EMS) plays an important role in protecting it. Different types of business activities are conducted by firms to achieve their corporate objectives such as manufacturing. But a negative impact occurs on the environment through these manufacturing processes. Here Environmental Management System (EMS) helps the organizations to achieve their core aims with minimum impact to the environment. The firms can play a vital role towards protection of world's environment by the application of Environmental Management System (EMS) in their facility (Gbedemah, F. S., 2004). In addition to reduction of environmental problems, an effective Environmental Management System (EMS) helps in cutting costs as well (Cheremisinoff, N.P., P. Rosenfeld and P.E. Rosenfeld, 2009). There are no boundaries of applying an Environmental Management System (EMS). All types of organizations could apply EMS regardless of their nature of business, size and scale. However, certification of ISO 14001 is often developed by large firms only. The standards required by ISO aren't able to meet in medium or small organizations due to certain issues. One of the issues could be unpaid and unlawful nature of ISO 14001 to obtain the standard certification. In view of all such scenarios, still many groups believe that they can have advantage over their competitors by gaining the certification of standard. This helps to gain instant external acknowledgement and various market profits for business (Jennings, R. Microsoft Access, 2010). Aside from this,

companies have improved their quality systems by linking and combining with ISO 14001 (Lawrence, L., Andrews, D., Ralph, B., and France, C., 2002). Application of ISO 14001 in a particular firm could help in enhancing their skills, communication channels, attitude as well as knowledge (Rondinelli, D., and Vastag, G., 2000). Developing Environmental Management System (EMS) in any organization helps to boost up confidence level employees and management, as it provides a new reason of relationship and interaction (Puvanasvaran, A. P., Tian, R. K. S., and Muhamad, M. R., 2011). Certain firms obtain Environmental Management System to build a better image. Adopting Environmental Management System helps organizations in attracting investors because of trust development, enhanced reputation and competitive edge, thus the return on investment rate increases as compared to the competitor (Bansal, P., and Bogner, 2002). Business benefits are not the only aims of developing Environmental Management System. Different fears and challenges appear, mainly related to the environmental problems, on development of technologies by the firms. The standard methods and techniques such as those provided by EMS force the government and private sectors or even individuals to minimize different environmental damages.

Successful application of sustainability practices can be done by using two types of ISO Standards: Guidance standards and Certifiable standards. Many adapting organizations have taken the benefit from different certifiable ISO standards, such as:

ISO Certifiable standards

ISO 9001:2008 Quality Management System (QMS) – emphases on enhancing customer satisfaction, continual improvement and disciplined problem solving; lets upper management to accelerate improvement by matching business performance outcomes with quality management system outcomes.

ISO 14001:2004 Environmental Management System (EMS) – emphases on Natural Resources, Saving of Energy and Pollution Avoidance; promotes Environmental Sustainability and Frequent Progress.

OHSAS 18001:2007 Occupational Health and Safety Management System (OHSMS) – emphases on Safety danger and Work-related Health assessments related to hazards with discussion and contribution to drive Frequent Progress.

ISO Guidance standards

ISO has developed many guidance standards, a number of which have been in collaboration with its partner, International Electro technical Commission (IEC). Sustainability can be successfully applied using guidance standards.

ISO 9004:2009 – Managing for the continual success of a company: An organization can progress continuously towards achievement sustained success using quality management approach. This standard can be used by any firm without any condition of type, activity and size.

ISO 31000:2009 – Risk management: Recommendations and ideologies minimize risks related to safety, financial and environmental risks. Threat is all about ambiguity and the impact of ambiguity in obtaining set goals related to environment and safety.

ISO/IEC 31010:2009 – Risk management: Companies use threat valuation methods to control threats related to technological, environmental, societal, security and safety results; political, traditional and social status impacts; and monetary, commercial and economic disciplines. This standard helps to choose from different options and to handle specific threats.

ISO 26000:2010 – Guidance on Social Responsibility: During all the decision makings related to the environmental and societal matters, this standard focuses that a clear ethical behaviour is being considered. This standard provides guidance to firms of all sizes with

regards to principles, concepts and practices related to social responsibility and it helps in sustainable development on safety and health and international norms of performance.

Environmental Management System (EMS)

A very significant component in understanding environmental management is to recognise what the environment actually is (Hewitt and Gary, 1998). ISO defined the environment as the surroundings in which a company operates, including land, water, air, natural resources, people, flora fauna and their relationship with each other (ISO, 1996). Environmental Management (EM) can be said to mean different thing to different individuals, however it was defined as the management of a company's or organization's influence on the environment (Hewitt and Gary, 1998). Therefore, Environmental Management (EM) is the method of reducing the environmental influence of a company or people's actions through the control of all features of their process that can become a reason or lead to an influence on the environment.

The ISO 14001 standard defines Environmental Management System (EMS) as "that portion of a complete management system which includes the organizational framework, scheduling responsibilities, actions, processes, procedures, practices and resources for implementing, developing, reviewing, achieving and sustaining the environmental program" (ISO, 1996). It can be said that Environmental Management System (EMS) is derived from the environmental program or policy of a company. A policy is a set of orders or standards that an organization or individual implements for a selected sequence of an activity (Hewitt and Gary, 1998). It can be documented and formal. According to these authors, Environmental policy is the documented and formal set of rules and objectives of an enterprise with respect to the environment. It assists as the guiding document for environmental progress and its obedience

is very significant to the success and integrity of the Environmental Management System (EMS). Below are the elements of an Environmental Management System (EMS).

According to ISO 14001 Environmental Management System (EMS) has four elements. It is similar to a sequence of, plan, do, check, and act. If the sequence of cycle is followed to continuously it leads to nonstop progress of the system. Figure 24 (appendix) shows the Environmental Management System (EMS) cycle which is an abstract explanation of the different elements. The design and application of an Environmental Management System (EMS) needs a significant time period and struggle therefore demanding the obligation of management of the company. Management needs to communicate their support to the system and highlight that they target to progress their environmental routine.

An inventory is then required to access how the company presently deals with environmental problems. This is the primary appraisal and it emphases on all components of which an Environmental Management System (EMS) consists in order to see the actions that have been supposed and with what outcomes. Some of the areas to be treated here according to ISO 14001 consist of environmental influence, use of resources such as, energy, water and raw materials, appropriate regulations, organizational culture and structures, marketing and products, communications and training, management and commands of events. Deficits will appear as the system is used and the holes that need to be occupied will become clear.

The 'Plan' Phase

This step is supportive in the construction of an environmental policy. It assists the track for future activity and communication of the company's environmental obligation and aims. Environmental policy deals with: the scale, nature, and environmental influences of the company's actions, services or products; an assurance to frequent progress and pollution avoidance; a promise to act in accordance with related environmental regulations and principles, and other needs to which a company contributes; offers structure for reviewing

and setting environmental goals and aims; it is recognised, applied and maintained; it is communicated to all workforces and; it is available to the general community (ISO, 1996).

Environmental policy and scheduling begins with the evaluation of the environmental aspects and influences of the organization's services, products and actions (Kuhre, 1995). Aspects can be bad or good and can be said to be the potential effects. They become influences when they clear themselves and lead to changes on the landscape. Features can be indirect or direct resulting correspondingly from the organization's actions or from those of supplies.

A firm's environmental policy identifies how the aims and goals will be met by specifying the activities, resources, time frames and procedures responsibilities. These should be entirely incorporated in and corresponded with other extents of management and new frameworks can be acknowledged if likely to allow total environmental management.

The 'Do' Phase

A company based chart is defined and laid down at this step in order to drive in the environmental management in the company. Individual characters and duties are defined in addition to the distribution of resources like finance, technology, skills and personnel. The next stage is the identification of training requirements to build environmental capability and awareness. This can be done from new employees' recruited or existing staff. Communication, both externally and internally is relevant for an Environmental Management System (EMS) application since it supports to keep people knowledgeable. Communication is the best if it is bottom-up and top-down. It leads attention to the circumstance that environmental management comprises of more than a system with instructions, procedures, performance checks, requirements and indicators, laid down in manuals, reports, schemes and strategies (ISO, 1996). Documentation is very significant in any Environmental Management System (EMS) since it points to implementation and execution. Document control involves designation of someone

to be answerable for change and modification. Processes and actions must be organised to make sure that policy addressing the most important environmental characteristics is carried out.

The 'Check' Phase

This step targets at checking how an organization executes in terms of environmental management and if necessary, to analyse the reasons of issues, recognise potentials for improvement and take subsequent activity to understand these variations (ISO, 1996). Processes and actions of important environmental influences are to be observed, their actions measured and compared with the goals and aims, and compliance with rules evaluated.

The 'Act' Phase

Management review here intends at ensuring that the Environmental Management System (EMS) continues to produce the anticipated effects as defined in the policy. Apart from the evidence derived from audits, other internal reports on incidents and performance, external reports on environmental changes and regulatory, and recommendations for improvement received from external and internal sources can play a character for the firm to act upon. The procedure is then repeated all over again. The motivations or drivers to use Environmental Management System (EMS) are external and internal connecting different forces.

Globalization combined with industrial development with growing environmental deprivation has forced a number of organizations and firms to adopt new plans for sustainability. Business has also come to understand the enormity of their activities on the environment thus tries to implement new practices to win sustainable development policy. A number of forces are now being put on firms from several places of the World. The drivers of Environmental Management System (EMS) in organizations and industries can be assembled

into two but with five different performers. They comprises of; the organizations themselves, market, social as well as the community and public, financial firms and governing authorities.

Organizations

Environmental problems have become progressively significant in firm's actions since it performs as insurance for its shareholders both outside and within (Chan, 1998 in Zutshi and Sohal, 2002). Surveys revealed that most managers support environmental management albeit at various levels (Banerjee, 1998 & Suhal, 2002). These increasing awareness can be traced back to the 1972 Stockholm conference and moreover by the Rio conference where environmental problems were brought to the front head of the globe. Environmental problems and concerns have thus become very significant problems in company dealings today. Companies have come to understand the benefits they stand to gain by implementing Environmental Management System (EMS) therefore beginning it within themselves. Some of the drivers within companies comprise of staff, stakeholders, parent organization and management.

Market

The market these days, particularly in established countries is leading environmental stewardship among organizations as most consumers now demand environmental reliability before they buy products. Environmentally friendly products are being pursued and they are ready to pay extra for that product. Organizations that fail to notice such a call become uncompetitive, therefore inspiring them to implement new strategies towards the environment.

Social forces/Community

A community can call for the presence of good Environmental Management System (EMS) in an industry that they sense is a risk to the environment and their life. With growing consciousness on the environment these days, society is a force to figure out as far as the environment is concern particularly in the DCs. The actions of environmental non-governmental organizations (ENGOs) are also becoming very voiced and assist as a driver of Environmental Management System (EMS).

Financial

Financial organisations and insurance firms these days call for the presence of an operative management system like Environmental Management System (EMS) in order to attain and get protection. The presence of such a system assists as an encouragement for the company to be granted the insurance or loan. Some international financial institutions like the World Bank (WB) and the International Monetary Fund (IMF) are some of such firms. People as well request for the presence of such a system before they spend in such an enterprise. Financial law suits can also stress them to adopt Environmental Management System (EMS) or their actions.

Regulatory Institutions

Research has revealed that environmental enterprise by companies is motivated mainly by external forces, such as regulatory stresses. Government rules may assist in exercise as a motivation to both cleaner production and economic development, if they are used as a business strength to attain market benefits over opponents (Porter and van der Linde, 1995b). It has been studied in other literature however that neither negative nor positive impacts of environmental rule on competitiveness were easily noticeable" (Jaffe et al., 1995). Companies seek to take full advantage of resource efficiency in reaction to both market stresses and regulatory (Porter

and van der Linde, 1995b). Environmental rule and regulation has been a key aspect leading to organizations putting into consequent EM (Kolk, 2000). Some organizations with less environmental threats used to emphasis on compliance to rules and regulations but as EM progresses, organizations started to move beyond simple compliance. We now concentrated on methods and approaches to Environmental Management System (EMS).

Environmental tools presently in existence comprises of; rules and regulations, information for firms, information for customers, marketable permits, training, liabilities, incentives, disincentives, voluntary agreements, and strategies. These policies and instruments are mostly used in progressive countries. Table 27 below shows some environmental tools and policies in Europe.

Direct Regulation	**Economic**	**Compulsory Information**	**Voluntary Information**	**Voluntary Agreements**
Prohibitions	National Product taxes	Compulsory labeling	Test reports	Legally obliging agreements
Admission	National product charges	Declaration of contents	Eco-labeling	Self-commitments
Registration	Financial support	-	Quality marks	-
Information responsibilities	Deposits/Refunds	-	Trade marks	-
Product standards	Marketable permits	-	Life cycle assessment	-
Guarantee times	Public procurement	-	-	-
Obligations to take back	Leasing	-	-	-
Quotas of Returnable goods	Product liability	-	-	-
Minimum quotas of waste things	-	-	-	-
Recycling quotas	-	-	-	-
Advertising rules	-	-	-	-
Distribution limitations	-	-	-	-
User obligations	-	-	-	-
User benefits	-	-	-	-

Source: Adapted from Scholl (1996), in Kolk, (2000): Economics of EM

Table 27: Product Oriented Environmental Instruments/ Policies being used in Europe

Although much has been written on Environmental Management System (EMS) theory, yet there is insufficiency of analysis and documentation of particular cases of Environmental Management System (EMS) operation for implementation (Kirkland and Thompson, 1998). This has engaged developing countries at a difficulty. The experts of Environmental Management System (EMS) just presented the concept with no satisfactory distribution of those ideas to overall public. The deficiency of communication of the concepts in Environmental Management System (EMS) has a number of origins. One, the idea is new; second, the deficiency of communication can also be recognised to competition between its practitioners particularly those in the established countries, and lastly, the deficiency of leadership on the problem (Kirkland and Thompson, 1998).

The gap between Environmental Management System (EMS) practice and theory has been intensified by the domination of a structural methodology to EMSs (Kirkland and Thompson, 1998). Environmental Management System (EMS) effort has concentrated on the identification and explanation of elements and structure but has not addressed how to put Environmental Management System (EMS) components together. ISO 14000 offers a list of resources required in an Environmental Management System (EMS) comprising of general instructions for the combination of these resources but fails to define procedures that may be used to combine the elements into an effective total. Commitment by firms is an important element of the system but this has not been provided for in the ISO 14000 series (Kirkland and Thompson, 1998).

Some books tried to guide students through the procedure of developing Environmental Management System (EMS) but these are all done in line with established countries standards

and examples with little consideration being given to that of the Low developed countries (LDCs). Also, stress is exerted on large scale productions without corresponding structural variation to provide accommodations to medium and small scale ones which governs the industrial scene in Low developed countries (LDCs). There is the need to include and skilled local specialists from Low developed countries (LDCs) to achieve experience in existing practice of Environmental Management System (EMS) for implementation.

In the current century, the businesses and organizations believe that it is highly important to contribute towards defending the environment as part of their corporate social duties. The procedures related to enhancement and protection of environment need to be adopted by organizations in order to maintain good relations with suppliers, customers and vendors. In today's global economy, the survival of businesses lies in fulfilling their corporate social responsibilities and this need is growing with time. The organization's responsibilities towards protecting the world environment are possible with the help of Environment management system (EMS) (Gbedemah, 2004). An Environment management system (EMS) provides a structure to accomplish organization's environmental responsibilities successfully and also supports in implementing the environmental initiative into daily operations. A successful Environment management system (EMS) is serious to all types of business regardless of the scale, size and nature of processes.

It is highly significant automotive, manufacturing, service and retail organizations to have an Environment management system (EMS) in place in the global market. The environmental liabilities can be decreased and cost can be saved by contribution of a successful Environment management system (EMS) (Cheremisinoff, Rosenfeld and Rosenfeld, 2010). It also helps to make sure that vendors, employees and suppliers understand their part to contribute efficiently towards meeting the environmental goals and environmental strategy of the association (Visser, Matten, Tolhurst & Pohl, 2010).

Many organizations have implemented environmental dogmas and executed environmental audits or assessments in response to green marketing chances, legislative forces, ethical concerns, increased public stress and the commitment of central and local government (Netherwood, 1998). However, organizations still be encountered with a difficulty of finding a systematic approach of implementing obligations to environmental management within their current organizational framework. Practically, one instrument which organizations have usually accepted to expedite operation of environmental rule is an environmental management system (EMS).

According to the British Standards Institute (BSI) Environment management system (EMS) is defined as: the organizational framework, procedures, duties, processes, practices and resources for defining and executing environmental dogma (Netherwood, 1998). Similar descriptions are found in the EU eco-management and audit structure (EMAS) and ISO 14001. Environment management system (EMS) is not like legislation but a voluntary instrument which can support organizations to control environmental influence caused by their processes (Roberts, 1998).

Despite the fact that different organizations may establish diverse environment management system, typically there are some common stages which can be found in these EMSs. This reason is that most of them were established founded on the stages of quality management system such as ISO 9000 (Netherwood, 1998). Therefore, it is possible to generate a standard for environmental management systems in order to make sure a definite quality for the Environment management system (EMS), and to inspire firms to develop their environmental performance.

Numerous voluntary environmental management systems have been established in the last few years. The publication of standard-BS 7750- was done by BSI in March 1992 and was the first environmental management system standard on the globe. At the same time that BSI

began effort on BS 7750, the European Commission was setting out its suggestion for an eco-audit structure and it was from this suggestion that EMAS finally appeared in 1993. In the same year of EMAS publishing, the action linking to environmental management system standardization began on the global scenario. In October 1996, ISO 14000 series were published.

The standardized environmental management systems are voluntary and are established to be externally certified by nationwide accredited organisations, in a similar method as the quality standard ISO 9000. It is claimed that organizations which enrol with the structures, gaining the ISO14001 and EMAS certification, will practise additional value such as legal compliance and market benefits (Netherwood, 1998).

Environmental management systems are considerably associated to quality management systems. They are tools that offer a cyclical and systematic method of incessant progress. The cycle itself initiates with scheduling for a anticipated result (i.e. better environmental activities), applying that strategy, examination to see if the strategy is working and lastly improving and refining the strategy based on observations form the checking course as shown in Figure 25 (appendix). Reasonably then, if the unique result anticipated remains the same, a scheme of this nature will, by default, generate growths of progress that incessantly move toward the desire outcome (Roberts, 1998).

In order for an organization to accomplish environmental performance through a management loop as stated above, it will require to explain duties for environmental management, organise resources to make sure that activity is taken on environmental problems, train staff to become conscious of their environmental duties, observe environmental action and audit and review the system of attaining environmental progress. The basis of all of this action is an organizational obligation to incessant environmental progress and an

environmental strategy (Netherwood, 1998). The steps of a typical environmental management system are shown in Figure 26.

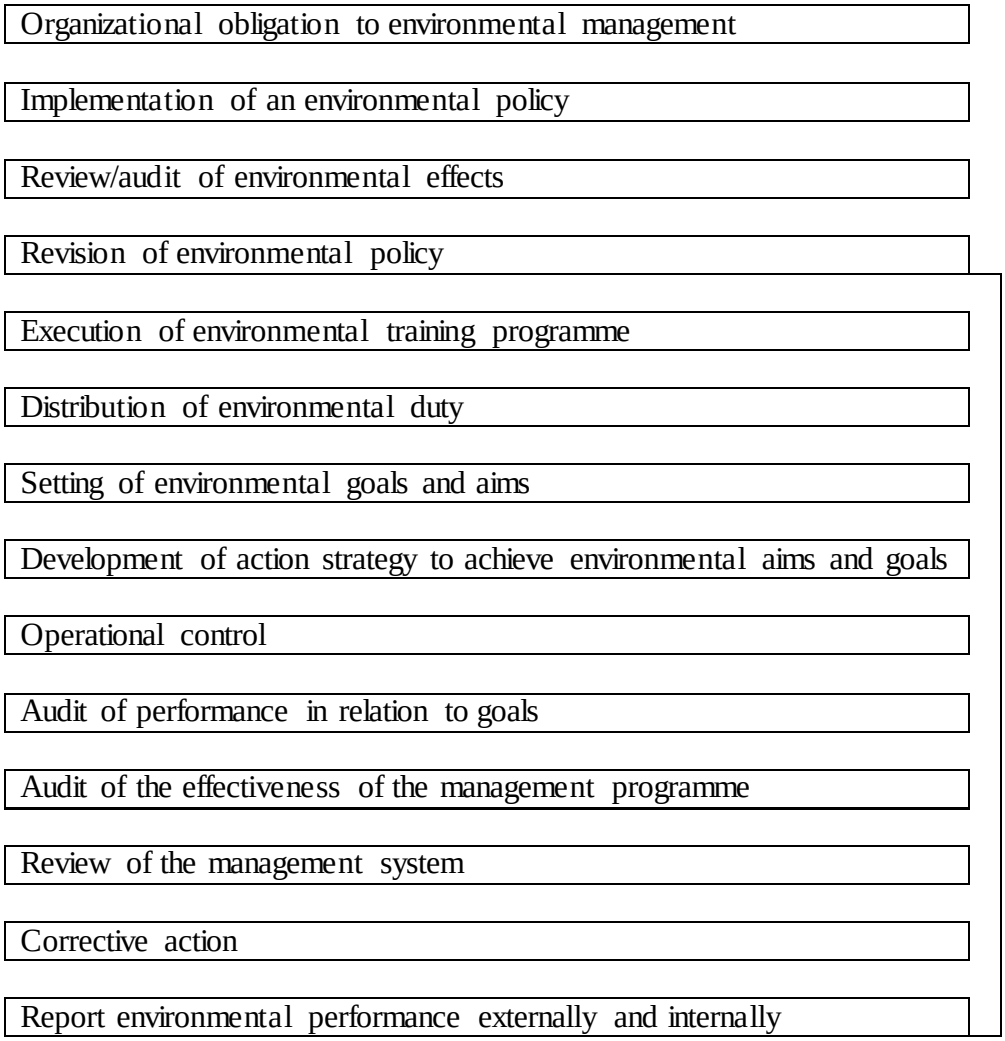


Figure 26: Stapes of a typical environmental management system

Source: Netherwood, 1998

Developing an Environment management system (EMS) within an organization will absolutely cost resources such as money, human resource, and time (Bansal, 2002). Such costs become clearer when an organization applies certification for their Environment management system (EMS). Furthermore, it has been proposed that Environment management system

(EMS) and the standards will just add extra layer of bureaucracy for the organization. So why do an organization require an environmental management system? The answer is generating a fruitful Environment management system (EMS) could bring more profits than the costs.

The benefits of improved environmental management can be divided into two comprehensive groups (Roberts, 1998). The first group addresses the circumstance that improved environmental management is good globally and an essential necessity of sustainability for our planet. This is because regarding that current business designs are essentially unsustainable, improved environmental management will help at least to move our business designs towards sustainability. The second group, which seems have a more direct association with organizations, addresses the circumstance that improved environmental management could assist the organization a lot. The table 28 lists some of the advantages.

1. Save company's costs.
2. Environmental targets not just set but met.
3. Procedures in place to ensure legislative compliance.
4. Improved public image and increased market opportunities.
5. Viewed more favourably by the regulator and the financial sector.

Table 28: Advantages of improved environmental management

Source: Roberts, 1998

A good Environment management system (EMS) will do two things. Firstly, it will permit the organization to expose methods in which the organization can decrease its environmental influences while at the same time decreasing costs or growing productivity. Secondly, it will coordinate the environmental actions of the organization to attain greater industrial productivity and efficiency.

The trade-offs handled in applying an Environment management system (EMS) have been discussed broadly. Components of an effective Environment management system (EMS) are expected to lead to better waste management, process amplification and source decreases, all of which are directly associated to lower costs. Supporters claim that the decrease in such costs often surpasses the costs of the Environment management system (EMS), leading to a 'win–win' scenario for the environment and organization. Good ecology is good economy in these scenario. Subjective proof is often quoted where an assignment or procedure reverted many times its cost while decreasing opposing environmental influences (N. Walley, and B. Whitehead., 1994). For example, large organizations with systems that elongated pre-date ISO 14001 contain Dow and 3M. 3M claims that its 4,700-plus schemes have abridged 807,000 tons of waste products and reduced costs by $827 million, since it thrown the program in 1975. Dow approximates that, in its home state of Michigan, the $3.1 million invested in its source decrease enterprise are creating $5.4 million in savings yearly thus far (Dow Advertorial, 2000).

However, such figures can be condemned as naive due to four causes. Firstly, the costs and assistances of an organization's total environmental struggle are rarely accumulated. Thus, remote schemes such as Dow's source decrease enterprise may be effective while the entire project may not be. Secondly, aiming to "win–win" results does not describe to a manager how the structures and systems should be built to yield these outcomes on a comprehensive and ongoing basis. It is one entity to capture the low hanging fruit once; it is something reasonably different to yield similar net outcomes annually. Thirdly, the opportunity of the environmental influence for a given plant or product is more subtle and often greater than just the waste and pollutants produced. When measured against a harder standard of total environmental influences, the achievements may not be as remarkable and

may be harder to recognise (S. Hart, 1997). Fourthly, engaging in a broad environmental management system will unsurprisingly uncover environmental threats.

If the firm is able to pay for cleaning up, an Environment management system (EMS) may generate financial problems rather than decreasing them. Thus, there has been additional stress recently on the one-time cost reserves from environmental management and minor on the worth of the continuing internal systems that are established through environmental management and the rewards from being approachable to external representatives. Convincingly, organizations may find that many environmental schemes, like other principal investments, do not return the expected achievements.

A good Environment management system (EMS) will, however, create schemes that can make strong improvements if continued, such as ongoing source decrease reserves. And although managers may not like the circumstance that their Environment management system (EMS) shows their organization's environmental influence to be greater than they expected, a good Environment management system (EMS) that frequently recognises new extents where influences had not been measured in the past can be appreciated in notifying management to possible problems.

ISO 14001

ISO 14000 is a sequence of international standards for environmental management. In order to satisfy the growing demand of creating international environmental management standard, International Organization for Standardization (ISO) began to establish it in 1993 and after approximately three year's growth, ISO published this sequence of standards (ISO 14004 and ISO 14001) in October 1996. It is the first such sequence of standards that permits firms from around the globe to track environmental efforts and measure actions according to globally accepted standards (Roberts, 1998).

The 14000series comprises of above a dozen discrete standards. But all these standards are fallen under two groups: guidance standards and specification standards (Krut, 1998). ISO requirement standards are strict documents: they define what an organization must do or not do in order to get accreditation. ISO 14001 is a design for the organization's environmental management system, and it is the only requirement standard in the ISO 14000 series. It explains how an organization might succeed and regulate its organizational system so that it continually improves, controls and processes the environmental characteristics of its processes (Krut, 1998).

ISO 14001 is projected to be appropriate to all sizes and types of industries and to accommodate varied social, cultural and geographical conditions (ISO, 1996). The general purpose of both ISO 14001 and the other principles in the 14000 series is to provision environmental protection and the anticipation of waste in synchronisation with socio-economic requirements. ISO 14001 applies to any company that desires to demonstrate and improve its environmental performance to others through the existence of an expert environmental management system (Roberts, 1998).

With the exception of demanding the assurance to continual development and assurance to conform to relevant regulation and legislation, ISO 14001 does not recommend environmental performance necessities. ISO 14001 identifies the necessities of the management system itself, which, if sustained correctly, will develop environmental performance by decreasing influences such as wastewater effluents and air emissions (Roberts, 1998).

The components of ISO 14001 are structured around five stages (Welford, 1998):

1. Environmental policy
2. Planning
3. Implementation and operation

4. Checking and corrective action

5. Management review

Each stage is concisely described below.

Environmental policy

Environmental policy is an official and recognised set of standards and objectives with respect to the environment. Fundamentally, the environmental program is the managing document for commercial environmental development and devotion to it is essential to the success and reliability of the whole Environment management system (EMS) (Roberts, 1998). A strategy must comprise of assurances to:

* Continual improvement;

* Prevention of pollution; and

* Conforming to related environmental regulation and other related needs.

Planning

The organization must then establish itself targets and objectives connecting to its three policy obligations and develop a strategy to meet these targets and objectives. Here the environmental purposes are the extensive objectives that your company establishes in order to develop environmental performance while environmental goals are established performance measurements that must be met to understand a given aim. All environmental aims must have at least one objective (generally more) and all objectives must relate directly to a definite aim (Roberts, 1998).

Implementation and operation

Having developed its strategy, the firm must then put in place the several components necessary for its effective application and operation.

Checking and corrective action

Having applied its strategy, the company must then check to see whether it has been successful in meeting its targets and objectives. If any have not been encountered, then remedial activity must be done. The whole management system must be occasionally checked to see that it meets the necessities of the standard (Welford, 1998).

Management review

Management must occasionally review the system to make sure its continuing suitability and effectiveness. Modifications are made to the system as and when essential. The figure 27 (appendix) shows the five stages of ISO 14001

ISO 14001 is a specification standard, i.e. it comprises of a set of needs for maintaining and establishing an environmental management system. By conforming with these needs a company can determine to the outside globe that is has an effective and appropriate management system in place. One method in which an organization can reveal that is by 'self-declaration'. This means that the organization checks its own compliance with the needs. However, an organization may feel that it carries more weight with the outside globe if its compliance with the needs of ISO 14001 is checked by an independent third party. This third checking is known as accreditation (Welford, 1998).

Up to the end of 2002, at least 49,462 ISO 14001 records had been delivered in 118 nations, a growth of 12,697 certificates (+ 34,54%) over the end of 2001 when the aggregate stood at 36,765 in 112 nations (ISO, 2004). Another review displays the growth of this number

is incessant in the next year. Up to December of 2003, there are 61,287 records had been delivered around the globe, a rise of 11,825 certificates can be observed in that year (ISO world, 2004).

The certification organisation in the UK is the United Kingdom Accreditation Service (UKAS), which is acknowledged by the UK government as the nationwide organisation for providing national accreditation of certification organisations and of sampling and measurement.

The International Organization for Standardization (ISO) established the ISO 14000 series of principles centred on the requirement articulated at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 for a better environmental class. The Geneva-based ISO had attained significant achievement in inspiring companies to scientifically report and develop product and service quality with the ISO 9000 series of principles. The UNCED proposed a comparable set of voluntary principles to boost up the systematic development of environmental quality. ISO 14001 was the first of the ISO 14000 series of standards which was issued in September 1996.

ISO 14001 positions the standards for an environmental management system (EMS). An environmental management system (EMS) prescribes needs for the company's responsibilities, techniques, structure, resources, procedures and practices, so that accountable business environmental management is established in the company. Presently there are numerous certifiable EMSs, including a European standard (EMAS), a worldwide standard (ISO 14001), a British standard (BS 7750), and numerous manufacturing firm particular standards such as Responsible Care established by the American Chemistry Council. ISO 14001 has the broadest industry and geographical coverage of any environmental management system (EMS) certification system. In general, the broader the implementation of the standard, the less rigorous and more flexible its needs. For example,

EMAS needs that the environmental programs and policy be made public, whereas ISO 14001 only needs revelation of the organization's environmental strategy. Thus, the broader the implementation of the standard, the less rigorous its needs.

An organization has a number of selections as it reaches the ISO 14001 final decision: it may select to accredit its environmental management system (EMS) through an independent representative; it may select to self-declare its obedience to ISO 14001; or, it may prefer and select only definite components of an ISO 14001 EMS. Like many ISO standards, ISO 14001 is voluntary—there are no legal needs to accreditation. Also, performance standards are not set by ISO 14001. Instead, ISO 14001 concentrations on management procedures rather than particular environmental results. If the organization encounters the management system needs dictated by the standard, then it can enlist its conformance with a third party. Either the whole firm or particular facilities, such as operating facilities or manufacturing plants, can be accredited.

An ISO 14001 certification is founded on the standards of continual development: scope, correct, implement, check, and plan. The first stage in setting up such a system needs that an organization recognise all its "environmental characteristics," which are described as connections among the environment and the organization, and the relevant environmental rules and regulations. The firm must inventory all the procedures and products that interface with the natural environment. In the second important stage, the organization establishes a strategy to alleviate its environmental influences, which are described as variations that arise because of the environmental characteristics. This needs that the organization establish an environmental program, delegate accountability for managing the environmental management system, set targets and outcomes, set up documentation procedures, and change its organizational systems and structures and so that the program can be imposed and the targets and goals met. The third stage needs that the organization incorporate its policy and

work towards its objectives and outcomes. That means that the environmental management system (EMS) must be transferred workforces empowered and trained, and processes documented. Once accomplished, the organization's actual environmental influences must be recognised and any non-conformance with the outcomes must be addressed. The fifth and final stage needs that the organization assess the environmental management system (EMS) through a management review procedure and make any changes considered compulsory. The organization now has a prospect to re-evaluate its structures and systems, as well as its outcomes, policy and objectives, thereby allowing continual development.

The steps required by an organization to acquire a successful Environment management system (EMS) can be set out by an internationally accepted standard ISO 14001 (Environmental Protection Agency, 2002). It provides assistance in incorporating the environmental objectives into the overall processes of an organization. Nearly 50 countries agreed to write ISO 14001 standards and more than 100 countries have recommended it as an international standard. The application of ISO 14001 is possible on all types of companies with different size and nature of processes. It is also applicable to organizations with varying risk profiles. It is easily adoptable by a complete company or by its specific functions (Woodside & Aurrichio, 2000). ISO 14001 is an organizational tool towards commercial environmental management (Puvanasvaran, Muhamad & Kerk, 2010). It also supports in dropping insurance and prosecution threats. Investor's confidence is built by ISO 14001 and outcome is extra ethical investment (Whitelaw, 2004).

ISO 14001 rules raised from appeals at the 1992 Rio Summit on the Environment for standardized procedures for implementing and developing environmental management practices. Working groups and technical committees composed of organization and government agents designated by countrywide standards relations permitted the standards in 1996 and continue to progress and update them.

ISO 14001 provides guidance on Environmental Management Systems (EMS) needs, centred on a simple plan, do and check structure. It concentrates on five main elements: the adoption and development of an environmental program to which senior managing staff is devoted a scheduling procedure that recognises all of the environmental characteristics of a facility's legal, operations and other desires, a set of noticeably well-defined targets and objectives for environmental development, and a set of environmental management plans a system of operation and implementation that comprises of a clear framework of accountability for environmental management, programs for competence, awareness and training among all workforces of the facility, a system of environmental management documentation, a documentation control system, external and internal communication of the Environmental Management Systems (EMS), processes for operational controls of environmental influences, and emergency readiness and reaction formation of a system of inspection and corrective activity that comprises of measurement and monitoring, for reporting non-conformance and for taking preventive and corrective activity, of record-keeping with respect to environmental management, and Environmental Management Systems (EMS) audits a management review procedure through which senior managing staff reconsiders the adequacy, suitability and effectiveness of the Environmental Management Systems (EMS) at suitable intervals to declare continuous development.

The main determination of the standard is to offer a consistent, documented and systematic technique that offers clear indication of the association among company's publicly specified environmental program and the incorporation of this policy in routine practice" (ISO, 1996). The standard identifies a nonstop, cyclical procedure comprising of five components as shown in Figure 3.1.

A major ancestor that directed ISO to establish standards can be outlined to the British Standards Institute (BSI) publication of the three portion quality series-BS 5750. The

accomplishment of this standard led to the implementation of BS 7750, the first formal standardized and systematic approach to environmental management (Hewitt and Gary, 1998). The BS 7750 was a voluntary management standard and it was issued in 1992. Countries started to develop their own environmental management system (EMS). An advantage began nationally within the EU and the EMAS was discussed with environmental groups, manufacturing firms and other interested shareholders within the environmental ground. It was created for businesses attentive in unpaid accreditation to an environmental management system (EMS) within the EU. The rise in national standards on the environment forced ISO to begin moves on EM standards. ISO boarded on generating standards that are not basically scientifically or technical grounded neither restricted to a particular region. The accomplishment of ISO 9000 directed to the creation of other standards. It is commonly supposed however that, the ISO 14000 series appeared as a consequence of both the UN Rio Summit on the environment held in 1992 and the Uruguay round of the General Agreement on Trade and Tariff (GATT) conferences (Hewitt and Gary, 1998).

There is mixed consequences with respect to ISO 14001 establishment throughout the globe. ISO 14001 accomplished success in Europe as a consequence of the establishment of other environmental management system (EMS) like EMAS and BS7750. These standards laid solid groundwork for the ultimate success of ISO 14001. Additionally, government organisations through the EU encouraged the circulation of environmental management system (EMS) in Europe, a phenomena deficient in most emerging countries of Latin America and Africa. What then are the causes for the achievement of ISO 14001 in Asia? One can say that, the size of organizations is the main contributor to the establishment of an actual environmental management system (EMS) here. Asia has huge MNCs as compared to Latin America and Africa. These huge corporations are insistent ISO 14001 down their supply chain. China is the foremost rising country with enormous certification to ISO 14001. Due to its huge population

many firms developed here. These organizations are affiliates with their parent enterprises in Europe. To do trade with these corporations, one has to be accredited to the standard. Brazil is also following the same stage as China in getting accredited, however, this is not the situation in other Low development countries (LDCs) as they are doing trade on a low level and are primarily import replacement production firms. It can be said that there is a positive affiliation between the level of trade establishment of a country and ISO 14001 accreditation. Established countries have incorporated environmental management system (EMS) as compared to Low development countries (LDCs).

Environmental management system (EMS) certification is not the environmental performance but the management system itself (Hewitt and Gary, 1998). An organization can manufacture environmental management system (EMS) but will not be accredited, however most organizations that establish environmental management system (EMS) do definitely certify it. Certification does not produce immediate outcomes (Hewitt and Gary, 1998). Certification of environmental management system (EMS) ISO 14001 has the following advantages to corporations. It;

- Demonstrates that its actions have been acknowledged and evaluated by a certified, independent third party agency. It demonstrations that an exterior 'stamp' of approval of the environmental management system (EMS) has been agreed and that, the firm's assurance to progress environmental performance is effective.
- Shows promise to the protection of the Environment. Perhaps, the maximum positive influence to the environment will be in the decrease of harmful waste. This would relate to decrease, recycling or reuse, all of which maximize regular assets. There is thus saving of other natural resources in the procedure.
- Provides new industries more chance with managers that the written certification essential to establish compliance with the rules and regulations will be stand by.

Overall, relationships with managers would increase after ISO 14001 accreditation. The organisation will know the accredited association attention for the atmosphere and has structures in place even before visiting the task. This encouraging relationship is exceptionally appreciated and would assist foster a healthier operational affiliation.

- Leads to long-term cost reserves, particularly in the region of environmental control and cleaning of occurrences. Accreditation will not abolish all clean-up cost, however, it should decrease the size and number of upcoming clean-ups (Kuhre, 1995). There would also be rise in competitive state of the organization. The costs would be moderately offset by augmented client moral, trust and satisfaction.
- Clearly, leads to avoidance of distress and probable death by workforces due to accidents. The costs accompanying with wounds will also be reduced. Systems that defend or reduce influences on the environment would in most circumstances also reduce influence on workforces. This connects to compact worker illness and injuries. A decrease in illness and injury will happen if the organization comprises of safety and health in wound of ISO 14001 certification struggles in calculation to EM.
- Rises public perception in the environment as these is growing days. If a production firm increases its EM program, it would certainly expand its community relationships as well. ISO 14000 processes are practical environmental activities. Any practical activity that an association does is respectable for the environment and could be transferred to the public since it is a positive scheme. If the public is conscious of these endeavours, their confidence in the company will be improved.
- Generates client satisfaction and trust. Once a company has the ISO 14001 accreditation, the client feel more protected that the environment is being accommodated for. Industries that attain the accreditation would be able to rise the market share of their products since most clients are environmentally aware these

exclusively in progressive industrialized nations. Accreditation is a bit more tangible than the lip service provided in many circumstances. ISO 14001 offers reasonable advantage to business.

- It levels the playing ground of global trade getting more participants to the scenario. These means enterprises accredited to ISO 14001 have market access all over the globe. Additionally, employment would be produced in the home nation thereby decreasing unemployment and ultimately poverty. Producing employment however does not mean poverty decrease as public have been working in production firms but are less rewarded thus poor.
- Insurance firms these days find it easier handling business with organizations that have effective environmental management system (EMS) like ISO 14001 as they view such an organization as having restricted accountability. Stakeholders these days also try to participate for investment in environment friendly corporations.
- The standard also offers an effective means of scientific growth as well as its transfer to other areas of the manufacturing firm or the organization.

Supporters of ISO 14000 assert that a global standard supports companies to complement and streamline their environmental management performances in a comprehensible structure and thereby decrease the necessity for multiple requirements, permits, and registrations under different local or national rules and regulations (Cascio, 1994). A global standard makes it relaxed for organizations to grow voluntary EMSs and for stakeholders, government regulatory organisations, insurance corporations, and financial bodies to assess an organization's obligation to refining environmental performance and decreasing hazards (Donaldson, 1996). Supporters entitle that implementation of an ISO 14001-certified Environmental Management Systems (EMS) helps corporations decrease their environmental liabilities and incidents, rise competency of procedures by eliminating

waste from manufacturing and spreading procedures, raise alertness of environmental influences of processes among all workers, and create a solid appearance of business societal duty (IISD, 1996). Not like rule and regulation, ISO 14000's voluntary methodology gives corporations the suppleness to establish EMSs that are suitable to their characteristics, operations, levels of risk and location (Rondinelli and Vastag, 1996).

Other advocates state that in proposing exterior certification that an organization's Environmental Management Systems (EMS) follows to international principles of management through third party inspecting, ISO 14001 accreditation develops stakeholder confidence in an organization and provides it global competitive benefits over those that do not implement and confirm their EMSs (Kirkpatrick and Pouliot, 1996). The instructions' strong stress on pollution hindrance can save industries cash by refining competence and decreasing the costs of fines, materials, energy, and drawbacks. Accreditation can not only rise consideration to negative environmental influences but also spread accountability for keeping high environmental standards all over the company and, possibly, to contractors, suppliers and vendors.

As with any industry activity, implementing ISO 14001 brings profits and damage. The standard has been condemned by numerous organizations (Yiridoe et al, 2003). One of the main obstacles to development and certification of an effective environmental management system (EMS) is that, corporations become exposed to legitimate claims as they establish environmental management system (EMS). The growth of an environmental management system (EMS) generates accreditation on environmental actions and these papers can become a base for court activity against an industry that does not go according to its goals (Kolk, 2000). These court case issues can produce restraint on the progress of an environmental management system (EMS). The good side however is that, the standard does not indicate reporting of

environmental performance by organizations. Inspectors may have access to data on performance and can disclose such data out.

Another flaw of the standard is its stress on conformance as against routine. An industry encircles its own environmental targets and objectives for improvement. It can thus develop its environmental performance as little as much, as slow or as fast as it adores (Sadgrove, in Welford, 1998). Likewise, the goals set by an industry can be an environmental minimum effort rather than a concrete commitment to reducing environmental influence (Shayler et al, in Welford, 1998). The authors recognised that a self-regulated environmental management system (EMS) like ISO 14001 does not assure progress in performance.

Some MNCs appealed they have much more cultured system at home other than the pathetic ISO 14001 as such there is no requirement to officially state to ISO 14001 (Kolk, 2000). The system has also been condemned for not concentrating on inner mechanism. It has been said that it is incomplete in providing rules on evidence compulsory for external and internal determinations, the company of the information system, and how the scheme and its data should be checked". The condemnation goes further that, accreditation itself does not give assurance that, the management system encounters all necessities. For example, it fails to identify restrictions to resource or energy intake, performance stages and discharge stages other than those of country stages, which in low developed countries (LDCs) like Ghana are not complied and low due to pathetic implementation mechanisms. The system does not intend at defending the environment (Welford, 1998). Accreditation therefore does not essentially make an organization environmentally faultless or continuously refining performance but reasonably depends on the individuals who run it which is deficient in the Ghanaian scenario.

Another opponent of the system is the extraordinary cost necessary to get accredited. Not only the budget but the associated bureaucracy elaborate in its implementation and preparation. The annual auditing of accounts also advances to the budget. A number of man

hours are therefore consumed on the accreditation. These problems do not assist the medium and small scale enterprises in emerging nations to get the accreditation.

Opponents of ISO 14000 point out that it is not a solution for environmental management issues and interrogate its efficiency in moving companies in the direction of sustainable improvement. The most frequent perceived condemnation is that ISO 14001 accreditation does not measure the real environmental performance of a company or plant (Krut and Gleckman, 1998). The standards simply accept that a corporation that confirms its Environmental Management Systems (EMS) has a management system in place to transact efficiently with its environmental influences. Authorization indicates that corporations encounter regulatory commands and go outside legal necessities to accomplish nonstop environmental developments, but there is no method of externally authenticating that such developments really occur. The ISO 14001 recommendations merely assume that an effective implementation of a good environmental management systems will eliminate or reduce negative environmental influences and transfer a corporation toward improved environmental performance. Voluntary methodologies such as ISO 14000 often effect in emerging objectives and aims grounded on agreement within a corporation that may be sub-optimal and application often relies mainly on peer pressure and industry encouragements that may be unsuccessful (Wallace-Jones, 1998). Opponents point out that the costs of certifying, documenting, and developing EMSs may depress many medium and small-sized organizations from looking for accreditation (Carraro and Leveque, 1999). Conserving environmental management systems and refining performance can be negotiated because there is no establishment for de-certifying a corporation that converts lax in its environmental performances (Powers, 1995).

Lean Manufacturing System

A tool for procedure improvement that targets at minimizing waste and maximizing customer value is known as Lean (Miller, Pawloski & Stanridge, 2010). Lean assists in focusing on core techniques that affect the outcome to the client. Maximum value can be delivered to clients by focusing on continuous improvement of process management components through Lean system. A company's objectives can be accomplished via Lean with zero wastage and fewer resources. Lean does not concentrate independently on tasks, tools, structures, assets and technologies. Lean delivers the best value to client by working on process flow optimization across assets, functions, technologies and systems (Lean Enterprise Institute, 2009). Formerly, it was thought that lean philosophies are applicable in the producing firms only. But this isn't true anymore. Lean can be applicable effectively across all firms. The organization must implement lean as an important part of their business plan to gain its complete benefits (Turbide, 2005). This will have a positive influence on the total performance and will result in lean philosophies being applied steadily across all the tasks in the business.

In order to completely enjoy the benefits of Lean, it should be implemented as a way of doing business and as a way of thinking (Sarkar, 2007). The conceptual background of lean also has an incredible potential for growing top-line revenue rather than having cost decrease as a special focus of lean philosophy. The potential of lean increases by creating a sustainable differential value benefit for the creativity that deploys the perception in its entirety (Reidenbach & Goeke, 2006).

Lean Management is a management idea which involves a complete set of characteristics, tools and approaches that have one principal aim: to remove unwanted and generate value of processes and products. Lean here means use of a smaller amount of industrial resources if paralleled to regular conditions in which an organization functions. For example, in situation of mass manufacturing it may mean half of struggle of the individuals,

half of space in the plant, half of share, half of tools and half of time period essential to propose the product presented to the market which, as a consequence, is familiarized two times quicker. Moreover, it needs to retain considerably less than half of supplies and permits to make a broad range of products with no faults, confirming reasonable improvement (Schmidt J. G., Lyle D., 2010 And Kruczek M., Żebrucki Z., 2012). Therefore, implementation of management according to that conception targets at manufacturing terminated all actions which are not essential and implementing the essential actions fine in the first route, in such a method and in correct order that the order submitted by the client fits into a distribution many intervals faster, better, cheaper, more agreeably for the workers and, at the same time, growing effectiveness of the enterprise. The roots of the lean concept can be found in the Toyota Production System (TPS), which is deliberated to be the first lean manufacturing procedure ever produced. The basis of that perception is based on well-known and common management theories such as Total Quality Management (TQM), Just in Time (JIT), competency-based management and value-based management. The spirit of JIT technique is to supply resources and/or services accurately in the instant when they are necessary, in a reasonable residence and accurate quantity. The determination of JIT method is to make sure timeliness of supplies and production, at the same time maintaining losses at the lowermost possible level, which effects in development of quality of the product. That needs possession the storage allowances at the minimum, rapid recognition and elimination of errors and inadequate labour, materials and damaged components (Helmold M., 2011)

TQM is a difficult viewpoint which systemically involves issues connected to quality. Owing to uninterrupted association of all associates of a given culture in the procedure of development of quality of a product (service), their launching targets and actions for the business firm in such a technique as to meet the burdens and prospects of the client (Schmidt J. G., Lyle D., 2010 And Helmold M., 2011).

Competency-based management signifies one of the human resource trends and is a method to conduct personal strategy in order to offer practised employee which will simplify growth and implementation of goals anticipated by a company. Competency-based management eases changes and makes company more bendable in an ever-changing environment (Helmold M., 2011).

Value-based management is a perception associated to long-term methodology of an industry. That concept is established on an equilibrium between satisfied clients, staff and effective financial arrangements. In such configuration, an organization can be satisfy and successful its shareholders. Generating value is a complex procedure which needs the company to source its clients with a product which meets their burdens (Helmold M., 2011).

In order to set the course for progress of the institute, it is essential to recognise the lean philosophy. It should indicate a state where a competently working formation is also flexible (able to alter to the ever-changing environment) and agile (dynamically and rapidly reacting to changes).

A lean enterprise generates its industrial management order of procedures in such a technique that its clients, who order a particular invention, pay for its producing, not for running of a complex organizational frame work, plants, warehouses, means of bureaucracy, maintenance and transportation (Breyfogle F.W., 2012). A client's order generally goes through many sections, e.g. customer services, sales, supplies, planning, manufacturing, accounts and logistics, lastly making its method to the financial section which evaluates effectiveness of each of those sectors in order to transport the ordered product to the client. Each of those sections works according to the expected plan and implements its own goals and tasks. Individual rules and regulations applied to those sections make the order implementation time much lengthier, while it is the most significant procedure of those happening in an originality, as its competence is severely connected to the sum of incoming cash and to the degree of fulfilment of

accountabilities. In a way, summary of lean management needs addition of conducted actions and stations them towards a common goal which is co-operation of all sectors (Schmidt J. G., Lyle D., 2010 And Breyfogle F.W., 2012).

A MODEL FOR LEAN ENVIRONMENT MANAGEMENT INTEGRATION SYSTEM

Toyota Manufacturing System was the first one to derive Lean as an operating idea. This idea concentrates on decreasing the time span between the receipt and shipment of an order or the time required in the establishment of the service that fills the order. Lean plays a vital role in eliminating the waste from the processes, such as elimination of unnecessary steps from the process of production or service. The production time and cost is decreased with the help of Lean, resulting in a more responsive organization.

National Institute of Standards and Technology Manufacturing Extension Partnership (NIST MEP), The U.S. Department of Commerce, defines lean as "an organized methodology to recognize and remove waste (non-value added actions) via nonstop progress by flowing the product only when the customer needs it in search of excellence." National Institute of Standards and Technology Manufacturing Extension Partnership (NIST MEP) has also improved the lean idea to the environmental purpose with a program called Clean. These programs work separately from each other in some organizations.

The methods and tools used during the application of lean are referred to as building blocks of lean. Although these tools vary from organization to organization and from advisor to advisor, the most common ones can be labelled as follows:

Five S

The name of this technique is given after five words beginning with letter 'S' in Japanese. The main objective of this method is to bring cleanliness, neatness, tidiness and well-

orderedness to operations along with the strategy required to keep processes uniform and organized (Pojasek, R.B, 1999).

Visual Controls

This method helps everyone involved to understand the status of the operation at a glimpse by keeping all parts, tooling and other manufacturing actions very clear. Visual controls are generally connected to Five S.

Poka-Yoke

The exact meaning of Poka Yoke is mistake proofing. Using this super technique, the process designs can be improved to make them almost impossible for slicks, mistakes, leaks and other process issues to occur (Pojasek, R.B, 1999).

Cellular Design

This method refers to designing of facility layout according to optimum three operational systems. Information, parts, raw materials, work standards and tooling are stored where they are used and needed. The design model provides the best batch size and centres on one-piece flow. The batch size decreases, if this model isn't suitable.

Quick Changeover

This technique helps multiple products in small batches to be run on the same equipment by changing fixtures and tooling rapidly.

Pull Scheduling

This method allows the internal supplier to manufacture only when an external customer or internal supplier indicates a need for the service or part using a 'kanban' system. This practice produces what the consultants refer to as flow and contributes to just in time manufacturing. The recommended techniques and standardized work is done throughout.

Kaizen

This is a step based event where many minor amendments are made in a specific part of a procedure. A continuous improvement occurs through this method.

Five Lean Principles

Lean thinking exists in conceptual form which means that it is not a particular methodology to be applied to organizational processes (Pun et al., 2006) (Please see Table 3).

Level	***Aspects***	***Focus***	***Aspects***	***Adaptation demanded***
Philosophy	Conceptual	Permanent goals	**Conceptual ⇑ ⇓ Operational**	**Less ⇑**
System	Coordination aspects	How techniques are integrated, coherently with philosophy		
Techniques	Operational	How to put the philosophy in practice		

Table 3: Lean Thinking: Philosophy, system, and techniques (Source: Picchi, 2001)

However, the philosophy provides a unified focus for organizational operations, which is eliminating wasteful activities which do not deliver value to customers (Ross, 1998). Thus, lean system aims targeting the value adding actions in the processes (Kilpatrick, 2003). The philosophy is based on the techniques and tools that support organisations with the implementation of change that ensures the quality improvement (Bosch Rexroth Corporation, 2009). The Toyota production system is an example of lean system that implemented value stream mapping in its manufacturing plant. The lean thinking, when penetrates in the organisation, it extends from the supply chain of the company to all its' business units and processes strategically beyond the boundaries of organisation, thus ensuring innovation (see Figure 3 appendix). The value is organized by the system with a flow across various organisational unit/ departments and operations (Puvanasvaran, 2011b). The lean system throw outs the wastes from the organisational processes and provide a value stream that focuses on the organisational goals.

Thus, the lean system can be defined as the system that identifies and eliminates wastes through pull system and provides continuous improvement (Kilpatrick, 2003). The lean thinking, lean principles, and its techniques can be implemented in different sectors. The lean approach creates an automotive manufacturing environment, which requires adaptation of lean principles. The lean thinking and its principles can be implemented in the healthcare settings, retailing, and financial service providing organisations, defence, distributers, administration sector, and construction companies. It is very important for the companies understand the lean principle, in order to understand their practicality in their organisation or sector. The five lean principles that have been proposed by Womack, Jones and Roos (1990) and many other researchers after them including are

The Value Principle

According to Hines (2010), to achieve value is the starting point of the lean thinking. The valuable product can be defined as the product that customer demands. Thus, the production and services of the company can achieve valuable products that ensure the customer satisfaction by incorporating core business processes that adds value to product. The value adding process starts from the problem solving in the various tasks and action that includes designing, engineering, manufacturing, finishing and delivering goods. Problem solving as explained by Spear and Bowen (1999) and Spear (1999) starts from the identification of the potential hypothesis that the company tests for achieving the targets. The problem solving provides basis for the company's foundation.

The problem solving requires involvement of the managers and their positive role for encouraging employees for improvement in their work, tasks, and job responsibilities. As they employees are directly linked with the core business processes, they require sufficient support from their managers. The organisation should structure specific hypothesis for scientifically experimenting them on the individual objectives that leads to change in the company. In order to successfully incorporate the first principle of achieve value through problem solving MacDuffie's (1997; 1995) model of five steps can be used.

- Defining the potential problems and issues
- Analysis of the problem
- Selecting the potential solutions for the potential problems
- Testing and evaluating the selected solutions
- Routing the problem solving method

The Value Stream Principle

The value stream can be defined as the set of actions in the processes that adds value to the final product or service delivered to the customers (Lee, 2001). Thus, the value stream in any production process can be achieved by the effective incorporation of the problem solving tasks and performing specific actions to transform the task into valuable tasks for achieving the delivery of finished goods to the customer with enhanced value (Jones & Mitchell, 2006). This process requires coordination between the processes and problem solving method to achieve flow. This involves the collaboration of information and actions to ensure the completion of tasks with improvement. The value stream ensures standardization that also minimizes the variance and errors in the processes that help improving the quality of the product or service, with least losses or wastes.

Achieving Flow Principle

After defining the value and valuable stream the company requires mapping the resources and process in such a way that it generates flow in organisational operations. The enterprises can add flow in their processes with the integration of lean system that eliminates wastes to achieve flow in the functioning (Morgan & Liker, 2006). Thus, this principle requires that the company finds out the value creating steps for the flow.

The Pull operation Principle

The pull system of the lean think approach is process of pulling out the wastes out of the potential processes. Thus, pulling out the wasteful actions in the individual processes, wasteful use of resources, and achieving the customer demand with quality production. This process may focus on eliminating the nine wastes described by El-Sharief (2013) and Peash,

M. A. H. (2012) as waiting time, over-production, over-processing, transportation, motion, inventory, correction, and material and human resources.

Achieving Perfection Principle

The perfection is achieved by incorporating all the lean principles together, by defining the value or problem solving method, value stream or valuable actions, ensuring flow, integrating pull system, and achieving standardization (Picchi, Augusto, and Granja, 2004). The continuous integration of the four lean principles can ensure the perfection through continuous improvement. Since, the business environment is constantly changing; customer demands are rapidly changing, and the competitiveness is increasing the companies need to focus on improving constantly by implementing the first four principles and achieves the fifth principle.

Traditional Lean Principles

Previously, the vision of Lean was explained to World by a book named Lean Thinking (James P. Womack and Daniel T. Jones, 1996). Lean thinking was briefly described in five principles according to the author, i.e. specifically state value by a particular product, recognize the value stream for each product, create value flow without breaks, let the client pull value from the manufacturer and follow perfection.

The out-dated lean method is too disorganized, too short period in nature and with minute concentration on the parts required to make it sustainable in most groups. What is called for is a more a complete method.

Redefining the Lean Principles

Here the original principles are redefined into a new holistic structure after considering all the problems and concerns, the 8Ps of the lean business approach (see figure 11 appendix). This structure helps to reflect on how Lean is being deployed in a business at any step of Lean maturity and in any type of manufacturing firm or company. This framework helps to take the concentration away form point-kaizen action towards a more aligned system, a more human approach, a more reliant system and finally a more sustainable system. Lean has become an integral part of organization as its aggressively working towards a completely aligned tomorrow better than today approach. Thus Lean is becoming a traditional drive towards everyone in the industry.

At least to some extent, this new 8Ps system will overcome the deficiency of the typical Womack and Jones system as shown in table 4. The influence of a specific principle on existing issues is more as represented by darker shades in the table.

#	Problems	New Principle							
		Purpose	Process	People	Pull	Prevention	Partnering	Planet	Perfection
1	Fit in Different Industries	■	■		■		■	■	
2	Over focus on Shop Floor & Order Fulfilment		■				■		■
3	Overfocus on Physical Flows		■		■				
4	Too much focus on Cost Reduction & Not Value Creation	■	■						■
5	Lack of focus on Quality/Risk					■			
6	Lack of focus on Environment & CSR					■		■	
7	Poor link with Business Needs	■			■	■		■	■
8	Poor link with Strategy	■			■	■		■	■
9	Lack of focus on Leadership & Engagement			■	■		■		
10	Poor focus on Sustaining Change	■		■	■				■
11	Little Emphasis on Communication	■			■				
12	Little focus on Support HR Policies			■					
13	Little focus on Staff Development & Training			■	■				
14	Lack of focus on Resourcing			■					■
15	Lack of focus in Wider Supply Chain		■		■		■	■	

Table 4: Countering issues with the 8Ps of Lean Thinking

A Model for LEMIS

Formerly it was believed that the aims of Lean and Environment management system are different and hence cannot be integrated. Organizations implemented their Lean and

Environment management system initiatives separately with an understanding that these two target different types of wastages. The application of Lean comprises of actions for minimizing wastages and optimizing the process flow. While the objective of Environment management system is apply the methods and policies in order to decrease the opposing effect of environment. According to various researches, a solid relationship between lean and green activities of a company has been successfully proven. A common advantage of both the lean and green initiatives is to reduce waste. The environmental impact of waste described in Lean is of great importance. An organization's environmental performance is positively affected by implementation of lean principles. A universal approach should be adopted by an organization for implementation of Environment management system and the lean principles should be integrated in its environmental features. An effective relationship between lean and green activities should be developed by the organizations to minimize wastages and maximize client satisfaction (Mitsuishi, Ueda & Kimura, 2008).

The lean objectives and the environment policies must be clearly described for the integration of lean principles into to the ISO 14001 standards in a company. A well-defined structure must be in place setting out the responsibilities and roles of the workforces in different sections across different levels. The workforces should be fully aware of green and lean objectives and the means to achieve them. Thus this contributes in reducing the time and effort required in searching for solutions (Gordon, 2001).

Integrating Lean into the Environment Management System

There are many stages involved in the multi-layered process of integrating Lean into the Environment management system. The first stage is to list down all those areas of function in an organization which has the major environmental impact. The organization should make sure the Lean philosophies are integrated into those techniques that affect the

environmental performance. The next stage is to provide awareness amongst the workforces about the Lean and green struggles of the firm. The organization should clarify the importance of real environmental care to employees rather than just undertaking to apply an Environment management system for ISO certification. The Employees must be able to see and realize the idea of the firm in incorporating Lean principles into ISO 14001 standards. Complete awareness about the environmental impact and on the development of actions should be given to employees. The capability of resolving employee problem is another significant factor for deriving the system effectively (Puvanasvaran, Megat, Tang, Muhamad & Hamouda, 2008). Upper managing staff plays a vital role in such scenarios and have a solid affiliation with problem solving capability (Puvanasvaran, 2009). This is only possible when full participation and support of the workforces is received by a firm in applying Lean principles into the Environment management system (Gordon, 2001).

The organization should effort on integrating the Environment management system necessities into the current systems. There could be problems of absence of coordination between the environmental processes and other practices if a distinct process flow is created for Environment management system. The measures and procedures for achieving the objectives must be clearly communicated to the workforces at all levels. The application of procedures and processes designed to create an economically sustainable work environment and remove wastage leads to realize the effectiveness of integrating Lean and Environment management system (Puvanasvaran, Kerk and Muhamad, 2011).

Lean Manufacturing System Model

There are several researches done on Lean Manufacturing System Models over the past decade (Bergmiller, G.G., 2006). The most significant existing Lean System Model is concisely summarized below.

The practices of Japanese automotive manufacturers were compared by the study of Womack and Jones that established the Lean manufacturing structure against the performances of European and American industrialists. In 1990, a study on the Lean producers was done by them which took a more global fame and struggle was done to capture their common best performances. Five basic principles of Lean production were identified from these studies, namely; 1) value, 2) value stream, 3) flow, 4) pull, and 5) perfection. *Value* is defined by the client and is the services and/or products the client buys. Anything not openly contributing to the formation of value is measured as wastage in the Lean thinking. The *value stream* is a group of all the particular activities necessary to bring services or goods to the client. Plotting the value stream supports corporations recognize value added stages versus stages that are extravagant. The next phase is to create product and data *flow* freely from value added phase to value added phase once value added stages are recognized in the value stream and extravagant stages are targeted for decrease. Pull systems control each step of production by only permitting previous processes to create when the next process requires parts. This perfect Lean structure would then reach perfection when production makes the services or goods needed by clients at the very time they are required without producing wastages along the approach (Womack, J.P., and Jones, D.T., 1996).

A title of J4000 for a Lean Operations Best Practices Specification was released in 1999 by the Society of Automotive Engineers (SAE). The J4000 has a whole segment dedicated to Management Obligation and comprises the Lean best exercise types recognized in the Panizzolo study (Panizzolo, R., 1998). In specific, the J4000 point outs that leading Lean producers demonstrate management commitment best performs such as thought of Lean as a strategic instrument for effectiveness, creating Lean policy goals, aims and declarations, holding managers accountable for Lean outcomes, training staffs, and enriching devotion to Lean principles above short-term functioning intentions. The J4000 description is designed as

a survey corporations can use to benchmark their practice against the best performances of business's Lean producing leaders. The survey gathers information in four parts: Management/Belief, Process Flow, Vendors/Clients, data and People (SAE, 1999). Liker disclosed the fourteen principles that cover the Lean production approach after reviewing the Toyota production system for twenty years with complete contact to Toyota industrial units, employees and officials, both in the United States and Japan. His description of the Lean system is same as Womack's, but offers significantly more factors in all parts of the production system. A well-organized 4P model of Liker's Fourteen Points is described below (Liker, J., 2004):

Philosophy

Long-term Thinking

Process

Pull Systems, Non-stop Flow, Visual Controls, Uniform Jobs and Procedures, Proven Tools, Stress on Quality, Level Workload

People

Helping Associates and Vendors progress, Staffs Who Follow the Lean Idea, Leaders Who Live the Lean Thinking

Problem Solving

Constructing a Learning Industry-Continuously Refining, Compromise Decision Making and Rapid Application, Managerial staff Who Go See Issues Themselves

Shigeo Shingo, a leading professional in refining manufacturing operations, was named The Shingo Prize for Excellence in production (Shingo, 2003). Established in 1988, the Prize encourages consciousness of Lean production approaches and identifies firms in Mexico, Canada, and the U.S. attaining world-class position. The Shingo idea is that world-class industrial practice may be accomplished via concentrated progresses in essential business and production operations. The Prize Committee used the principles based on empowerment, production plans, leadership, organizational tradition, quality, client satisfaction, cost, delivery and system incorporation (Shingo, 2003). According to these sources it was concluded that the best descriptive approach for the measure of "Leanness" is the Shingo Prize model. This model shown in Figure 12 (appendix) distils the soul of the concepts of Liker, the SAE, and Womack and Jones into one comprehensive model. The Shingo Prize has an exclusive database of Lean corporations' practice to these principles based on a group of professional examiners.

CONCEPTUAL FRAMEWORK

One of the tools of system thinking is the Causal Loop Diagram (CLD). It provides assistance to see responses between the components of a structure and conceptualise issues. The components of a structure demonstrate causality by connecting to each other via arrows. The plus sign at the head of the arrow demonstrates that the factor after and factor before the arrow move in the same directions. The minus mark determines that the factor after and the factor before the arrow move in reverse directions. 'R' in the centre of the loop describes that the factors are emphasizing each other over time and moving in the direction of decrease or

direction of progress. ‘B’ in the centre of the loop indicates that the factors are balancing each other. A delay is described by a cut in an arrow.

The issue of environmental degradation is described by the Causal Loop Diagram (CLD) in figure 13 appendix. In industries especially the main reason of environmental issues is the low importance given to environmental management by authorities and industries. Only in Accra-Tema Metropolitan Area (ATMA) about 60% of all manufacturing firms are situated. Low EMS is due to no awareness in the country on Environment management system.

Low assurance to comply with regulation is due to low awareness. Because of no assurance there is no Environment management system and vice versa generating a re-enforcing loop. There is no guarantee to obey with regulation along with low execution leads to growth of environmental issues. There is an interruption here before the issues can get visible. Environment management system is said to raise sustainable expansion. There should be increase in Environment management system for sustainable expansion. In order to make sure compliance to environmental rules for sustainable growth the study with a structure of the certification procedure of organizations is provided in below Figure 14 appendix.

The leading variables in the system are request for EMS, EMS ISO 14001, obligation to compliance to regulation and sustainable progress. The research philosophies are built by these main relationships. It shows the different interlines between the different components within the system. The system is not limited to contain all the components but rather based on expectations that these are what motivate compliance and certification. Getting Environment management system ISO 14001 means obligation to act in accordance with regulation. Low environmental issues will result by a rise in commitment and its exercise. Current scenario of issues is due to its unavailability. If there is increase in implementation, manufacturing firms will be ready to put Environment management system into their processes which will lead to

sustainable growth. Some main factors that run Environment management system application like citizens awareness, certifiers accessibility and business or government encouragement through ENGOs which are deficient and leading to low demand for Environment management system thus low certification leading to environmental issues. Environmental management can be changed by the use of Environment management system facilitation.

All things being equal, if manufacturing firms and organizations get certified to ISO 14001 they will stand by cost management, regulation, and generate market entrance thereby making sure feasible business as well as sustainable growth. The major aim here is to use the system to act in accordance with market specifications, industrialized standards and international and constitutional rules and principles.

Figure 15 (appendix) shows means of building Environment management system expansion attractive for sustainable growth. The pink arrows are indicating means of resolving an issue. When organizations and buildings for Environment management system are established in the form of accreditation firms, the cost of certification will be reduced, struggle sets in and certifiers come into the schemes. The current scenario of low certification is due to strictness of certifiers, rise in time of certification and high budget requirement for certification. Information on the benefits and significance can be derived from Environment management system by generating awareness in both manufacturing firm and among citizens, within environmental and media associations and ENGOs. An Environment management system will be demanded from manufacturing firm. The process is assisted by the Certifiers as well.

Biological activity in water system and sustainability can be enhanced by increasing the use of Environment management system in grouping with other structures. Pollution can be reduced by a recommended waste treatment within manufacturing firm.

Similarities & Differences between Lean & Sustainability

According to the International Organization for Standardization (ISO), sustainability is the ability to improve and maintain performance in the long term. If looked from another angle, Sustainability is to maintain your business socially, economically and environmentally. Sustainability largely comprises of three elements: social responsibility, business sustainability (financial/ economic) and environmental sustainability. Sustainability simply links with an ideal balance of profitability, responsibility, social accountability and danger. A firm should follow certain management rules uncompromisingly to maintain and accomplish sustainability for nonstop success.

The International Organization for Standardization (ISO) has created standards for Environment, Quality and Safety, each of which details methodologies to attain long-term sustainable victory.

Sustainability is the ability to maintain your business environmentally, socially and financially (Table 5). To achieve whole sustainability, specialists must identify the tools that are available for operative application. Implementation of the nominated tools on continuous basis throughout the firm in persistent way will point any firm on a sustainable track.

Connection of Sustainability and ISO Standard	
Sustainability Elements	**ISO Standard**
Business Sustainability	ISO 9001; ISO 31000; ISO 31010; ISO Guide 73
Environmental Sustainability	ISO 14001
Social Responsibility	(OH&S) ISO 26000; OHSAS 18001

Table 5: Connection of Sustainability and ISO Standard

The concept of sustainability can be understood by considering lean stretched to a much wider aim. Sustainability is easy to understand for those firms which are already familiar with lean. The lean executes when the teams and individuals throughout an organization start asking questions like, "How does this add worth to the client?" and "How can we do this better?" Sustainability works alike but the difference is the criteria of decision making. Sustainability stresses on three bottom lines, people, planet and profitability rather than stressing on the economic client. It focuses on life for the longer term. There is a connection between Sustainability and Lean (Table 6).

LEAN	**SUSTAINABILITY**
Long term approach- create worth for community, individuals, as well as finance and environment	Spend in long term- consider community, individuals, finance and environment
Produce the correct process to create the exact result	Make sure the bionetwork is in equilibrium, if essential, interfere in system
Continuously creating complications visible a resolving root ground drivers industrial learning	Be apparent and reflect the whole system vs. treating indications
Reduce or remove waste of any type	Producing waste damages something else in the system
Add significance by developing associates and individuals	Spend on people- consider shareholders including your associates, staff and vendors

Table 6: There is a connection between Sustainability and Lean

There are many definitions of sustainable growth and all the experts say nearly same as noticed by the World Commission on Environment and Development in 1987, according to which it is mostly referred to as Brundtland report for the commission's chair. Sustainable development is a development that meets the necessities of the current without bargaining the capability of upcoming generations to meet their own necessities. The dimensions of sustainability are financial, environmental and societal, named it three pillars. These pillars can be illustrated as three overlapping ellipses or rings to show that they can be mutually strengthening but are not mutually special (Figure 16 appendix).

Miscellaneous and complex problems, such as environmental management, biodiversity, land usage, freshwater, oceans, forests, renewable and reutilizing energy are covered by sustainability. In these circumstances, it may be better to go for sustainability in the situation of the triple bottom line of planet, profit and people (3Ps). An internet research explained that some sites correlate 3Ps to corporate social responsibility (CSR) while some uses in the perspective of sustainability. It was noticed that CSR, also called responsible business, corporate citizenship, corporate duty, corporate societal performance or sustainable responsible business (SRB) is a form of corporate self-regulation incorporated into a business model. Preferably, corporate social responsibility (CSR) program would work as a self-regulating, built-in mechanism whereby business would observe and make sure their devotion to ethical standards, law and international norms. The beginning of 21st century sees the arrival of another imperious modern production planning namely Green Production, which incorporates all problems linked to manufacturing with ultimate result of decreasing and reducing resource consumption and environmental influence during a product life cycle inclusive of combination, shipping, designing, packing, processing and the use of products in distinct or nonstop production firms (Tan and Zailani, 2009; Tan et al. 2002). Green production is an on-going method of frequently improving manufacturing procedures with a definitive

objective of sustainability and it is a technique with sustainability as the final albeit distant aim (Guerry and Boots, 2012).

A complete system philosophy is used by lean systems in order to pull together best practices perceptions and create an effective process. Total Quality Management (TQM), Just-in-Time (JIT), supply chain management, resource scheduling and continuous improvement are included in these models (Oduoza, 2008). There will certainly be an environmental sustainability component, when Lean grows and latest manufacturing models that go beyond Lean arise (Found, 2009). Theoretically, the terminology of green production often used synonymously with the perception of sustainability.

There is a great stress on organizations to verify their environmental identifications. Currently, business decisions are arising by taking win-win method of green considerations (Simons and Mason, 2003). The benefits of environment and finance in companies are the most convincing causes of developing lean to go green according to recent surveys and academic research (Ravet, 2011). Lean and green are challenging the current utilization of resources and supporting initiatives designed to do more with less and both concepts have a great deal in common (Simons and Mason, 2003). Green and lean have a combined concentration on wastage drop and are often seen as compatible advantages (Mollenkopf et al., 2010; Ravet, 2011). When green and lean are applied together rather than individually, a more positive and vital effect on measures of operational performance is detected (Miller et al. 2010). Fortunately, the environment gets benefits through lean plans without a need of separate concentration on environmental deliberations or the requirement of special environmental toolkits (Kidwell, 2006).

Environmental agencies have opportunities open according to US Environmental Protection Agency (EPA), while organizations are trying to invest and initiate lean to work as partner with lean enhancers for more improvement of environmental welfares related to Lean

(Found, 2009). Currently untouched opportunities for the lean experts are environmental wastages, such as excess water or energy use, poisonous waste or solid waste (Kidwell, 2006). Important green lean rehearsal bundles are required to be discussed, identified and analysed in order to encourage the organization towards green lean application. This gives a guidance to make a suitable act for effective application of green lean system. The sustainable and successful application of green lean assumes great importance in this framework.

The use of Lean management is specifically and broadly in the automotive industry. Further growth of lean values is connected with sustainable development. There are certain problems of combining sustainability and lean. Lean Production is described as business system for handling and organizing processes, product development, client relations and vendors that requires less space, less material, less human energy and less time to make products with fewer faults to precise client expectations, compared with the earlier system of bulk production.

The aim of Lean production is defined as to get the correct things to the correct place at the correct time, the first time, while reducing waste and being open to variation. The philosophies of Lean production allowed the corporation to minimize inventory, deliver on demand, level the management assembly, and maximize the use of multi-skilled workers and emphasis resources where they were needed. The summary of Lean production management is given in the form of ten points below:

- Do it correct the first time
- Eliminate pollution
- Reduce inventory
- Authorize employees
- Meet client desires
- Maximize flow

- Pull production from customer demand
- Create a philosophy of nonstop improvement
- Partner with vendors
- Design for quick exchange

Sustainable production can be defined as the making of manufactured products using the processes that are energy conservative, pollution less and natural resources and are financially safe and sound for end users, communities and employees. There are certain variations and similarities between sustainability and lean. It examines the regular allowance of the lean direction to sustainability. Sustainable production comprises of producing sustainable products and sustainable production of all products. Previously consists of producing energy efficiency, renewable energy, green structure and other social equity related and green products. Sustainable or green production is described as a philosophy to obtain technologies to transform materials without use of poisonous or non-renewable materials or release of greenhouse gases or generation of wastage. The term green is often used and can be exchanged with environmentally safe. The perspective of sustainability is the opposite of economical short term thought. Lean mostly focuses on cyclical thinking instead of linear, closed loop and result oriented thinking. It basically works to think into the depth of whole system, which helps experts to focus for long term unscheduled significances of their decision. The assumption of sustainability is that the resources are limited and therefore the resources should be reused again and again.

BENEFITS OF THE MODEL FOR SUSTAINABILITY OF ISO 14001 STANDARDS

The organizations have realized that real value can be obtained by gaining certification of ISO 14001 environmental management systems. The benefits of ISO 14001:2004 are as under:

- Management of environmental problems by applying suitable processes.
- A structure for frequent progress of environmental performance is provided in the organization.
- Advantage of recycling process is taken within the organization to decrease the cost of waste management.
- Potential for decreased community liability insurance rates.
- Reducing consumption of materials and energy and well usage of natural resources.
- All the workers and managerial staff are well aware of environmental protection.
- Growing competitiveness.
- Enhanced assessment of new clients.
- Improved proficiency of existing environmental safety procedures.
- Better commercial look.
- ISO 14001 standard has yielded numerous benefits in terms of improved financial and environmental performance.
- Assurance availability of a responsible environmental management.
- Identification as well as limitation of liability.
- Valid diligence along with an auditable paper trail with the help of which issues are mitigated and identified.
- Accompanying adherence to some other standards.
- Pro-activity that results in cost saving.
- Elaborative dedication to continual improvement.
- Improved efficiencies, alleviated operating costs, and ultimately, elevated profits.
- In addition to waste management and recycling programme adopted, some significant improvements in safety, record keeping and job-site organisation, are seen. These

advantages will be translated into cost improvements and great efficiency for long duration which, in turn, will be of great value for the services.

According to Hewitt and Gary (1998), the ISO 14001 EMS certification does not only focus on the environmental performance but, it targets the overall management system of the company. The certification may not generate the enhanced results instantly. However, there are many benefits that the company may achieve, along with the evaluation process, which is done by the independent third party. Following are the major benefits of adopting EMS, with the ISO 14001 system integration.

The organisations achieved the certification will be able to enhance their market share, since; the company can attract more customers, as the customers of industrial countries are informed and conscious about the environmental issues (Krut and Gleckman, 1998). The competitive edge can be achieved by the company considering the informed consumers. The certification will allow the effective strategic management that may help in technological development. The technological development will be transferred to other sectors, providing the advantages to the industry and country. According to Evangelinos and Halkos (2002), some companies can also gain greater market share by exploiting the environmental problems for strengthening their position in the market and then penetrate in the new market.

The cost reduction is the most prominent benefit of this certification, which is achieved through waste management. The energy saving and the efforts of human resources also reduces the financial pressure on the company. The material consumption associated with the production is also reduced, which results in efficient supply chain and cost saving regulation (Rondinelli and Vastag, 2000). The efficient supply chain does not only means the cost effectiveness but, the improvement in meeting customer demands and thus, accelerating competitiveness in the market.

According to Rondinelli and Vastag (2000), the certification of ISO 14001 and its compliance can substantially enhance the managerial and operational systems of the company. Thus, the ISO 14001 boosts the economic position of the company, by enhancing its environmental performance,

Del Brio and Junquera (2004) highlighted the competitive advantage that the companies can achieve with the implementation of ISO 14001 standards, as it helps the companies in achieving control over its structure, using the ISO 14001 tools. Other advantages that can be considered as competitive advantage for company in the corporate business environment, as elaborated by Poksinska et al. (2005) includes; the improved corporate image, increase in marketing advantages, reduction in pressure for the customer demand, and improved relationships with other companies.

It is the flexibility of ISO 14001 systems that has gained the attention of many government officials, who seek the solution for the environmental issues of Asian countries (Puvanasvaran, 2012b). The ISO 14001 can create effective low to tackle with environmental problems of the country. However, the organisations need to understand the ISO 14001 as a voluntary system, which is used as a tool to enhance the environmental performance of the organisation. Therefore, Sohal and Zutshi (2004c) suggest the system does not change the existing policies or regulations but addresses the environmental problems with guidance and flexibility.

The companies can also achieve the benefits of cultural and structural changes. The ISO 14001 introduces the culture of environmental responsibility and management. According to the standards of ISO 14001, EMS has four basic components. These components work in the cycle. These components are planning, doing, checking, and actions. If the company constantly performs the cycle, this may lead to continuous enhancement of the organisational system (see figure 6 & 7 Appendix). The need for continuous improvement demands the time

and effort of the leadership, which is linked with the strong commitment to the four components of EMS (Sohal and Zutshi, 2004b). Thus, the integration of ISO 14001 for the enhancement of EMS of the organisation requires the culture and structure that fully supports its objectives (Sohal and Zutshi, 2004c). The important factors in this regard are the times frames, actions, methods, and resources of the companies that require focus from the top management. The organisation may need restructuring and reforming its culture for the improvement of its resource utilization, cost efficiency, and effective processes (Sohal and Zutshi, 2005). The organisations structuring for the ISO 14001 standards may achieve the benefits of legitimacy, marketing, insurance and due diligence, cost saving, political benefits, legislative compliance, and human health (see figure 4 appendix).

CHAPTER 3: METHODOLOGY

A section on methodology is a vital component in a management science dissertation. Methodology relates to the selection and use of specific tools and strategies for data collection and analysis. The selection of methodologies should be related to the theoretical background defined formerly. The academic work which has been studied and reviewed reflects in the specific methodologies and is often deep-rooted within the specific trend and school of thoughts due to close association. Both data collection and analysis are encircled in some methodologies, such as ethnography, semiotic analysis and content analysis. While some methodologies either collection or analysis of data (although their difference is not clear)

- Data collection methodologies contain observation, questionnaires and interviews.
- Data analysis methodologies contain statistical analysis, semiotic analysis, discourse analysis and content analysis.

The methodology and its specific tool should be very clear before adopting as there are a number of them available for use. For example, interviews are mostly considered as open ended, semi structured or structured. The related studies as quoted in the literature review, which have used the same methodology, can be mentioned as well. As textual analysis is not a methodology but a way to focus. If texts are being focused then the type of textual analysis should be specified, such as, discourse analysis, content analysis or semiotic analysis.

Using selected methods with confidence and competence is a significant practical thought while decision making of methodology. A psychoanalytical method of textual analysis should not be selected without making sure that you and your supervisor is confident in handling it and that this method is acceptable and appropriate. The ideal case of choosing a method is to use the one which has already been used successfully. Further training and

advice can be taken from the experts using the chosen method on regular basis. Methodological handbooks should be consulted for assistance on pitfalls and problems related to your topic. A good practice of preparing a methodological section is to consult a number these. Additionally, a number of research papers associated with the topic should be utilized during the preparation of methodology.

A clear reason regarding selection of methodology for data collection and analysis should be defined in this section of methodology. While defining the cause, one should consider the limitations and advantages of the alternative methodological tools and techniques related to the topic employed by other associated studies.

If counting of data is possible then it is quantitative or else qualitative. Frequently one or the other type of data prevails in a study, in which case this may reflect the tradition or school of thought within which the study is outlined. However, quantitative and qualitative methods are not seen as mismatched within all academic research conducts: many studies (such as research into marketing) do effectively associate both methods (e.g. semiotic analysis and content analysis). If you are not including either qualitative or quantitative data, you need to clarify why you are doing so. How does your decision relate to the methods implemented in the literature you have assessed?

There is a connection between research design, research approach and research question. Approach is something more than the nature of data being used. It refers to the complete alignment of research and the sort of claims made for the study. Dissertations either comprise of qualitative or quantitative data, or a blend of both. The selection depends upon the capabilities, preferences and the suitability of specific approaches to the topic under discussion. The selection of data under discussion should be justifiable. In some cases, quantitative data is specifically useful when it is required to find out how common are the specific forms of behavior such as illegal drug use for a specific age class. Qualitative data is

specifically useful when you wish to find out why individuals involved in such behavior. Recalling, the research techniques components under use and the various types of studies done for other elements, will point out that there is an adequate opportunity to use the most comfortable techniques and approaches. These approaches and techniques need to be validated by citing of relevant literature.

In order to find out the measurable effects or social trends of specific policies, there is a requirement of undertaking quantitative data analysis and using large datasets and a need of implementing a realistic approach to the topic under study. The range of quantitative dissertations is closer to the lower end of the range of the approved lengths of the dissertations. For example, if the length of the dissertations is to be 20,000 to 25,000 words then the length of quantitative dissertation will be closer to the 20,000 words. They also comprises of figures and tables providing significant outcomes. The tables should be properly labelled and titled and that sources of your data must be recognized.

Choosing either quantitative or qualitative analysis will depend on different things:

- The chosen philosophical approach (constructionist, phenomenologist or realist).
- The abilities and skills with techniques of data assortment (if required) and analysis.
- Involvement in the problem or topic.
- The way research query being structured.

There are many techniques of combining quantitative and qualitative analysis and data. Two examples of such combination are given below:

Observing policy effects and social trends relates to quantitative type of analysis. A human touch can be given by making one or numerous conversations asking what these trends mean to individuals or how specific people experience procedures. Once quantitative analysis is complete, a segment of qualitative data should be included according to

assortment done. The outcomes of the qualitative data can be utilized in the discussion part so the design in the quantitative analysis could be understood.

An evaluative case study of a policy or procedure will lead to a specific concentration on case. The techniques are triangulated, i.e. collecting data in numerous dissimilar behaviors and some of the data may be quantitative. Each kind of data is analyzed and described and a thorough discussion is done to illustrate how each piece of analysis backs the overall scenario under process.

Primarily writing a theoretical dissertation will lead to a complete literature based dissertation. This is probably to be the methodology of theoretical examination: discussion and choice of descriptive material and theoretical material, in perspective, and thorough comparison of theories in terms of their applicability. Awareness on specific outlines of behaviour can be taken from certain useful theories and concepts. How valuable is the awareness of organized racism? Is neutrality in the media conceivable? How beneficial is subcultural theory for accepting effective societies? Here, the concentration of consideration is not so much to determine something about the social world, for example virtual societies, as to reach a conclusion about the worth of vital perceptions or theories in accepting that world. How the study is approached and how contrasting approaches are drawn upon requirements to be stated very evidently. A literature based or theoretical based study is not essentially easier than an empirical study, indeed, it may well be tougher. Recall that theoretical studies, such as data based studies, need to have their research scheme spelled out from the start.

Even an empirically concentrated dissertation could entirely be literature based. An assessment of a field of work may be chosen to conduct. It is definitely thinkable to create a dissertation based fully on review of literature because all dissertations contain a literature review. To apply on this, the literature needs to be reviewed from an unambiguous angle and

find out some themes to make the review distinctive. Practical debates may be explored in the chosen field across different countries or time periods.

RESEARCH DESIGN & METHOD

This study is based on the mixed research methodology for assessing the significance of lean system with the ISO 14001 standards for ensuring the improvement in the environmental performance of the company (Puvanasvaran et al., 2012). The mixed method uses both qualitative and quantitative data to conduct the data collection and analysis (Castro et al., 2010). The mixed methods are reliable as they provide information from both qualitative and quantitative resources. The mixed methods are also referred as the hybrid research design. In the mixed method qualitative approach helps the researcher in using the natural settings for gathering data (Creswell, 2013). According to Creswell (2013), statistical tools are used to analyze the quantitative data. The quantitative results and findings can be validated, which are achieved using the statistical tools. Thus, the researcher will focus on achieving the qualitative and quantitative data, with respect to integration of ISO 14001 EMS with lean principles.

The efficiency of the research study can be determined by one of the core features, i.e. the research design. The analysis and results of data collected are wasted if the technique applied does not meet the requirements of the goals. A joint scheme of Quantitative and Qualitative research design would be utilized. The survey form will subsidize to the quantitative part of the study while the review of existing literature will provide a significant addition to the qualitative part of the study. The purpose of this research is to make sure external and internal validity of the research study with Cronbach's Alpha. The most appropriate tool used in the current study is the cross-sectional survey. Data of this study was collected from numerous ISO 14001 certified companies the World. Doing a survey by

distributing feedback forms to the respondents is the finest way to collect information for this research.

Research Philosophy

There are many diverse research philosophies available for adoption, three out of which are the most popular. These are interpretivism, post-positivism and positivism. Each is appropriate for a different nature of study, and each includes different suppositions about the world (ontology), how we know that the type of knowledge and world (epistemology). Table 7 gives detail of each philosophy and helps in deciding type of philosophy to be used according to the area of study.

PHILOSOPHY	**DESCRIPTION**	**TYPE OF DATA / DATA COLLECTION**	**ONTOLOGY**	**EPISTEMOLOGY**
Positivism	Targets to reflect scientific technique. Uses hypothesis testing, empirical evidence and	Quantitative data, surveys based on larger sample sets, scientific methods, numeric	The world is objective and do not depend on our subjective practice	The world is knowable, and this information is communicable between agents

	deductive reasoning.			
Interpretivism	Specifically in social sciences, a method to studying people that initiates from position that the subject matter is inherently dissimilar from non-human subjects.	Qualitative data, detailed inspections, small numbers of respondents, textual, subjective practice	The world is reliant on the many subjective practices of that world, and does not occur independentl y of practice	There is no opportunity of 'objective' information of the world; all we have are dissimilar practices.
Post-Positivism	Shares the key suppositions of positivism, but takes a more relativistic perception	Qualitative, quantitative, mixed techniques	There is an objective world, but understanding of it is clarified through the subjective involvement of characters. Awareness is by its nature fractional and assured by individual skill	

Table 7: Positivism, Interpretivism & Post-Positivism

The researcher's chosen research philosophy in this study is based on positivism and interpretivism (see figure 17 appendix). The research philosophy plays a vital role in the study

as it depends on the beliefs of the author that are incorporated in any research. The interpretivism is based on the interpretation of the researcher for the results of primary data, backed by the literature and past studies (Kelliher, 2011). This interpretation is the point-of-view, beliefs, and opinion of the researcher based on his knowledge and understanding of the theories and literature on the topic. The positivism related to the consistency of the collected data with the theories and literature. Since, the survey and interviews will be conducted, researcher aims to focus on the positivism, in order to support the new data with existing data.

Research Strategy

Yin (1994) formulates that there are 5 primary research oriented strategies for making data collection within the social sciences i.e. Survey, experiment, history, archival analysis, and case study. Moreover, Yin (1994) recommends that the below-mentioned conditions need to be taken into consideration to make any decision for any strategy

1. The category of research question posed
2. The degree of control that an investigator has over actual behavioural events
3. The degree of focus on contemporary as opposed to historical events

The table 8 shows these conditions and their link to the research strategy planned to be used.

Strategy	Form of research question	Requires control
Experiment	How ,Why	Yes	Yes
Survey	Who, what, where, how many, how much	No	Yes
Archival Analysis	Who, what, where, how many,	No	Yes/No

	how much		
History	How, Why	No	No
Case Study	How, Why	No	Yes

Table 8: Relevant situations for different research strategies (Source: Yin, 1994)

According to Saunders et al. (2000) the time aspect is an important factor that needs to be considered. Depending on what research approach is being conducted, it can be conducted as a cross-sectional study, displayed as a "snapshot" of data taken at a particular period of time. It can also be conducted as a longitudinal study, representing events over a given period of time.

DATA COLLECTION TOOLS AND PROCEDURES

According to Yin (1994) there are 6 different sources for making data collection He added that within a case study, it is not important to adhere to only one source.

Main information gathered for which the technique used for information selection is self-report surveys. The benefits of this technique are:

i) This technique is cost-effective as in comparison to other techniques like meeting.

ii) It is free from interviewer's prejudice.

iii) Participants get sufficient time to provide well believed out solutions.

iv) Huge examples can be used

The data collection method in this study is based in secondary as well as primary sources. The primary data will be collected through interviews and survey questionnaire. The secondary data will be collected from the online libraries including Sage, Phoenix, EBSCOHost, and Emerald. The secondary data collection includes selection of journal articles, academic articles, and books. The primary data will be collected to gain first-hand information

on the topic and secondary data will be used to analyse primary information. Since, secondary information is achieved from the past researches of scholars, professionals, and researchers of the field; it may provide an understanding of the significance of integrating ISO 14001, lean systems, environmental management system, as well as the implementation of these systems as combination in the organisational system. The secondary data to analyse the primary information attained from the interviews will be collected according to interview questions. The survey questionnaire data analysis will require comparing the results of past studies with the new information.

Questionnaire development

Referring to all the information collected such as books, literature review, etc. helps in the development of questionnaire. The questionnaire was divided into two sections for this study. Section A and Section B.

The query was developed by referring to previously conducted study in the first section of the questionnaire (Puvanasvaran, Megat, Tang and Muhamad, 2009; Boyer, 1996). It is used to recognize the ISO 14001 certifies organizations implemented the lean manufacture exercises. The questions were established from Malaysian Standard Environmental System (EMS) and Womack et al. (1990) necessity with assistance for use (ISO 14001:2004) in the second section of the questionnaire. The important and positive relationship of lean principles was measured with the ISO 14001 necessity in the second section of the questionnaire.

Pilot test

The validity of the questionnaire outcome and the aim of the research can be met by making sure the conduction of pilot test. This can be executed by sending the feedback forms to various ISO 14001 certified organizations around the globe. On visiting an organization

the questionnaire can be discussed thoroughly. The current questionnaire was modified by the researcher on getting an opinion. The whole time spent with a firm can also be identified from the pre-test.

Sending and receiving questionnaire

Primary sources were used to obtain data in this research study. The data achieved first hand by the researcher on the variables of concern for a particular purpose of this study refers to the primary data. The primary data is gained from the ISO 14001 certified businesses around the globe. The information gathering technique used is questionnaire.

A pre-formulated set of questions on paper in which respondents give their answers is known as a questionnaire. It is easy to get the data for the researchers by this method so it is preferred for current study. An additional benefit is that it is quite economical as compared to other methods. Close-ended kind of questions is inquired in this questionnaire. This is to ensure that the state and the answer are easy to be filled in by the respondents in the questionnaire. Likert scale queries will be used in the questionnaire. The method of distributing and collecting the inquiry forms takes around 8 weeks so the questionnaire should be distributed about two months earlier from the estimated time of collection.

The information was gained from ISO 14001 certified firms in the World. The list of the numerous ISO 14001 certified firms were collected from the Global Certified Database. A large number of questionnaires were posted by hand into the respondent. Numerous finished questionnaires were received after close follow up by email, telephone call and individually meet up with the respondent to hand in and collect the questionnaires. Transparent instructions were communicated to make sure that the individual chosen as respondents must be those involved with the ISO 14001 in their corresponding organization.

Sampling and Sample Size

The researcher will be using the convenience sampling strategy in order to conduct the primary data collection. Since, the number of participants for this study is very high, the researcher preferred the convenience sampling would help saving the time and cost for the data collection. The sample population of this study will be the managers of various organisation of UK; these include both large and small enterprises.

Data Analysis Method

Once the number of companies involved in the definite activity is recognized, the data analysis method can be decided. It has been estimated that a commercial spread sheet package such as MS Excel would be appropriate, although more refined analysis software such as SPSS is accessible within the university's IT centre should be required. The data analysis techniques to interpret the primary quantitative data will be done using SPSS tools. The primary qualitative data will be analysed using content analysis technique. The secondary qualitative data will be used in the discussion, while comparing the primary data or results of this study with the past literature and studies.

The data analysis technique can be seen in the data analysis flow chart in the figure 18 (appendix). From the information collection, goodness of information, feel for information, hypothesis testing to the clarification of the outcome, the flow and step can be seen. Numerous different reliability coefficients are available. The most common one used is Cronbach's alpha (Coakes, 2005). It is used to evaluate the inner constancy dependability of numerous scores or substances that the researcher needs to add together to get a summated or summary scale score (Morgan et al., 2004). The average correlation of things within a test if the things are standardized is the base of Cronbach's alpha (Coakes, 2005). In order to

provide good care for interior consistency dependability the alpha value should be usually greater than 0.70 and positive (Morgan, Leech, Gloeckner & Barret, 2004).

The first step of the questionnaire in the study, i.e. the standard deviation and mean were calculated with the marks of the eight variables. The value of the amount of implementation of lean production practices in the ISO 14001 certified organization is known as the mean value. The percentage of each variable is also calculated to support the value of the standard deviation and mean. The measurement of relationship between lean principles and the ISO 14001 requirement is done in the second part of the questionnaire through correlation, descriptive statistics and reliability coefficients. The relation of variables is measured by correlation. Information is selected for proof and outliers of a linear relationship before computing a correlation coefficient. A measurement of linear association is Pearson's correlation coefficient. Sprerman's rho will be used to calculate the correlation between the inconstant, if the relationships are not linear (Morgan et al., 2004). The relationship between two nonstop variables is described as a Pearson correlation coefficient. Phi-coefficient is a correlation between two categorical or dichotomous variables (Coakes, 2005). Correlation is calculated among each variable of the lean values that is value streams, value, perfection, pull and flow with the ISO 14001 need.

Correlation, Descriptive Statistics and Reliability Test are used for this research study. In order to interpret, analyse and record raw data the Statistical Package of The Social Science (SPSS version 19) is used. The information gains were display, compiled and summarized in a method that is easily understood.

Accounting for survey Errors

To make a survey's precision optimal, various forms of study errors have to be included. The most common errors that are created when using a study are included in this

research. I will explain this by giving some examples of how some typical created errors or errors are included. The public desirability prejudice makes participants respond to concerns by their desire, either conscious or subconscious, to gain reputation or appear in a different public role (Zikmund & Babin, 2007, p. 132). This prejudice is reduced by choosing for an unknown on the internet set of concerns.

Secondary data will be studied firstly through the university library using a variety of information sources such as Internet search engines, the OPAC system, bibliographic databases, and commercial and academic abstracts. To support the search, a table of fundamental terms will be built and the sources positioned will be interconnected with this. A secondary cross reference table will be established so that data can be viewed from various angles.

RESEARCH INSTRUMENT & PARTICIPANTS

Research Instrument

There are two instruments survey questionnaire and interview question will be used in this study. The survey questionnaire will comprise of 40 questions, which will be close ended. While, there will be ten interview questions that will be close ended.

Research Participants

There will be 100 participants for the survey questionnaire and 10 participants for the interviews. The informed consent will be provided to the participants before conducting the survey and interview. The researcher will inform the participants about the aims of this study. The researcher will try to develop trust amongst participants and ensure them that their confidentiality and identity will not be disclosed. The individuals who agreed to participate in

the study will be given the survey questionnaire and interviews will be conducted from the individuals who would be willing. The data collected for this research will be kept confidential.

DATA VALIDITY, RELIABILITY AND ETHICS

The study test should make sure to set out to test. The measures should also be able to accurately access the focal area. For an analysis, it is important to be legitimate and efficient. The topics inner credibility, exterior credibility, builds credibility and stability will be mentioned here. Internal validity: prevails to the level that an trial varying is truly accountable for any variance in the reliant varying (Zikmund & Babin, 2007, p. 211). The build of the 31 variables are depending on previously analysis. These factors have been confirmed to impact the highest possible operating of a popular. Because of this, the inner credibility is assured.

Validity

It dominates when assess successfully activities and in all loyalty represents a unique concept (Zikmund & Babin, 2007, p. 211). Most issues in the set of concerns are obtained from formerly research. These issues therefore already are verified to execute.

Reliability

An indicator of a measure's inner balance. Reliability is measured by Cronbach's α (Zikmund & Babin, 2007, p. 210). In this research, balance will also examined by using Cronbach's α. When converging several issues that assess the same different, Cronbach's α will be measured so inner balance will are available. The reliability of a study helps its results to be used repeatedly by other researchers at other times. In order to be informative, the study done should be both reliable and valid.

We analyzed 31 variables of our data construct by reliability testing (see Table 9). We found that the Cronbach's Alpha coefficient of 0.67 indicates the survey data is reliable (see Table 10).

		N	%
Cases	**Valid**	123	97.62
	Excluded	3	2.38
	Total	126	100.00

Table 9: Reliability Statistics

Cronbach's Alpha	N of Items
.67	31

Table 10: Case Processing Summary with reliability statistics

Ethical Considerations

Specifically, the dissertations related to human beings should make sure strong consideration of ethics. The steps should be taken to make sure that no one is harmed even in minor way. The steps required in covering the problems of data protection and data confidentiality should be very clear.

Related ethical problems should be discussed. The issues involved are highly dependent on the specific study so a distinctive guidance needs to be taken from supervisor here. The researcher aims to consider ethics as a main concern in the data collection, both primary and secondary. The researcher will ensure the rights of confidentiality of the

participants and information provided by them will be used in the study else kept private. The researcher ensures that there will be no biasness in the interpretation of results and selection of studies for analysis (Bryman, 2012). The informed consent is an important document, which will be provided to the participants and the survey or interview will be conducted only with the individuals willing to participate. Biasness and discrimination will also be avoided in the selection of participants, as the convenience sampling will be used, therefore, all individuals who are easily available, as well as will to contribute will be interviewed or provided survey questionnaire.

This section I am using the principles of Quality, Cost, Delivery, Accountability, Continuous Improvement (QCDAC) to identify the performance measurement for each integration of sub clauses of ISO 14001 with 9 Lean core elements.

Refer file "PMI_A1"

There are too many performance measurement needs to identify and I cannot finish and hope you can propose a good method to this part to solve the problem. I am worried the examiner will question me how I identify the performance measurement. So I apply this QCDAC method in all sub-clauses.

After this I jump to the next step is grouping the performance measurement into:

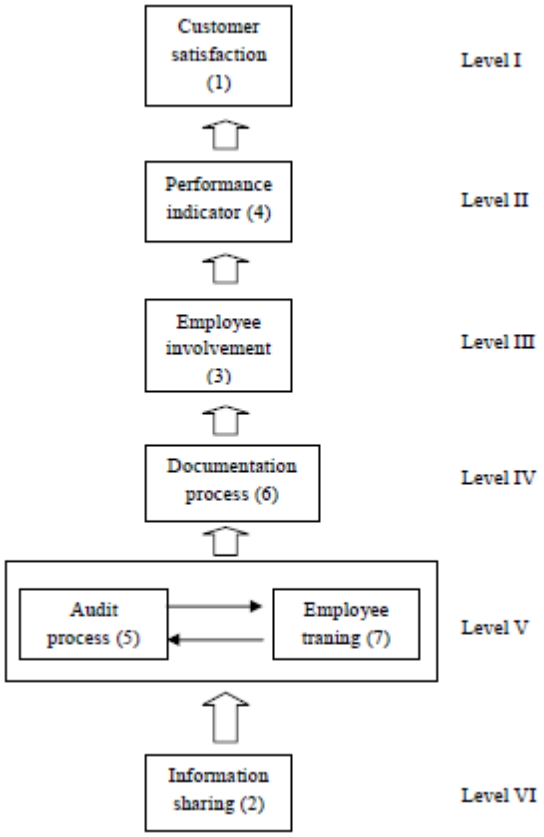
- Audit Process
- Customer Satisfaction
- Documentation Process
- Employee Involvement
- Employee Training
- Information Sharing
- Lead Time
- Performance Indicator

GROUPING OF PERFORMANCE MEASURES BASED ON CORE ELEMENTS OF 5 LEAN PRINCIPLES

1. VALUE

Enhanced product / service package value

Below figure shows the diagraph for ISM model- Value based on Enhanced product / service package value



Customer satisfaction

Customer satisfaction ratings, Feedback from stakeholders, Number of customer complaints,

Information sharing

Accessibility of Information, Level of Information Sharing, Level of use of the information gathered, Number of decisions employees may accomplish without supervisory control, Number of informative top management meetings with employees,

Employee involvement

Employee understanding and compliance level, Flexibility in decision making, Level of Employees Participating, Number of employees aware and in compliance, Number of employees understanding and compliance, Number of suggestions made by employees,

Performance indicator

Compliance to necessary legal requirements, List of aspect that affect the environment, Number of achieved objectives and targets, Number of achieved Programmes, Number of improvements, Sales volume,

Audit process

Number of audits, Number of audits completed versus planned,

Documentation process

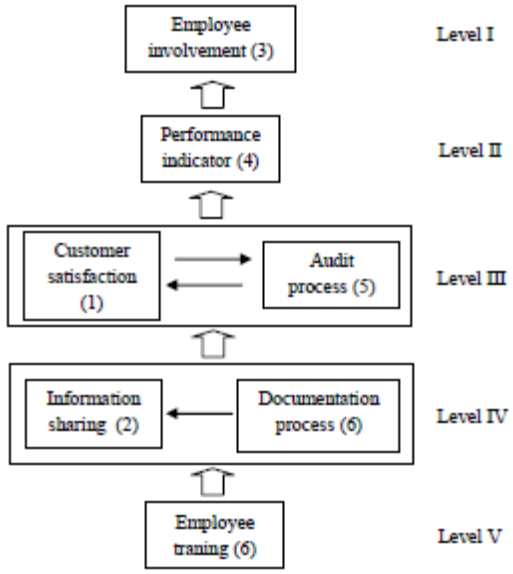
Level of understanding of the document by employees, Number of documented procedures, Number of emergency drills, Number of Environmental Documentation, Process Flexibility,

Employee training

Number of activities that enhance the environmental preservation, Number of employee education programs, Number of employees trained,

Time based competition

Below figure shows diagraph for ISM model- Value Stream based on High value adding in the extended enterprise



Customer satisfaction

Effectiveness of distribution planning schedule, Level of customer perceived value of product,

Information sharing

Level of Information Sharing, The frequency with which information is given to employees,

Employee involvement

Effectiveness in handling crises, Flexibility in decision making, Level of Employees Participating, Number of employees understanding and compliance, Number of ideas generated, Percentage of implementing the suggestion,

Performance indicator

Level of adjustments of the operations, Number of achieved objectives and targets, Number of achieved Programmes, Return on investment for environmental improvement project,

Audit process

Number of audits, Number of audits completed versus planned, Number of audits drills,

Documentation process

Improved handling of emergencies in future, Necessary licenses and compliance with all the regulations, Number of Calibration, Number of documents change, Number of documentation interchange between parties, Number of documented procedures, Process Flexibility, Quality of delivery documentation, Schedule of management of environmental aspects,

Employee training

Levels of knowledge obtained by training participants, Number of Tasks Employees can perform,

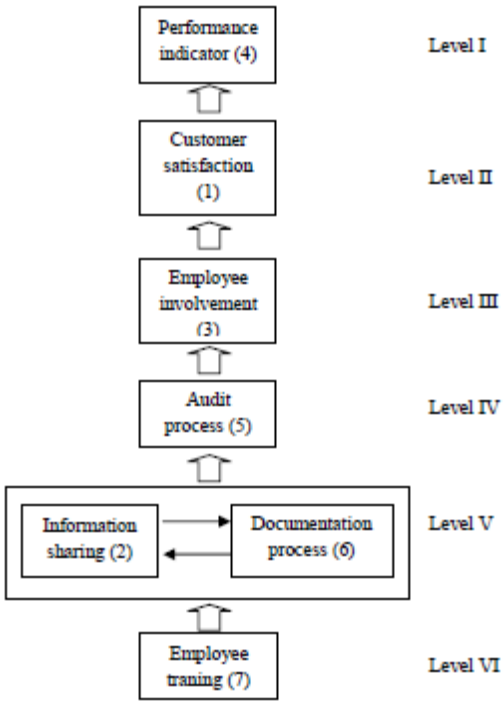
Lead time

Cost and time of implementation, Lead time in achieving the organization objectives, Lead Time of Delivery, Period of implementation, Process time cycle, Time required to get information, Time taken to respond and control emergency situations,

2. VALUE STREAM

High value adding in the extended enterprise

Below figure shows a diagraph for ISM model- Flow based on Dense, regular, accurate and reliable flow



Customer satisfaction

Customer query time, Feedback from stakeholders, Level of customer perceived value of product,

Information sharing

Level of information sharing, Number of decisions employees may accomplish without supervisory control,

Employee involvement

Number of employees understanding and compliance, Number of employees who understand,

Performance indicator

Inputs and outputs from organizations activities, Number of achieved objectives and targets, Percentage of environmental objectives in line with the management objectives, Percentage of Tasks performed

Audit process

Number of audits, Number of audits drills, Number of procedures reviewed, Number of review activities during actual emergencies,

Documentation process

Level of change in operations, List of the applicable legal and other requirements documentations, Number of documents change, Number of documented procedures, Number of documentation interchange between parties, Number of emergency drills, Number of Environmental Documentation,

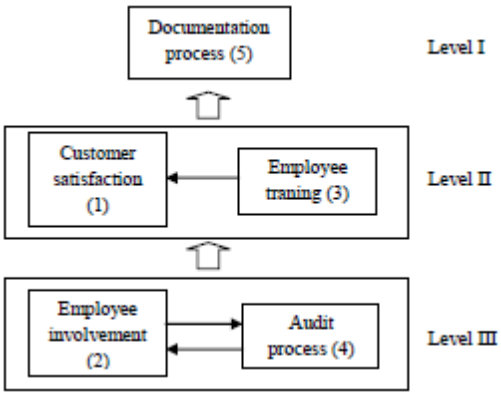
Employee training

Level of knowledge, Number of employees in compliance, Number of employees trained,

3. FLOW

Dense, regular, accurate and reliable flow

Below figure shows a diagraph for ISM model- Flow based on Standard work



Customer satisfaction

Effectiveness of distribution planning schedule, Evidence of the control measures being undertaken, Level of positive popularity of the organization to the outside world, Number of customer complaints, Overall Efficiency % Gains,

Information sharing

Level of Information Sharing, Percentage of consistency of the information with the actual values, The frequency with which information is given to employees,

Employee involvement

Level of awareness for interests parties, Number of employees aware and in compliance, Number of suggestions made by employees, Percentage of implemented suggestion,

Performance indicator

Level of adjustments of the operations, Number measurable environmental performance indicators, Number of achieved objectives and targets, Percentage of tasks performed,

Audit process

Number of audits, Number of audits completed versus planned, Number of procedures created,

Documentation process

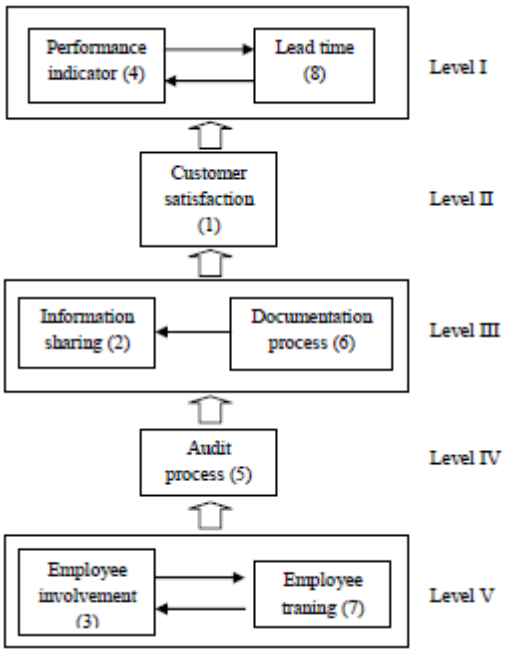
Improved handling of emergencies in future, List of processes enabling coordination, Number of calibration, Number of documentation interchange between parties, Number of documents change, Number of documented procedures, Number of Environmental Documentation, Number of Management Review, Quality of delivery documentation,

Employee training

Level of knowledge, Levels of knowledge obtained by training participants, Level of Legal Knowledge, Number of employee suggestions during training, Number of Tasks Employees can perform,

Standard work

Below figure shows a diagraph for ISM model- Value based on Time based competition



Customer satisfaction

Effectiveness of distribution planning schedule, Operation control assessment levels,

Information sharing

Percentage of procedures which are written recorded in the company,

Employee involvement

Number of suggestions made by employees, Percentage of implementing the suggestions,

Performance indicator

Level of adjustments of the operations, List of necessary control measures, Number of strategies developed,

Audit process

List of non-conformances, Number of audits,

Documentation process

Level of change in operations, Number of calibration, Number of documents change, Number of documented procedures, Percentage of procedure adjusted, Process Flexibility, Verification process of legal requirement,

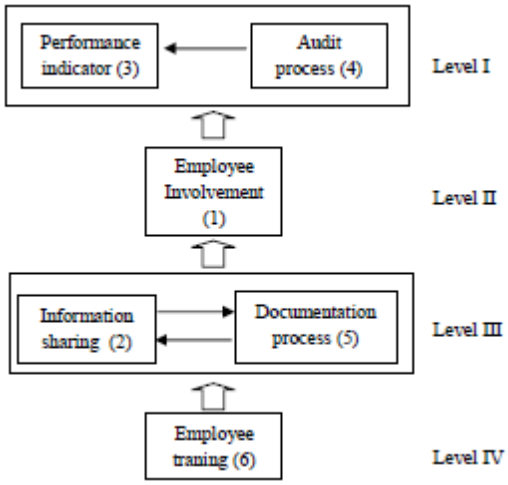
Employee training

Level of knowledge, Level of standardization, Number of employees in compliance,

4. PULL

JIT production and delivery

Below figure shows a diagraph for ISM model- Pull based on JIT production and delivery



Employee involvement

Level of employees participating, Number of employees aware and in compliance, Number of employees understanding and compliance,

Information sharing

Accessibility of Information, Information on time, Level of Information sharing, Number of decisions employees may accomplish without supervisory control, Number of well laid crisis communication plan, Presence of an effective crisis communication plan, The frequency with which information is given to employees,

Performance indicator

Number of achieved objectives and targets, Percentage of tasks performed,

Audit process

Number of audits drills, Number of procedures created, Number of procedures reviewed, Number of audits findings

Documentation process

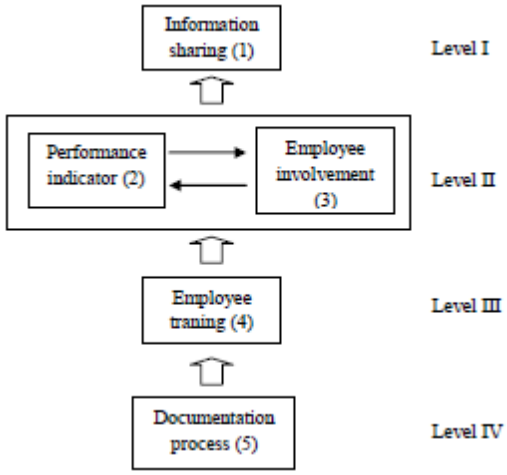
Number of documented procedures, Number of emergency drills, the level of compliance to the new standardized,

Employee training

Level of environmental awareness, Levels of knowledge obtained by training participants

Flexible resources

Below figure shows a diagraph for ISM model- Pull based on Flexible resources



Information sharing

Accessibility of Information, Level of information sharing, Number of decisions employees may accomplish without supervisory control, Number of informative top management meetings with employees, The frequency with which information is given to employees,

Performance indicator

Number of achieved objectives and targets, Return on investment for environmental improvement projects,

Employee involvement

Employee awareness and input, Level of Employees Participating, Number of employees aware and in compliance, Number of employees understanding and compliance,

Employee training

Level of knowledge,

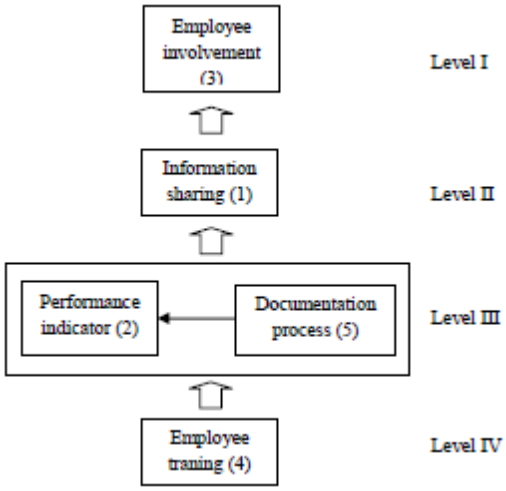
Documentation process

Number of documented procedures, Number of Environmental Documentation, Number of necessary emergency equipment, Quality of delivery documentation, the level of compliance to the new standardized,

5. PERFECTION

Learning

Below figure shows a diagraph for ISM model- Perfection based on Learning



Information sharing

Accessibility of Information, Level of information sharing, Number of decisions employees may accomplish without supervisory control, Number of Informative Meetings, Percentage of procedures which are written recorded in the company, The frequency with which information is given to employees,

Performance indicator

Number of achieved objectives and targets, Number of benchmark parameters, return on investment for environmental improvement projects the level of benchmark parameters,

Employee involvement

Level of employee Participating, Number of suggestions made by employees,

Employee training

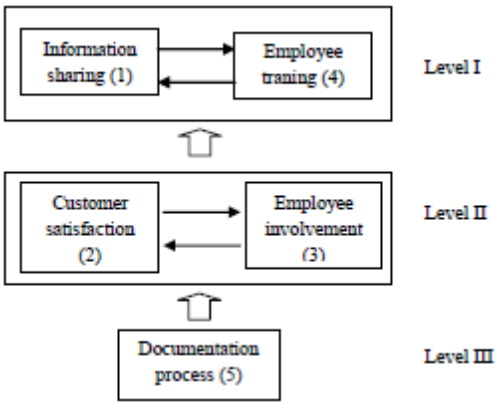
Certification of employees, Level of employees capacity, Levels of knowledge obtained by training participants, Number of employees trained, Number of identified training needs,

Documentation process

Number of adjustments made on procedures, Number of documented procedures, Number of Environmental Documentation, Quality of delivery documentation,

Common focus

Below figure shows a diagraph for ISM model- Perfection based on Common focus



Information sharing

Accessibility of Information, Level of Information Sharing, Number of decisions employees may accomplish without supervisory control, Number of informative top management meetings with employees,

Customer satisfaction

Customer Satisfaction Ratings, Feedback from stakeholders,

Employee involvement

Employee understanding and compliance level, Input from an interested party, Level of Employees Participating, Number of employees aware and in compliance, Number of employees understanding and compliance, Number of suggestions made by employees, Protocol of workers' participation,

Employee training

Level of environmental awareness, Levels of knowledge obtained by training participants, Number of tasks employees can perform,

Documentation process

Number of documented procedures, Quality of delivery documentation, the level of compliance to the new standardized,

IMPLEMENTATION FRAMEWORK

LEMIS Performance Measurement Model

PHASE 1 INPUT	PHASE 2 ANALYSIS PROCESS	PHASE 3 OUTPUT
Performance measures identification based on QCDAC principles with 9 core elements of Lean Principles for each sub-clauses of ISO 14001. • Enhanced product/service package value • Time based competition • High value adding in the extended enterprise • Dense, regular, accurate and reliable flow • Standard work • JIT production and delivery • Flexible resources	Interpretive Structural Modelling (ISM) approach for performance measures analysis and to identify and rank the performance measures. • Develop Structural Self-Interaction Matrix (SSIM) • Develop Reachability Matrix • Level Partitions for Reachability Matrix • Develop Reachability Matrix in conical form • Develop diagraph • Formation of ISM based model • Matrices Impacts Croises	Implementing the performance measures into a real life environment for results validation this will incorporate with peoples' involvement, which refers to the employee participation in the practices. • Selection of performance measures based on ISM analysis • Identify and select performance measures related to ISO 14001 performance indicators

• Learning • Common focus	Multipication Applique and Classment (cross impact matrix multiplication applied to classification) MICMAC analysis	

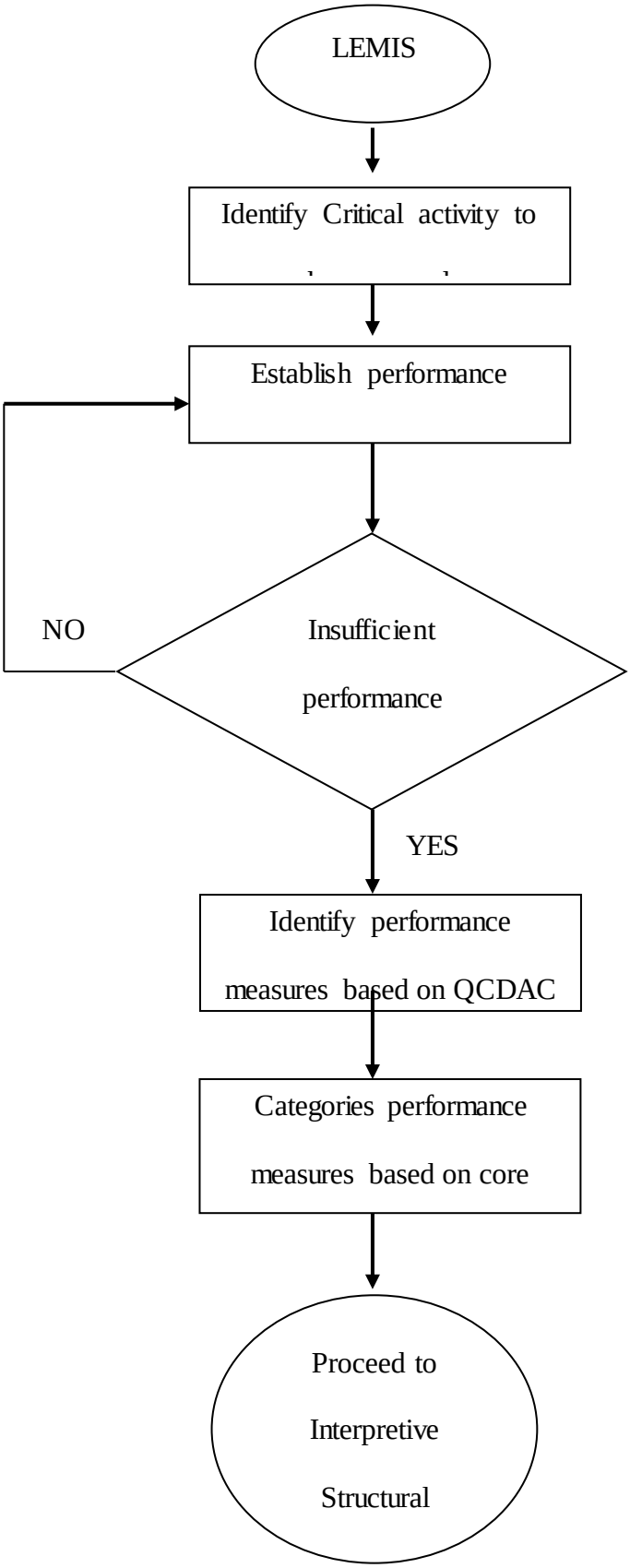

LEMIS
Identify Critical activity to
Establish performance
NO
Insufficient
performance
YES
Identify performance
measures based on QCDAC
Categories performance
measures based on core
Proceed to
Interpretive
Structural

Figure. Flow diagram for performance measures identification

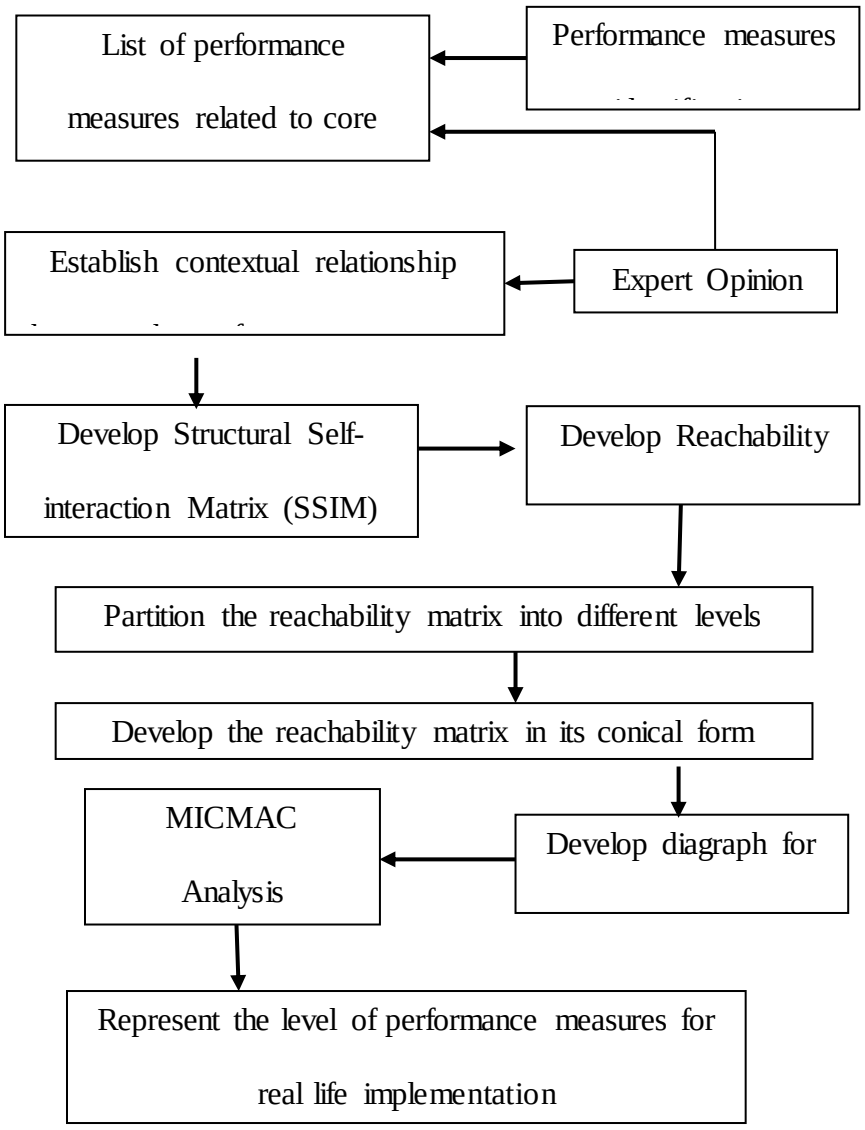


Figure. Flow diagram for preparing the ISM model (modified from Kannan et al., 2009)

LIMITATIONS OF THE STUDY

The limitations of the study will be acknowledged here. For example, whether the data was used from one country or was taken from different regions of the world. Were the people certain age and sex were focused or a broader view was taken to gather more information?

Sample size limitation

Due to resource and time constraint, we have had to use small size of the sample in the structured questionnaire which limited the degree to which we can apply and conclude the results as a general theory. Moreover, a random sampling instead of the convenience sampling might have reinforced to generate a more valid data analysis and to improve the accuracy of our results.

Additional research on other forms of EMIS and ISO

As described previously, we have conducted our study research for five major forms of EMIS and ISO. While we also acknowledge the presence and significant value of other forms of EMIS and ISO, such as adver-gaming and chat rooms in we have had not performed any consumer research Thus, there is some need of more investigation and analysis in order to display a more complete picture.

Time issue of EMIS and ISO campaigns

In our research, the questions presented to customers were generally in accordance with previous times, such as whether they had submitted e-mails to colleagues, bought products or services or came into contact with a previous EMIS and ISO strategy before research. Thus, this intended that no real-time information has been gathered. Our information and following results will be in accordance with the customer reaction in the set of questions and meeting, and in circumstances where customers are not aware of the strategy or have neglected whether

they bought a particular promoted products or services, this will reduce the precision of our research.

Geographical constraints

We have limited our focus on participants for both the organized set of questions and in-depth meeting to customers living in few countries due to source and time concern. This will limit the usefulness of our research information on common customers as a whole.

Limitations of Structured Questionnaire

Non-response error

As described in the previous area, we experienced circumstances in which the set of questions was came back to us in an imperfect way. This can be considered as non-response mistake on the aspect of the participant. Non-response is determined as a failing on the aspect of potential participant to take aspect in the research or to response particular concerns in the set of questions (Burns & Shrub, 2000). On our aspect, we tried to keep this mistake to a little by guaranteeing privacy and privacy and telling the participants that their solutions will remain private and we will not affiliate their titles with their solutions. In addition, as stated earlier, we also removed came back surveys which included more than 20% of invalid responses.

Respondent misunderstanding

Respondent misconception is determined as circumstances in which a participant gives an response without understanding the question and/or the associated with guidelines. Potential participant uncertainty exists in all reviews (Burns & Shrub, 2000). We consider that

circumstances of participants checking more than one box in the Likert range concerns and failing to position the items to be able of 1-5 in the Ordinal range concerns as participant misconception the requirements of the questions

RESEARCH STUDY LIMITATIONS AND DELIMITATIONS

The extent to which the specific results are developed true of other populations should be very transparent. The extent to which study and results are generalized should be cleared as well. The main focus of the study is the research aim and objectives, which defines its scope.

- Thus, the first major limitation is the research topic that focuses on the integration of ISO 14001 EMS with the lean systems in the organisations.
- The second major limitation for the study is time. This constraint can affect the primary data collection. Therefore, the researcher intends to delimit the data collection through survey questionnaire by e-mailing the questionnaire to the participants. This will save significant time to travel and surveying 100 participants.
- However, the interviews will be conducted face-to-face, thus, the time require for conducted interviews depends on the participants' willingness and availability. Furthermore, for interviews the individuals, who are available as well as agreeing for interview earlier than the others, will be given preference.
- The cost and financial constraints are also crucial to affect the primary data collection in this study. The cost is the third limitation as primary data collection requires travel. The researcher will delimit this constraint by hiring the person for interviewing the participants, who are available at far from the researcher's location. The hired person will record the interview for the researcher and will save sufficient time and cost for travel.
- There is sufficient data available on the online sources on the research topic; however the relevant data to research objectives will be critical. Therefore, the researcher aims to search

appropriate data on internet libraries. However, there is a wide range of data available on the topic and it will be challenging for the researcher to focus on the objectives and do not distract in the searching process.

CHAPTER 4: RESULTS

QUESTIONNAIRE DEVELOPMENT

Result Part 1

Lean Principles Adoption in Environmental Management System (EMS): A survey on ISO 14001 certified companies in Malaysia.

The questionnaire development is done by referring to all the data gather such as literature review, books, and etc. For this study, the questionnaire was divided into three sections. Section A, Section B and Section C

In the first section of the questionnaire, the question was developed by referring to previous study conducted by Puvanasvaran, Megat, Tang and Muhamad (2009); Boyer (1996). It is used to identify the ISO 14001 certifies companies adopted the lean production practices. In the second section of the questionnaire, the questions were developed from Womack et al. (1990) and Malaysian Standard Environmental System (EMS) requirement with guidance for use (ISO 14001:2004). The second section of the questionnaire was used to measure the positive and significant relationship of lean principles with the ISO 14001 requirement. In the third section, questions were developed based on research work done by Raj Kumar et. al., (2009), Khim L. Sim et. al., (2009), Sakakibara et. al., (1993), John H.S. Craig et. al., (2008), Sheffield Work Psychology Research Unit (1994), Flynn et. al., (1994) and Quazi et. al., (2001). This section was used to measure the agreement of respondent towards the identified issues and challenges. Appendix A shows the complete questionnaire for this study.

DATA ANALYSING

The data analysis flow chart in the Figure 1 shows the data analysis process. From the data collection, feel for data, goodness of data, hypothesis testing to the interpretation of the result, the step and flow can be seen.

In this study, the first part of the questionnaire, the mean and standard deviation were computed with the scores of the eight variables. The mean is the value of the degree of adoption

of lean production practices in the ISO 14001 certified company. The percentage of each variable also has been measure to support the value of the mean and standard deviation.
In the second part of the questionnaire, reliability coefficients, descriptive statistics, and correlation will do to measure the relationship of lean principles with the ISO 14001 requirement. Correlation is measured between each variable of the lean principles that is value, value streams, flow, pull and perfection with the ISO 14001 requirement.

The third part of the questionnaire, reliability coefficients and correlation will used to test the reliability where Cronbach's α (alpha) (Cronbach, 1951) is a coefficient of reliability. Correlation measures the degree of association between two variables when both are measured on a series of objects (Bower, 2000).

The Statistical Package of The Social Science (SPSS version 19) uses to record, analyse and interpret raw data. The data obtains were compiled, summarized and display in a form that is easily understood (see figure 18 appendix).

Result Part 2

i. Lean Production Practices in the ISO 14001 Certified Companies

The lean production practices are identified in the ISO 14001 certified companies. This section also will measure the adoption of lean production practices in the ISO 14001 companies. Reliability Test and Descriptive Statistics are discussed in this section. This section will discuss the result from analysis to prove that the ISO 14001 certified companies has adopted lean production practices.

i. Reliability

Table 11 shows that the alpha value for the ISO 14001 certified company that has adopted lean production practices is 0.772 and no of item is 8, which is exceeded or higher than 0.70.

Other than that, with the exception of Cellular Manufacturing, the scale reliabilities are highest when all the 8 items are included which is 0.809. The alpha value just slightly increased approximately 4.8% of the increment, even after elimination of the item Cellular Manufacturing.

Scale	**Mean**	**SD**	**Alpha if Deleted**
Lean Production Practices (Alpha = 0.772)			-
Items			
Continuous Improvement (Kaizen)	1.94	0.24	.758
Zero Defect	1.81	0.39	.723
Just-In-Time (JIT)	1.90	0.31	.741
5S' and General Visual Management	1.88	0.33	.747
Total Preventive Maintenance (TPM)	1.79	0.41	.720
Pull Production and Kanban	1.69	0.47	.719
Standardized Work	1.88	0.33	.747
Cellular Manufacturing	1.63	0.49	.809

Table 11: Reliability analyses of Lean Production Practices

Similar to the study done by Puvanasvaran et al., (2009) on Lean Process, the results show that the alpha value just increased slightly in their studies and no elimination has been done. Therefore the elimination needs not necessarily to be justified (Grandzol & Gershon, 1998).

ii. Descriptive Statistics

Descriptive Statistics of lean production practices are shown in Table 12. It shows that the highest lean production practices in the ISO 14001 certified company are Continuous Improvement (Kaizen). 93.8% or 45 respondents have adopted Continuous Improvement (Kaizen) in their companies. This is followed by Just-In-Time that is 89.6% or 43 respondents. 5S' and General Visual Management and Standardized Work have the same value that is 87.5% or 42 respondents. It follows by Zero Defect that is 81.3% or 39 respondents. Other than that, 79.2% or 38 respondents have adopted Total Preventive Maintenance (TPM) in the companies. It is followed by Pull Production and Kanban that is 68.8% or 33 respondents. The last lean production practice is Cellular Manufacturing that is 62.5% or 30 respondents.

Items		**Frequency**	**Percent**	**Cumulative Percent**	**Mean**	**SD**
Continuous Improvement (Kaizen)	No Adoption	3	6.3	6.3	1.94	0.24
	Adoption	45	93.8	100		
Zero Defect	No Adoption	9	18.8	18.8	1.81	0.39
	Adoption	39	81.3	100		
Just-In-Time (JIT)	No Adoption	5	10.4	10.4	1.9	0.31
	Adoption	43	89.6	100		
5S' and General Visual Management	No Adoption	6	12.5	12.5	1.88	0.33
	Adoption	42	87.5	100		

Total Preventive Maintenance (TPM)	No Adoption	10	20.8	20.8	1.79	0.41
	Adoption	38	79.2	100		
Pull Production and Kanban	No Adoption	15	31.3	31.3	1.69	0.47
	Adoption	33	68.8	100		
Standardized Work	No Adoption	6	12.5	12.5	1.88	0.33
	Adoption	42	87.5	100		
Cellular Manufacturing	No Adoption	18	37.5	37.5	1.63	0.49
	Adoption	30	62.5	100		

Table 12: Descriptive Statistics of Lean Production Practices

From Table 13, the statistics show that the lean production practices had the mode value of 2. It shows that ISO 14001 companies have adopted the lean principles in their organization. The mean value of 1.81 also shows that the result is more toward to the adoption of lean production practices.

N	Valid	48
	Missing	0
Mean		1.81
Median		1.94
Mode		2
Std. Deviation		.236

Percentiles	25	1.63
	50	1.94
	75	2.00

Table 13: Mean, Median, and Mode for All Lean Practices

Result of reliability analysis and descriptive statistic in the Table 11 till Table 13 clearly support that the ISO 14001 certified companies has adopted lean production practices.

1. Relationship of lean principles with ISO 14001 requirement

This section will measure the agreement of adoption of lean principles and ISO 14001 (EMS) implementation. Reliability Test and correlation are discussed in this section. This section will discuss the result from analysis to prove that Lean Principles have a positive and significant relationship with the ISO 14001 requirement.

i. Reliability

The result of reliability analysis for each set of lean principles; value, value streams, flow, pull, and perfection are shown in Table 14. Cronbach's alpha is used to assess the internal consistency reliability of several items or scores that the researcher wants to add together to get a summary or summated scale score (Morgan et al., 2004). In addition, the mean and standard deviation for each of the items are also indicated. Cronbach's alpha is used to assess the inter-item reliability, with alpha values of 0.7 or higher considered to indicate acceptable reliability for establishing scales (Soriano-Meier & Forrester, 2002).

Items	Cronbach's Alpha
Lean Principles	.986
Value	.963
Value Streams	.946
Flow	.967
Pull	.955
Perfection	.945

Table 14: Overall lean principles Cronbach's Alpha

That means all questions are highly reliable with the study. Therefore, it is concluded that the measured have an acceptable level of reliability.

ii. Correlation

This section will discuss the analysis and result of correlation on lean principles with ISO 14001. Each of the lean principles will be identified and studied to measure how strong and significant the correlation is. Lean Principles have a positive and significant relationship with ISO 14001 requirement can be analysed and support from the result in this section.

According to our survey shows that the inter-correlation between 1st lean principle Value with ISO 14001 requirements are highly significant where p is less than 0.01. All five variables were positively correlated with Value. According to the correlation analysis between 1st lean principles Value and ISO 14001 requirements (see Table 15), we discover that the higher variable with value are implement documented environmental objectives and targets has the highest correlation, where value r is equal to 0.948. Figure 19 shows the PP plots of Lean Principles "Value" against ISO 14001 Requirements. The PP plot is useful to compare the

centre of the distribution. In this case, we can quite reasonably conclude that the normal distribution provides a good model for the data.

Items	1th Lean Principles **Value** Correlation
Value help to improve our fulfilment to customer requirements in ISO 14001	.935**
Value help to implement documented environmental objectives and targets	.948**
Value help to implement program for achieving environmental objectives and target.	.929**
Value helps an organization comply with environmental laws and regulations.	.938**
Value help to increase awareness and participation of employees.	.923**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 15: Value with ISO 14001 Requirements

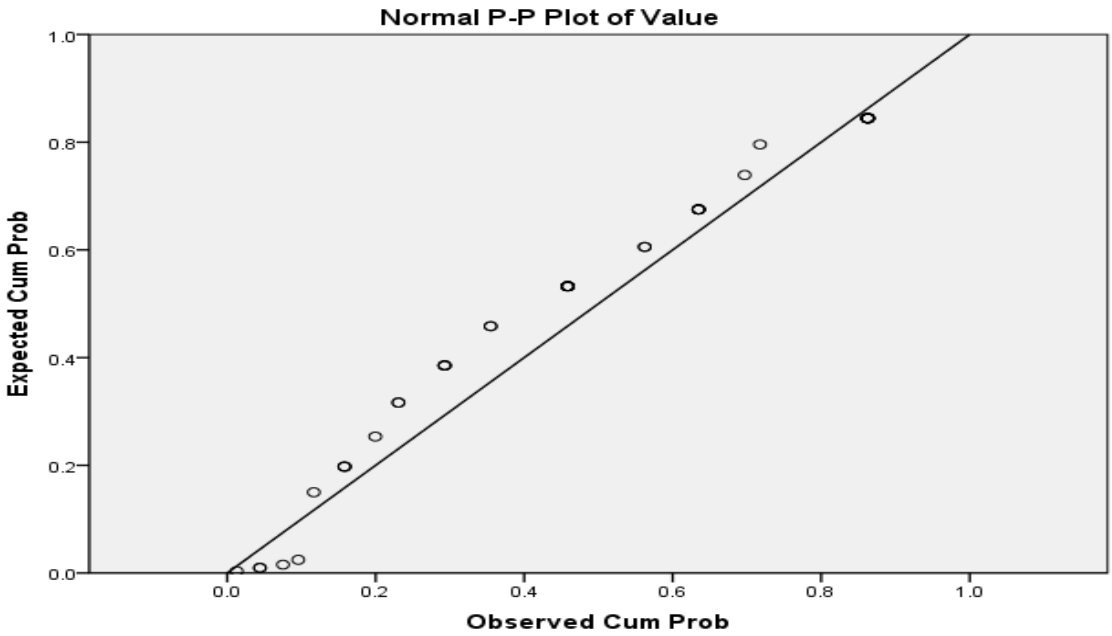


Figure 19: Lean Principles "Value" against ISO 14001 Requirements

From the correlation analysis between 2nd lean principles Value Stream and ISO 14001 requirements (see Table 16) are highly significant where p is less than 0.01. We can see that, the higher variable with value stream are identified ISO14001 implementation process loopholes has the highest correlation, where value r is equal to 0.959. Figure 20 shows the PP plots of Lean Principles "Value Stream" against ISO 14001 Requirements. The normal probability plot shows a strongly linear pattern. There are only minor deviations from the line fit to the points on the probability plot. The normal distribution appears to be a good model for these data.

Items	2nd Lean Principles **Value Stream** Correlation
Value stream help to streamline work in ISO14001 implementation.	.872**
Value stream significantly reduce waste within ISO 14001 implementation process.	.907**
Value stream help to identify ISO14001 implementation process loopholes.	.959**
Value stream help to identify actual and potential nonconformity.	.909**
Value stream help to reduce the complex documents control system in ISO 14001 implementation.	.896**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 16: Value Stream with ISO 14001 Requirements

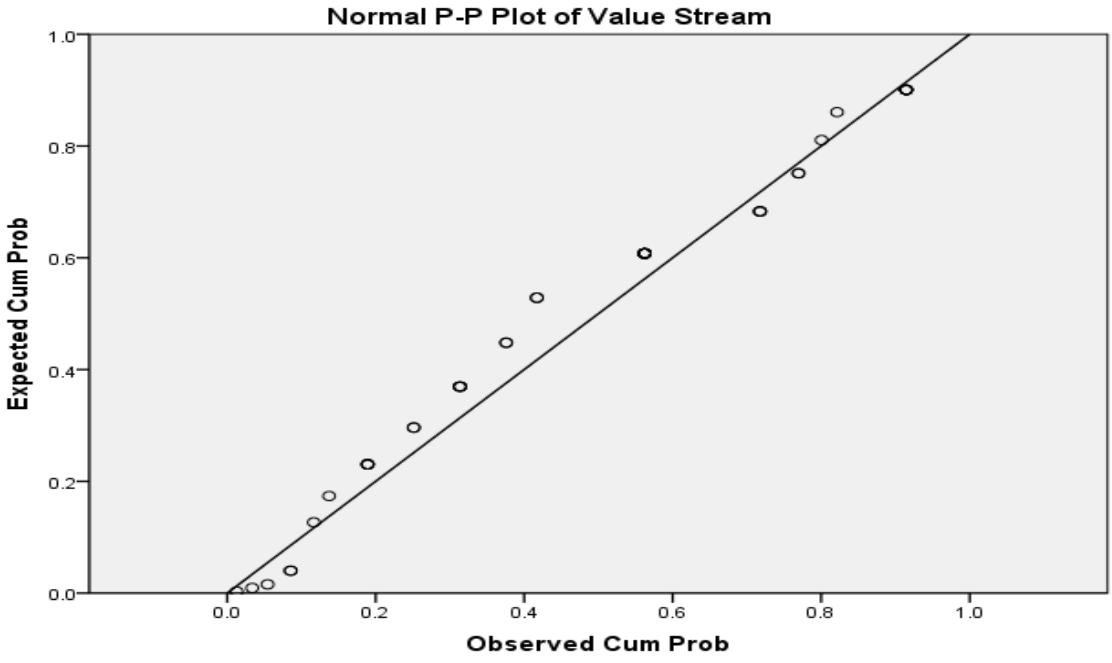


Figure 20: Lean Principles "Value Stream" against ISO 14001 Requirements

Based on the relationship between 3rd lean principles Flow and ISO 14001 requirements (see Table 17) are highly significant where p is less than 0.01. All six variables were positively correlated with Flow, we find that identifying nonconformity to mitigate their environmental impacts has the highest correlation, where value r is equal to 0.961. Figure 21 shows the PP plots of Lean Principles "Flow" against ISO 14001 Requirements. The normal probability plot shows a reasonably linear pattern in the centre of the data. However, the tails, particularly the lower tail, show departures from the fitted line. A distribution other than the normal distribution would be a good model for these data.

Items	3rd Lean Principles **Flow** Correlation
Flow help to identifying nonconformity to mitigate their environmental impacts.	.961**
Flow help to correcting nonconformity to mitigate their environmental impacts.	.951**
Flow help to investigating nonconformity in order to avoid their recurrence.	.885**
Flow help to evaluating the need for actions to prevent nonconformity to avoid their occurrence.	.927**
Flow help to reduce the usage of resources in ISO 14001 implementation.	.885**

Flow help the organization to verify that the system is operating according to plan.	.958**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 17: Flow with ISO 14001 Requirements

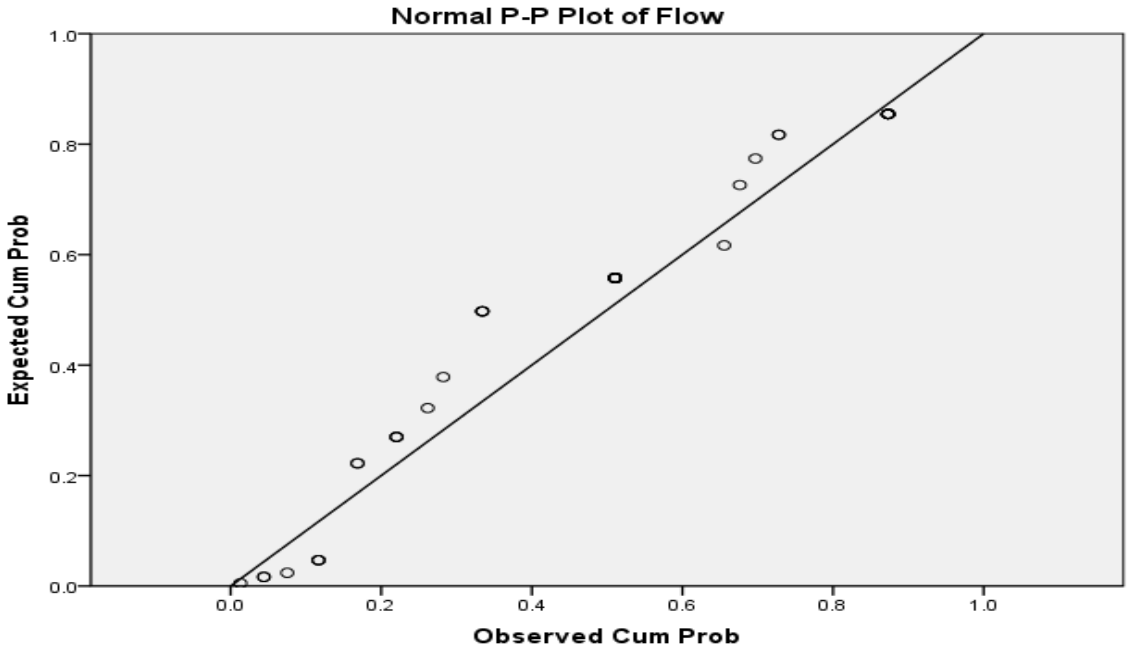


Figure 21: Lean Principles "Flow" against ISO 14001 Requirements

According to our survey shows that the inter-correlation between 4th lean principle Pull with ISO 14001 requirements are highly significant where p is less than 0.01. All four variables were positively correlated with Pull. From the Table 18, the correlation between lean principle Pull and ISO 14001 Requirement, the organization stipulating the operating criteria in the procedures has the highest correlation, where value r is equal to 0.950. Figure 22 shows the PP plots of Lean Principles "Pull" against ISO 14001 Requirements. For data with long tails relative to the normal distribution, the non-linearity of the normal probability plot shows the middle of the data may show an S-like pattern. In this particular case, the S pattern in the middle is fairly mild. In this case we can reasonably conclude that the normal distribution can be improved upon as a model for these data.

Items	4th Lean Principles **Pull** Correlation
Pull help to taking actions to mitigate their environmental impacts.	.938**
Pull help to implementing appropriate actions designed to avoid nonconformity occurrence.	.933**
Pull help the organization to ensure the effective planning that relate to its significant environmental aspects.	.936**
Pull help the organization stipulating the operating criteria in the procedures.	.950**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 18: Pull with ISO 14001 Requirements

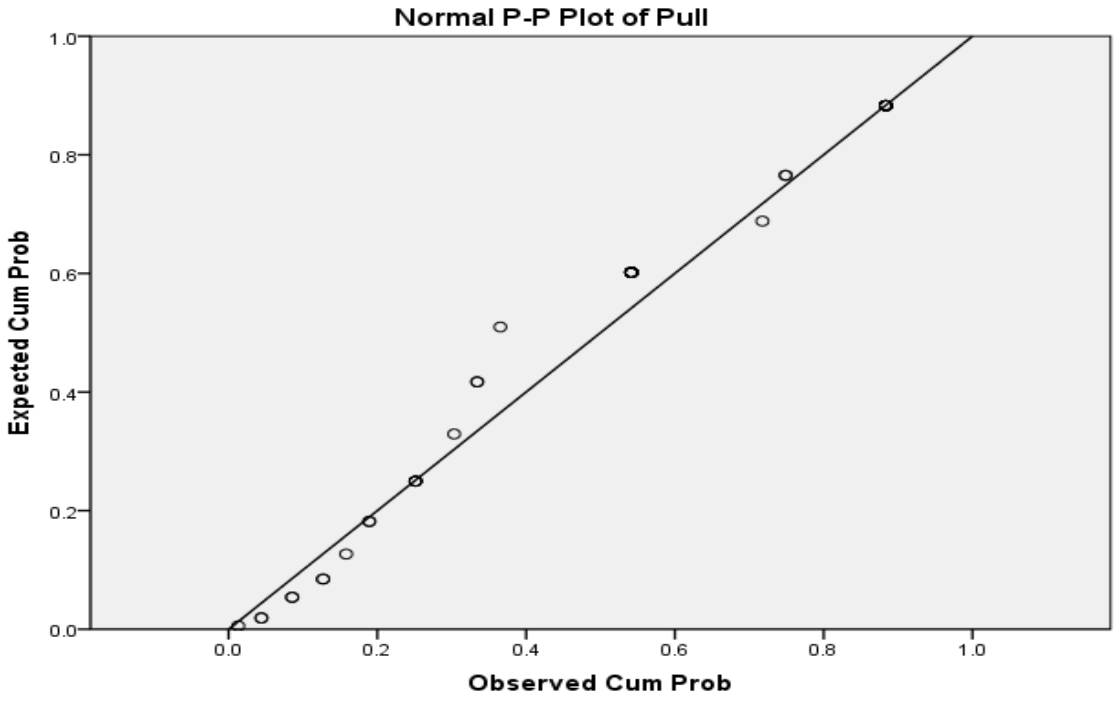


Figure 22: Lean Principles "Pull" against ISO 14001 Requirements

Table 19 shows that the inter-correlation between 5th lean principle Perfection with ISO 14001 requirements. All four variables were positively correlated with lean principle Perfection highly significant where p is less than 0.01. From the table, correlation between lean principle Perfection and ISO 14001 requirement, to ensure this standard continuing suitability, adequacy and effectiveness has the highest correlation, where value r is equal to 0.960. Figure 23 shows the PP plots of Lean Principles "Perfection" against ISO 14001 Requirements. There are only minor deviations from the line fit to the points on the probability plot. The normal distribution appears to be a good model for these data.

Items	5th Lean Principles **Perfection** Correlation
Perfection helps to assessing opportunities for improvement and the need for changes to the standard.	.922**
Perfection helps to ensure this standard continuing suitability, adequacy and effectiveness.	.960**
Perfection helps to ensure this standard consistent with the commitment to continual improvement.	.879**
Perfection helps in sustaining the ISO 14001 standards certification.	.949**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 19: Perfection with ISO 14001 Requirements

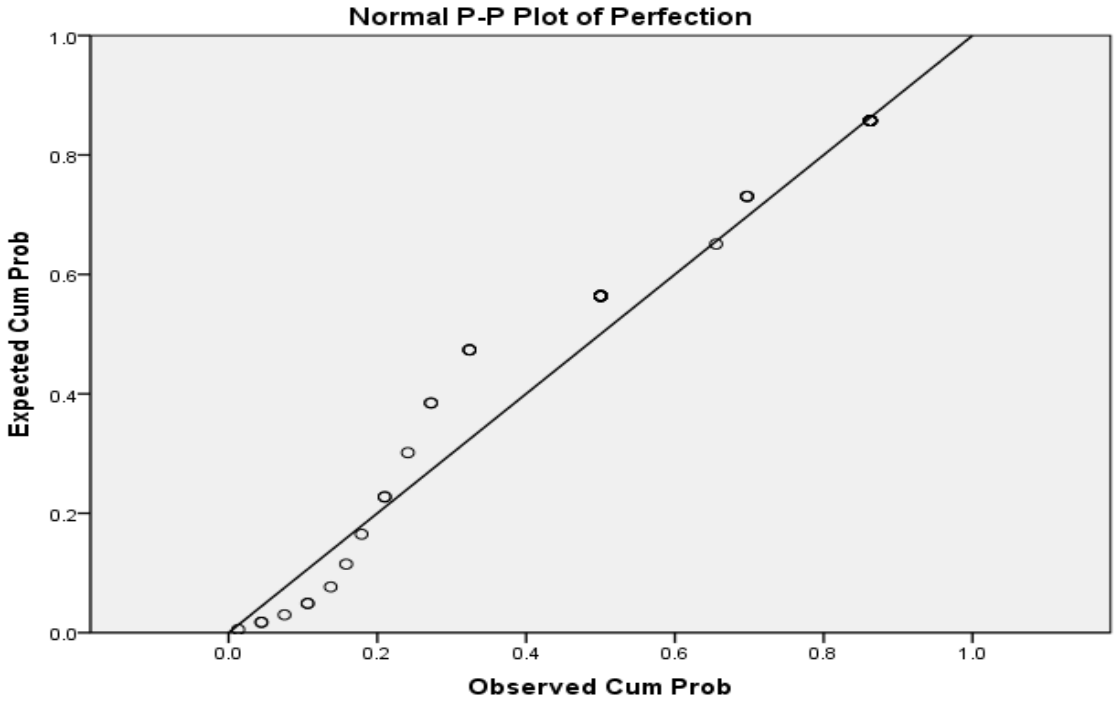


Figure 23: Lean Principles "Perfection" against ISO 14001 Requirements

To use skewness and kurtosis to see if the distribution is normal, we need to convert the given skewness and kurtosis scores to z-scores. Use the following formula: zskewness = (K-0)/SEskewness or z kurtosis = (S-0)/SEkurtosis. S = Skewness; K = kurtosis; SE = Standard Error (of skewness or kurtosis). If the value is smaller than 1.96, the distribution is normal. In larger samples, this value should be increased to 2.58. The results of the Z score of Skewness for lean principles value is -0.478/0.343 = 1.39, value stream is -0.739/0.343 = 2.15, flow is -0.471/0.343 = 1.37, pull is -0.378/0.343 = 1.10 and perfection -0.477/0.343 = 1.39. The results show the Z score for the five lean principles is smaller than 1.96, the distribution is normal. Another way in which normality can be tested is by means of the Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk tests. These tests compare the distribution with a comparable normal distribution. The Shapiro-Wilk test is used for small sample sizes (less than 50). The results of the tests are shown in Table 20. Shapiro-Wilk test for Lean principles value p= 0.053, value stream p= 0.056, Flow p= 0.052, Pull p=0.072 and perfection p= 0.114. If the Sig p>0.05 and

therefore the data is normally distributed. From these result we reach the conclusion that lean principles has a positive relationship with ISO 14001 requirements.

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Value	.124	48	.062	.953	48	.053
Value Stream	.126	48	.055	.952	48	.056
Flow	.125	48	.059	.937	48	.052
Pull	.127	48	.051	.956	48	.072
Perfection	.125	48	.060	.961	48	.114

Table 20: Output of Kolmogorov-Smirnov and Shapiro-Wilk Test for Checking the Normality of the Lean Principles

2. Critical factors in integrating Lean Principles with ISO 14001(EMS)

Management commitment, communication, training, teamwork, quality commitment, employee welfare and employee involvement, amongst other factors; classified as the most pertinent issues which are critical for the successful integration of lean principles and ISO 14001. Questionnaire survey was carried out to support and prove the findings of literature studies on the critical success factors.

This section discusses the measurement of the critical factors relationship in integrating the Lean Principles with ISO 14001(EMS). The findings and result from this survey expected to prove that management commitment, communication, training, teamwork, quality commitment, employee welfare and employee involvement are the most pertinent issues which critical for the successful integration of lean principles and ISO 14001.

i. Reliability

Reliability test was conducted before the correlation test. The result for reliability test of critical factors in lean principles and ISO 14001 integration phase are shown in Table 11.

ii. Correlation

Correlation measures the degree of association between two variables when both are measured on a series of objects (Bower, 2000). Result of analysis shows that 0.824 is the highest (meaningful) correlation factor achieved in this study, where in confidence regions for correlation coefficients (*r*), correlation factors between 0.4 to 0.5 considered as "moderately significant," factors between 0.5 to 0.7 considered as "significant" and those above 0.7 considered as "highly significant" (Sachs, 2002, p. 536). To further study on the relationship between factors of influence and the Lean-ISO 14001 integration, correlation were done by correlating the integrated lean-ISO 14001 elements based on five lean principles with factors of influence.

a. Factor of influence against Value based ISO14001

Table 21 shows the inter-correlation between Value based ISO14001 with factors of influence. All seven variables correlated highly significant with Value based ISO14001 at *p* value less than 0.01. Another important point to be noted was, all variables were positively correlated with value based ISO14001 and none of them had a negative Pearson's correlation coefficient.

Dimension	***Items***	***Cronbach's Alpha***
Management Commitment	Policy has been clearly started by the top level management.	.954

	Quality Goals have been communicated to all by the top level management. Top management allocates adequate resources towards effort to implementation process. The initiative for the vision of a quality culture comes from top management. Continuously monitor the system and processes in organization. Review the quality issue on regular basic. Review the safety of employees and workplace on regular basic.	
Communication	The communication system in the company keeps all employees well informed. We have timely and effective communication from all levels of management. The Company values my ideas relative to continuous improvement. Employees at all levels can speak out about conceives and reactions to qualities initiatives.	.952

	The company works hard at sharing best practices throughout all its divisions. Clear description of job responsibilities.	
Training	Employees are rewarded for learning new skills. Knowledge of continuous improvement tools allows me to apply them at work. Our organization considers training as essential for performance improvement. We continually innovate for process improvement. Sufficient resources are available for employees' quality training.	.928
Teamwork	All our employees are aware of their responsibility in an organization. The people in my work group encourage each other to work as a team. I have to work closely with others to do my job well. I am willing to put myself out to help my work group. All team members' opinions and ideas are considered before making a decision.	.936
Quality Commitment	I feel that quality is the most important aspect of my job.	.962

	Each individual has an important part to play in increasing the quality of products. It pleases me to know that my own work has made a contribution to the quality of products. Producing a quality piece of work is a major source of satisfaction to me. I feel that I share any responsibility for the quality of products. I take personal responsibility for the quality of my own work.	
Employee Welfare	Employees will join an organization that has a good and safety working environment. Our organization shows great concern in improving Employee Welfare in the area of Environment Health and Safety. Our employees support Safety and Health programmes as it is linked to their welfare. The company will do everything possible to reduce or eliminate layoffs in the future.	.925

	Promotions are based strictly on need rather to reward individuals. Promotion policies are well structured.	
Employee Involvement	Employees are given more planning responsibility. Employees are given more quality responsibility. Employees are encouraged to give suggestions. Employees are encouraged to involve in the production process. All employees' suggestions are objectively evaluated.	.936

Table 21: Cronbach's Alpha for each Issues and Challenges for Lean Principles and ISO 14001 Integration

Critical success factors (CFS)	**Value based ISO14001 Correlation (*r*)**	**Correlation**
Management Commitment	0.797	Highly significant
Communication	0.776	Highly significant
Training	0.762	Highly significant
Teamwork	0.716	Highly significant
Quality Commitment	0.781	Highly significant

Employee Welfare	0.794	Highly significant
Employee Involvement	0.784	Highly significant

**Correlation is significant at the 0.01 level (2-tailed).

Table 22: Factor of influence against Value based ISO14001

b. Factor of influence against Value stream based ISO 14001

Table 23 shows the inter-correlation between value stream based ISO14001 with factors of influence.

Critical success factors (CFS)	**Value stream based ISO14001 Correlation (*r*)**	**Correlation**
Management Commitment	0.809	Highly significant
Communication	0.700	Highly significant
Training	0.719	Highly significant
Teamwork	0.745	Highly significant
Quality Commitment	0.772	Highly significant
Employee Welfare	0.824	Highly significant
Employee Involvement	0.771	Highly significant

**. Correlation is significant at the 0.01 level (2-tailed).

Table 23: Factor of influence against Value stream based ISO14001

c. Factor of influence against Flow based ISO14001

Table 24 shows the inter-correlation between flow based ISO14001 with factors of influence.

Critical success factors (CFS)	**Flow based ISO14001 Correlation (*r*)**	**Correlation**
Management Commitment	0.771	Highly significant
Communication	0.622	Significant
Training	0.713	Highly significant
Teamwork	0.728	Highly significant
Quality Commitment	0.673	Significant
Employee Welfare	0.696	Significant
Employee Involvement	0.689	Significant

**. Correlation is significant at the 0.01 level (2-tailed).

Table 24: Factor of influence against Flow based ISO14001

d. Factor of influence against pull based ISO14001

Table 25 shows the inter-correlation between pull based ISO14001 with factors of influence.

Critical success factors (CFS)	**Pull based ISO14001 Correlation (*r*)**	**Correlation**
Management Commitment	0.732	Highly significant
Communication	0.649	Significant
Training	0.692	Significant
Teamwork	0.690	Significant
Quality Commitment	0.680	Significant

Employee Welfare	0.732	Highly significant
Employee Involvement	0.736	Highly significant

**. Correlation is significant at the 0.01 level (2-tailed).

Table 25: Factor of influence against Pull based ISO14001

e. Factor of influence against perfection based ISO14001

Table 26 shows that the inter-correlation between perfection based ISO14001 with factors of influence.

Critical success factors (CFS)	**Perfection based ISO14001 Correlation (*r*)**	**Correlation**
Management Commitment	0.765	Highly significant
Communication	0.641	Significant
Training	0.711	Highly significant
Teamwork	0.752	Highly significant
Quality Commitment	0.722	Highly significant
Employee Welfare	0.738	Highly significant
Employee Involvement	0.733	Highly significant

**. Correlation is significant at the 0.01 level (2-tailed).

Table 26: Factor of influence against perfection based ISO14001

CHAPTER 5: DISCUSSION

EVALUVATION OF THE STUDY

Environment management system (EMS) helps organizations to fulfil their responsibilities towards protecting the world environment (Gbedemah, 2004). An Environment management system (EMS) provides a framework to attain industry's environmental responsibilities effectively and also assists in applying the environmental initiative into day-to-day tasks. An effective Environment management system (EMS) is adjustable in all kinds of business regardless of the scale, size and nature of methods. An effective Environment management system (EMS) can contribute towards cost saving and decreasing the environmental liabilities (Cheremisinoff, Rosenfeld and Rosenfeld, 2010). It also helps to make sure that suppliers, employees and vendors realise their role to contribute professionally towards meeting the environmental aims and environmental approach of the organization (Visser, Matten, Tolhurst & Pohl, 2010).

The stages required by an industry to obtain a successful Environment management system (EMS) can be set out by a globally accepted standard ISO 14001 (Environmental Protection Agency, 2002). It offers support in integrating the environmental aims into the overall procedures of an association. The implementation of ISO 14001 is possible on all types of firms with different size and nature of methods. It is also appropriate to industries with fluctuating risk profiles. It is easily adoptable by a complete organization or by its particular tasks (Woodside & Aurrichio, 2000). ISO 14001 is an industrial tool towards commercial environmental management (Puvanasvaran, Muhamad & Kerk, 2010). It also assists in decreasing insurance and prosecution fears. Investor's confidence is built by ISO 14001 and result is additional ethical investment (Whitelaw, 2004).

A tool for process development that targets at reducing waste and increasing client value is known as Lean (Miller, Pawloski & Stanridge, 2010). Lean assists in focusing on essential practises that affect the result to the customer. Maximum value can be provided to clients by focusing on nonstop progress of process management elements through Lean system. An organization's aims can be attained via Lean with zero wastage and less resources. Previously, it was thought that lean principles are appropriate in the manufacturing firms only. But this isn't true anymore. Lean can be applicable effectively across all companies. The association must apply lean as an essential part of their business strategy to gain its complete benefits (Turbide, 2005). The theoretical experience of lean also has an incredible potential for growing top-line revenue rather than having cost reduction as a special focus of lean principles. The potential of lean rises by creating a sustainable distinction value advantage for the creativity that deploys the awareness in its entirety (Reidenbach & Goeke, 2006). To retain something over time frequently is known as sustainability. In the perspective of environmental management system (EMS) certification, the sustainability is to retain the position of the certified firm as environmentally friendly.

Causal Loop Diagram (CLD) is one of the tools of intellectual system. It offers support to observe reactions between the elements of a framework and conceptualise problems. Low awareness is the cause of low assurance to obey the rules. Because of no assurance there is no Environment management system (EMS) and vice versa producing a re-enforcing loop by Causal Loop Diagram (CLD). There is no guarantee to follow the principles along with low performance leads toward development of environmental problems. There is a disturbance here before the problems can get visible. Environment management system (EMS) is said to raise sustainable growth. There should be elevation in Environment management system (EMS) for sustainable growth.

The primary variables in the system are request for EMS, sustainable progress, EMS ISO 14001, and responsibility to compliance towards the rules. The research approaches are built by these main associations. It shows the diverse interlines between the different elements within the system. The system is not restricted to comprise of all the elements but rather based on potentials that these are what encourage certification and compliance. Getting Environment management system ISO 14001 means responsibility to act in accordance with the parameters. Low environmental problems will result by a rise in assurance and its use. Present situation of problems is due to its absence. If there is increase in application, producing firms will be ready to put Environment management system (EMS) into their operations which will lead to sustainable development. Some major aspects that run Environment management system (EMS) application like citizens awareness, certifiers convenience and business or government inspiration through ENGOs which are incomplete and leading to low demand for Environment management system (EMS) thus low certification leading to environmental problems. Environmental management can be improved by the use of Environment management system (EMS) facilitation.

When industries and structures for Environment management system (EMS) are built in the form of accreditation organizations, the cost of certification will be decreased, struggle sets in and certifiers come into the systems. The existing situation of low certification is due to severity of certifiers, enlargement in time of certification and high cost requirement for certification. Evidence on the welfare and importance can be derived from Environment management system (EMS) by generating awareness in both producing firm and among nations, within environmental and media industries and ENGOs. An Environment management system (EMS) will be demanded from producing firm. The procedure is supported by the Certifiers as well. Biological activity in water system and sustainability can be improved by enhancing the use of Environment management system (EMS) in grouping with other

frameworks. Pollution can be decreased by a recommended waste treatment within organization.

Previously it was supposed that the goals of Environment management system (EMS) and Lean are dissimilar and hence cannot be combined. Organizations executed their Lean and Environment management system initiatives individually with an understanding that these two produce different kinds of wastes. The application of Lean involves activities for minimizing wastes and optimizing the process flow. While the aim of Environment management system (EMS) is to apply the ways and plans in order to reduce the opposing influence of environment.

The lean aims and the environmental plans must be clearly described for the incorporation of lean values into to the ISO 14001 standards in a firm. A well-defined framework must be in place setting out the duties and characters of the employees in different sectors across different ranks. There are numerous researches done on Lean Production System Models over the past decade (Bergmiller, G.G., 2006).

A study on the Lean manufacturers showed that a more global structure and effort was done to capture their common best routines. Five basic principles of Lean manufacturing were identified from different studies, namely; 1) value, 2) value stream, 3) flow, 4) pull, and 5) perfection. The J4000 has a complete section dedicated to Management Obligation and covers the Lean best practice varieties (Panizzolo, R., 1998). The J4000 sketch is designed as a survey which businesses can use to benchmark their exercise against the best performances of business's Lean producing leaders. The survey gathers data in four parts: Management/Belief, Process Flow, Vendors/Clients, data and People (SAE, 1999). Liker released the fourteen principles that cover the Lean manufacturing approach after reviewing the Toyota manufacturing system for twenty years with full contact to Toyota industrial units, employees and officials, both in the Japan and United States. Shigeo Shingo, a leading expert in refining manufacturing processes, was named The Shingo Prize for Excellence in manufacturing

(Shingo, 2003). Established in 1988, the Prize boosts up awareness of Lean manufacturing methodologies and recognises firms in Mexico, Canada, and the U.S. attaining world-class ranking. The Shingo idea is that world-class industrial exercise which may be accomplished via focused growths in important business and production processes. The Prize Committee used the values based on authorization, production strategies, leadership, organizational culture, quality, customer satisfaction, cost, delivery and system integration (Shingo, 2003). According to these sources it was decided that the best expressive methodology for the measure of "Leanness" is the Shingo Prize model.

ASSESSING RESULTS WITH RESPECT TO IDEAS OF VARIOUS AUTHORS

At least one of lean production practices is adopted by all the ISO certified firms according to the results of the data analysed. The results of reliability analysis obtained in the Table 1 show a different scenario that all the variables are designated tolerable reliability for launching scales with the Cronbach's alpha value which is exceeded or greater than 0.70. This table also shows that the mean value of each variable i.e. Zero Fault, Continuous Development (Kaizen), General Visual Management, 5S' and Just-In-Time (JIT), Pull Manufacturing and Kanban, Cellular Production, Total Preventive Standardized Work and Maintenance (TPM) is greater than average toward the implementation of lean manufacturing procedures. Analysing the results through the value of mean and standard deviation is similar to that done in previous research article (Roslan et al., 2009). In the same way the degree of adoption was identified by the analysis of mean and standard deviation (Puvanasvaran, 2009). In another study, the acceptable reliability was indicated by considering alpha values of 0.7 or higher for establishing scales (Soriano-Meier & Forrester, 2002).

A positive and vital relationship was found by this study between ISO 14001 requirement and Lean Principles: value stream, value, perfection, pull and flow. Similar to the

previous study, correlation and reliability test was used to identify the grade of assurance and implementation in the analysis to verify and sustain the Hypotheses (Puvanasvaran, 2009). The hypotheses are verified and simplified with the Pearson Correlation Analysis similar to the previous study done (Roslan et al., 2009).

According to Table 4, all the variables are indicating highly tolerable reliability for launching scales with the Cronbach's Alpha which is exceeding or greater than 0.70. The table also elaborates the Cronbach's Alpha value of five lean philosophies that are Flow (0.967), Value (0.963), Perfection (0.945), Pull (0.955) and Value Streams (0.946). The recognised scales reliability is highly suitable because the Cronbach's Alpha for lean philosophies is 0.986 far exceed 0.70.

All the variables are absolutely interconnected to the lean principles that are Value, Flow, Perfection, Pull and Value Streams as extracted from Table 5 to Table 9. If p value is less than 0.01, a highly important correlation is developed between ISO 14001 requirements and lean principles. While making a correlation between ISO 1401 requirement and lean principle flow according to Table 7, the highest correlation is developed in case of identification of nonconformity to mitigate their environmental impacts, where value r is equal to 0.961.

We need to convert the given kurtosis and skewness scores to z-scores in order to utilize kurtosis and skewness to see if the circulation is standard. The following formula be utilized: z kurtosis = (S-0)/SEkurtosis or zskewness = (K-0)/SEskewness. Here S = Skewness; K = kurtosis; SE = Standard Error (of kurtosis or skewness). The distribution is normal if the value is less than 1.96. This value should rise to 2.58 in larger samples. The outcomes of the Z score of Skewness for lean principles value stream is -0.739/0.343 = 2.15, value is -0.478/0.343 = 1.39, perfection -0.477/0.343 = 1.39, pull is -0.378/0.343 = 1.10 and flow is -0.471/0.343 = 1.37. The outcomes show that the distribution is normal, as the Z score for the five lean

principles is smaller than 1.96. The Shapiro-Wilk and the Kolmogorov-Smirnov (K-S) tests provide another way in which normality can be tested. Comparable normal distribution is used to compare the distribution through these tests. In case of small sample sizes (less than 50) the Shapiro-Wilk test is used. The outcomes of the tests are exposed in Table 10. Shapiro-Wilk test for Lean principles value stream p= 0.056, value p= 0.053, perfection p= 0.114, Pull p=0.072 and Flow p= 0.052. The data is normally distributed if the Sig p>0.05. The conclusion extracted from these outcomes is that there is a positive relationship between ISO 14001 requirements and lean principles.

CHAPTER 6: CONCLUSION

The main objective of this study is to recognize the application of lean manufacturing practices by the ISO 14001 certified organizations and to measure the important and positive relationship of lean philosophies with the necessities of ISO 14001. According to the outcomes achieved, at least on lean manufacturing practices is adopted by all the ISO 14001 organizations. Above all, the core results show that the lean principles have a highly substantial and positive relationship with ISO 14001 needs.

The understanding and awareness of the application method and the lean principles is required by everyone. This is where it plays a critical part in ensuring a fruitful application of lean philosophies integrates with ISO14001 needs. In order to attain the continual progress through ISO14001 EMS, the incorporation of lean values in ISO 14001 will serve practical techniques.

BENEFITS OF THE PROPOSED MODEL

The managers can deal with the environmental problems more efficiently by the incorporation of ISO environmental system which can lift the organization's decision-making competencies. The environmental management system (EMS) is based on the systematic technique, which assists the identification of dangers and responsibilities suitably, resulting in the progress of the environmental performance of the industry. The significance of the role of ISO 14001 has also established the attention from governments globally that anticipate to incorporate the environmental management system (EMS), enforce its guideline, strategies, and procedures (Govindaraju and Daily, 2004). The motive why government globally are concentrating to impose the rules and principles of ISO 14001 contains the tax inducements, decreasing inspection regularities, and decreasing necessities for environmental parameter in future.

These progresses offered by the ISO 14001 EMS can be acknowledged as the principal accelerators for the economy of the nations. However, the economic status of the organization can be improved by the ISO 14001 certification, as it satisfies the community with the industry's business responsibility and its improving status for the environmental problems. The industries can accomplish sustainability and rise sales by launching environmentally sensitive policies for marketing (Govindaraju and Daily, 2004). The compliance and incorporation of ISO14001 can offer numerous competitive benefits to the industries by addressing the product distinction problems and support in operative marketing approaches.

The industries that have already applied the ISO14001 standards successfully in their business tasks with suitable compliance can set a scale for the challengers and also can quantify or estimate their performance with this scale. It is made important for them to apply ISO 14001 because there are many aspects that apply pressure on the industries in the exterior market. Therefore, the principles of ISO 14001 have become essential for the companies for the existence in the market, sustaining organizational relations, and dealing with the internal/ external shareholders. The participation of top management as the factor manipulating the application of ISO 14001 EMS in the business is highlighted (Govindarajulu and Daily, 2004).

The same findings were indicated on the necessity of ISO 14001 standard application (Nakamura et al, 2001). Stress on the execution of ISO 14001 is due to the paybacks it provides and inspiration from the senior management (Fryxell et al, 2004). There are studies that provide thorough evidence and theoretical assessment of the environmental management system (EMS) framework, how it assists the companies, and complete understanding of its techniques (Yin, 2003). The demonstration of ISO 14001 has provided the standard that assists with the resource selections to input in the organisational procedures. The ISO 14001 designs provide better transparency and understanding about the choice of useful procedures and forms foundation

for the environmental system of the firm. Thus, the environmental management system (EMS) of an organization works in the methods and zones that are distinct by ISO 14001.

The assessment of the industrial practices through environmental management system (EMS) of the firm is based on the practical reminders of ISO 14001 that permits them to implement the operative marketing approaches. The environmental management system (EMS) confirms the suspicious choice of structural resources for the prospective method and these choices are based on the ISO standards (Acevedo, 2004). The tradition of incorporation of environmental management system (EMS) system is related to the industrial promise, considering the resource distribution due to environmental problems can be unlimited (Kilbourne, 2004). There is an uncertainty in the meaning of environmental problems that company faces, which has been understood by numerous expert by different methods (Gupta, 1994).

The environment is defined as a serious characteristic, which defines the actions of the organization for the amount consumed on the procedures, the manufacturing quality, and the maintainability aspects (Gupta, 1994). The industrial development of the firm depends on these actions. The global population existing in the industrial nations are able to use the most of the earth's resources as compared to the remaining people. The established nations are technologically advanced and thus, using additional natural resources, which consequences in their development economically, growing the demand of resources, as well as the rise in pollution. It is important that the operations of environmental system incorporation into industrial actions as the conventionality to decrease the remains in the industrial tasks (Melnyk et al, 2002). This decrease in remains is accomplished by observing, establishing, developing, applying and coordinating the industrial jobs connected with the environment.

In order to develop the procedure productivity, a decrease in energy usage and raw material consumption was highlighted (Chan, 2006). The area of environmental management

system (EMS) denotes the environmental humiliation as an influence of environment (Lefebvre, et al, 2003). The environmental features surrounding the company is defined as produced energy and materials in the method of manufacturing (Seiffert, 2006). The environmental structures can be considered by the produced or consumed resources during the creation of elaboration or good services of the industries. The environmental system of the industries addresses the environmental influences when implemented in the presence of ISO 14001 standards which may be producing various social significances.

The ISO 14001 consist of the standards that permit the environmental management of the organization to emphasis on such constituents that assists the necessities of competent and economical environmental system. The duty of administration was met to strengthen the establishment of ISO 14001 principles and its maintenance (Chan & Wong, 2006). The participation and assurance of the administrative system was focused to make sure that the real establishment of the standard, in order to accomplish trustworthiness amongst workforces, who directly associate with the industrial tasks and actions (Chan & Wong, 2006). The resistance of the businesses was emphasized against the variations, the administration concentrating on the effective policies for the environmental management system (EMS) application and ISO 14001 principles can help reducing and avoiding these problems (Oliveira, 2005).

MAJOR CHALLENGES FOR THE INTEGRATION OF THE PROPOSED MODEL

The research still contain some limitations. Firstly, the research primarily emphases on the services organizations and production environment. Secondly, the research can be further improved through a larger population with several types of organizations to realise the implementation of lean values in ISO14001 application.

This is one of the first challenges to recognise and incorporate the lean values into ISO 14001. There is no incorporation within this two management system based on the

current scenario. The incorporation of lean principles into ISO 14001 will serve real techniques for this standard to accomplish the frequent progress.

The environmental management system (EMS) is a fundamental portion of a company's processes and it is not just restricted to the implementation of extra tasks. There is a limitation of opportunities provided to the company and fewer benefits to improve the environmental performance, when Ad hoc approach is used in order to attain the environmental competence. The environmental liabilities are also proposed to increase the working complexities and costs, considering the growing environmental issues (Govindaraju and Daily, 2004). Therefore, an organized and demanding methodology is needed by the organizing board, with respect to the method of policy making.

The organization may also face critics along with the benefits of environmental management system (EMS) based on ISO 14001 (Curkovic et al, 2005). The environmental indicators, which are based on the superior environmental routine, can be upgraded with the solid commitment to the stances and rules of ISO 14001. There is a concerned emphasized by the experts that companies may not be able to produce the enough expenses for the establishment, for accomplishing the profits ISO 14001 offers (Bouyer et al, 2006). Therefore an effective establishment of the ISO 14001 in several activities of the industry procedures is linked with traditional backgrounds of the organization, considering the management and elasticity of the activities with the ISO 14001 EMS. Thus the industrial framework and tradition along with the top managerial staff and leadership also influence the establishment of the ISO 14001 ideas for the environmental management system of the organization.

The effective application of ISO 14001 standards should make sure the industrial tradition for achieving improvement in the several activities of the prospective business actions. The company's plans adopted by the other firm may make sure the achievement in the similar environment as well as the industrial achievement in past cannot define the company's

accomplishment with same approaches in another environment (Thang, 2007). With respect to the executed scheme the industrial tradition and framework of the organizations may foresee their attainment (Thang, 2007). The organizations need to embrace the practices of other business considering the circumstance that those procedures are reliable with that industry's tradition and framework, while it may not be reliable with their philosophy.

The firm's tradition defines its referential philosophies; there service quality, and association with its workers that belong to the firm's representative world. Human resource management (HRM) is defined as the management of performance and quality through support of the officials, policy making and information to accomplish a suitable route in attaining the industrial objectives (Hussain, 2006). It was found that the performance of the industry's environment management system (EMS) relies on its human resource management (HRM) or human capital that defines competitive edge and the level of achievement for a firm (Ichniowski et al., 1997, Brown, 2007). In order to reduce the resistance applied by the human capital in a company to produce revolution, the firms can target six generic policies (Lima et al, 2006). These six approaches comprise of participation, education, negotiation, cooperation, coercion (explicit/ implicit) and assistance. The firms can make sure an effective execution of these six approaches by the incorporation of environmental management system (EMS), supported by ISO 14001 principles, as it separates quality from the human resources actions that are directly connected to industrial volume and achieves the industrial objectives.

Keeping a company competitive for a long duration is one of the most frightening challenges for every CEO's of international companies (Mefford 2009). They face burden for gradually increasing productivity and maintaining the cost low and at the same time in order to play in the international market they should improve and innovate product design. A choice for minor cost and advanced productivity would be increasing the profitability of the organization. A challenging task for the supervisors in all of the studied companies turns out to be the

effective awareness of the strategy and vision for lean execution to the employees (Czabke, Hansen & Doolen 2008). It seems to be a difficult task for the management to understanding the new order, new idea, and communicating it at all the organizational levels. Sometime it seems that the business encounter some difficulties with the application of the new method even when the CEO of the firm is fully devoted to the industrial improvement program. It occurs very often that the applied agendas fell back to their original untidy and costly mode. Individuals are resistant to changes on their operational place even if the management is devoted enough struggles in training agendas and clarifying the standards of the new exercise. Specifically when employees experts meet the new challenge of altering their method of functioning and when they need to be influenced in the profits of the new practice. Many negative approaches can be turned into a great struggle (Mefford 2009).

A tough time is the choice to let go some of the workers who cannot accept the implementation of change and wouldn't assist the application efforts. Other challenge for the executives in the beginning of the application procedure was essentially to follow the new acts and philosophies avoiding going back to the previous step. A report on another challenge for organizations gives indications for influence of workforces leaving the organization in the advanced level of lean application (Lewis 2000). Workers' experience, knowledge and skills essential for carrying out particular jobs throughout an organization can be rare and hard to duplicate and hence provide a policy for sustainable competitive benefit. So following issues with employees maintenance have a main influence on executing performance and "getting into a command war"(Lewis, 2000).

On the other side the complication is not always such a bad thing. It should be considered as a decent manner to manage probable disturbances in technology breakages, capacity and supply delivery, etc. So if options are not accessible the danger of economic damages is greater. A serious challenge for leaders today is to synchronize the requirements of

the organization, the tasks and people and its value chain in a manner to accomplish the complete profits of the lean enterprise while growing the well-being of partner corporations, practical power and different opportunities. To attain this objective supervisors require a new innovative managing procedure. A methodology formerly recommended that would not only fulfil the above mentioned requirements, but would also offer a pronounced worth to the clients (Womack and Jones, 1994). Employees must be devoted to a particular practice, so that the value chain is flowing efficiently. Workforces should be organized in small concentrated groups, which will ensure the flow is unceasing without blockages. The real challenge for the firms is to know how far in the lean journey they are and to achieve the condition of nonstop development in their organization.

RECOMMENDATIONS FOR THE EFFECTIVE IMPLEMENTATION OF LEMIS

Future study and a few interesting recommendations that can be done in the future are given below.

- An exciting part for future study would be to recognise the effects of lean ideologies on ISO 14001. The first is related to the so called environmental management system (EMS) and the second is to the five lean values.
- Lean principles and ISO 14001 have usual cohabitation whether people recognise the relationship or not. Upcoming study can better integrate both lean principles and ISO 14001and elevate the industry or firm in terms of productivity as well as nonstop progress of the ISO 14001, as the study is to realize the association between them.
- The improvement of the structure can be done in the future study once the linkage has been examined and identified. The study can be applied in the ISO 14001 certified firms in different countries with this framework and the victory of the lean philosophies and ISO 14001 incorporation can be measured.

- This structure can help to make progress using the measurement and study and application procedure before the incorporation of lean philosophies and ISO 14001 can be truly an achievement.
- Simplicity philosophy: There is a strong need to create the awareness in the industries about the necessity of innovative management tools for producing better results, instead of costly environmental management tools. The tools should not only be simple and easy to use, but also should be credible enough for the government authorities and other international purchasers to accept them because of the relevant results they provide. The implementation of new ideas should be strategically planned by aiming for an incremental change for the first two years and then the implementation should be divided in to a number of deliverables, after setting achievable objectives (3 to 5 years). This all should be followed by the more radical changes that involve research and development (10 to 50years); the stronger the change, the greater the cost and transitional time. The other design attributes, that market wants, such as reliability, performance, competitive price, quality and value for money are required to be balanced by greener performance, in order for the aforementioned changes to take place. This, therefore, becomes a continuous learning process.

- Benchmarking and associations: If the companies continue working alone, on individual basis, achieving environmental improvements will not be possible completely. The process of self-assessment must be adopted by the companies to compare their performance (environmental) with the overall analogous performance. The objective should be to ensure an improvement in the environmental management of their business in comparison to the best industrial practices already being used by businesses in the same sector as theirs.

This can be ensured by creating partnerships and associations with and between different businesses; especially the ones that are in the same location, so to help the process of sharing resources and expertise in issues related to environment.

Industrial associations are also important for the ideas and resources to be shared. This can be done by product exchanges, which means that the by-products of one company are utilized as a feedstock by another company instead of managing them as a waste. If this exchange is effectively adopted it will result in the communities having a better environment and an improved economy, which means creation of new jobs and a better public image. Companies get in to collaborations with other companies and NGOs and this partnership is equally vital among different sectors of government and private firms for the effective development.

- New thinking: The best investment a company can make is for technology solutions that are cleaner, long term and cost efficient in operations. It will improve company's reputation among the neighbours, clients, authorities and other sponsors that are supporting the cause. New ways should be thought for promoting environmental management systems on reduced financial costs. Taking example of ISO 14001, the staff training accounts for a major part of the overall cost as the training of every concerned individual is recommended. This may be reduced by introducing some effective self-training courses for the organization's employees. Developing and promoting the use of better management accounting systems and techniques that tend to facilitate reducing the environmental costs reasonably. Encouraging the involvement of many management levels while the decision making can also be adopted as another alternative approach. The contractors should either be paid for each short term endeavour made by the contractors for energy savings and productivity; alternatively, an efficient long term strategy can be

designed to ensure the same results.

- Government Incentives: For the companies responsible for environment, an implementation of incentives should be considered by the government. Regulatory flexibility approach may be used for this implementation, for example fewer inspections and reduced fines are something that will also allow taking care of non-complying companies easily. A necessary infrastructure for ISO 14001 certified companies can be developed by the government to ensure continual environmental improvements. Economic incentives to take care of the environment whilst making money, such as fees, charges, deposit refund systems, marketable permits, subsidies, information disclosure and voluntary actions reduce cost more than traditional regulations. Focus can be shifted towards the development of financial service sector and credit schemes to support the projects or companies that have performed good.

- Education: Priority should be given towards educating the top management in staff training related to environmental protection issues which will ease the process of obtaining necessary support for EMS implementation. High economic and financial costs can be imposed by neglecting the environment but at the same time, many benefits can be achieved at much lower costs. The managements of the companies should understand that a thorough knowledge and know-how of environmental issues must be included in their business strategy as an integral part. They must be taken as something that can bring revenue to the company or can at least reduce their expenses. The more educated the top management is, the easier it gets to educate other people involved in the process. The involvement of other role players is necessary because the customers must be made a part of the policing process so that they understand that the responsibility of taking care of the

environment and maintaining good living standards is the responsibility that all of us should assume. Environmental protection programs should be promoted through schools and the environmental management practices should be added in to the curriculum being taught at schools, in an effective manner on practical grounds. Another approach that can be adapted is to focus on training the experts working in environmental field and the industry representatives, so that the environmental activities within the organizations can be evaluated systematically. For employees, copies of training material can be distributed, printed in local language so to help them with better understanding. The ISO 14001 auditors should be encouraged to focus more on the environmental issues during their audits; while other strategies and tools are being used to deal with remaining issues.

- Build on existing business practices: Another seemingly popular standard with the companies is ISO 9001 and by integrating it with ISO 14001 resource allocation for environmental matters can be enhanced and the costing can also be reduced. It is essential that an evaluation of alternative strategic choices is performed; cost saving can be ensured if the things are brought inhouse and, for example, some employee can be given the position of environmental officer on site, therefore eradicating the need to rely on the consultants. Another way of ensuring cost reduction is to use materials that are locally manufactured, because their transport cost is also less.

- ISO 14001 can be implemented much more effectively if other ISO 14000 (ISO 14031/32 [Guidelines for Environmental Performance Evaluation] and ISO 14060 [Guide for the

inclusion of Environmental Aspects in Product Standards]) are included.

- Encourage innovation: Simple practices such as using suggestion boxes can be implemented for improving the environment. Action should be taken on those suggestions and recommendations and if one of those improves the company's economic and environmental performance, then the employee who suggested that, should be duly rewarded; both financially and in other forms as well. Another strategy to encourage innovation is the competition for innovation. Innovation should not only stay confined to an idea but should move to the product development through which, very important information can be extracted for help in decision making processes. Incentives like Profit sharing schemes should be implemented where the employees are rewarded a certain percentage of the company's environmental performance profit. This will not only motivate the employees in playing their active part in making further contributions towards innovation.

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APPENDIX

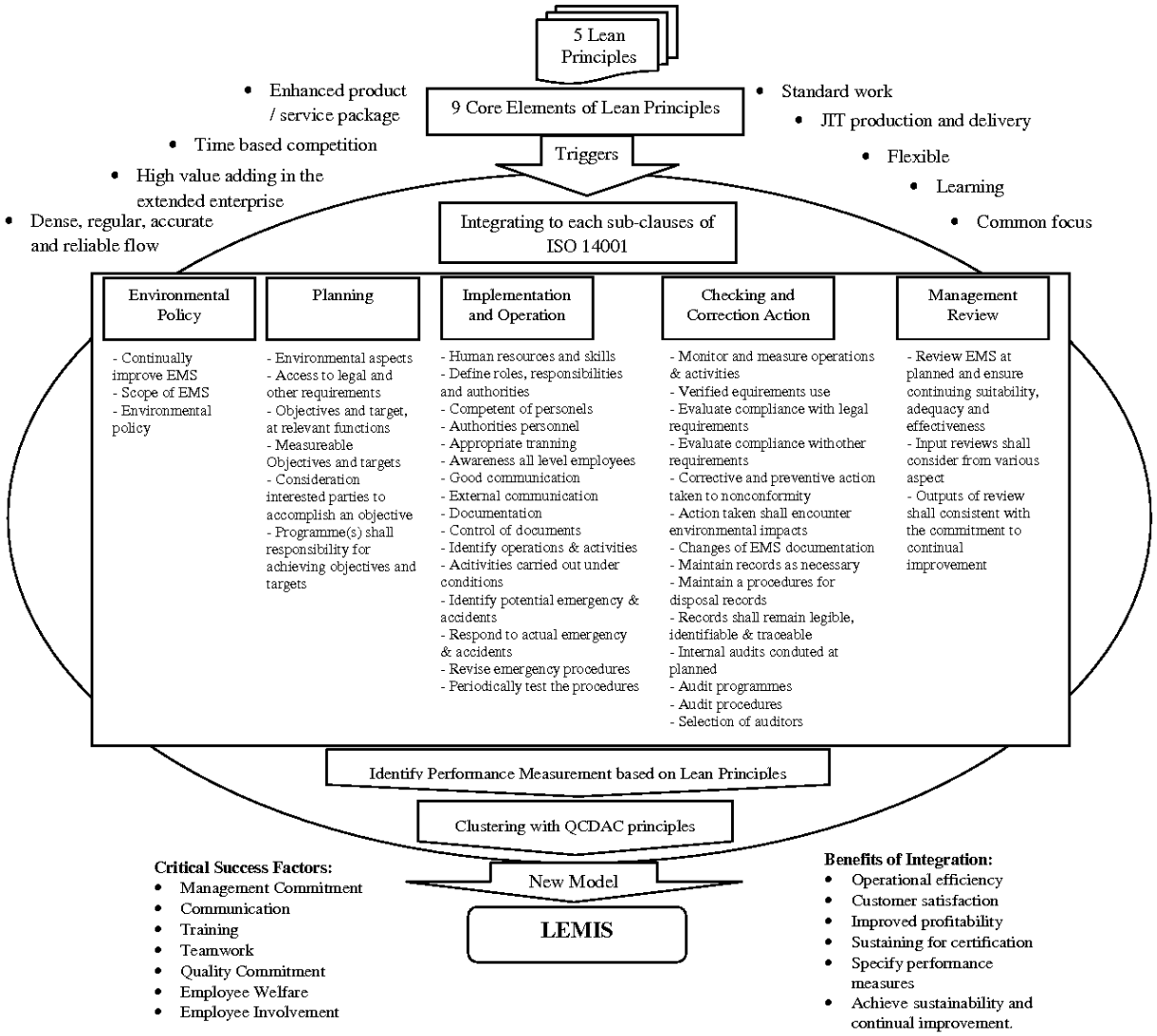


Figure 1: Core Elements of Lean Principles

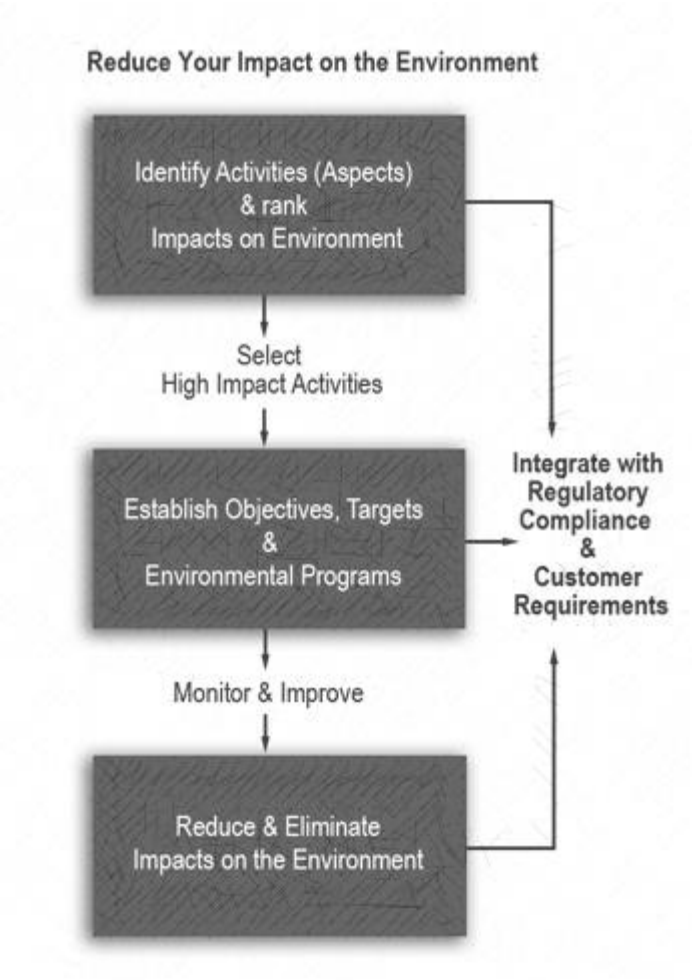


Figure 2: Reducing the impact of environment on organisational system

http://www.objectivesintl.com/what/iso_14001.html

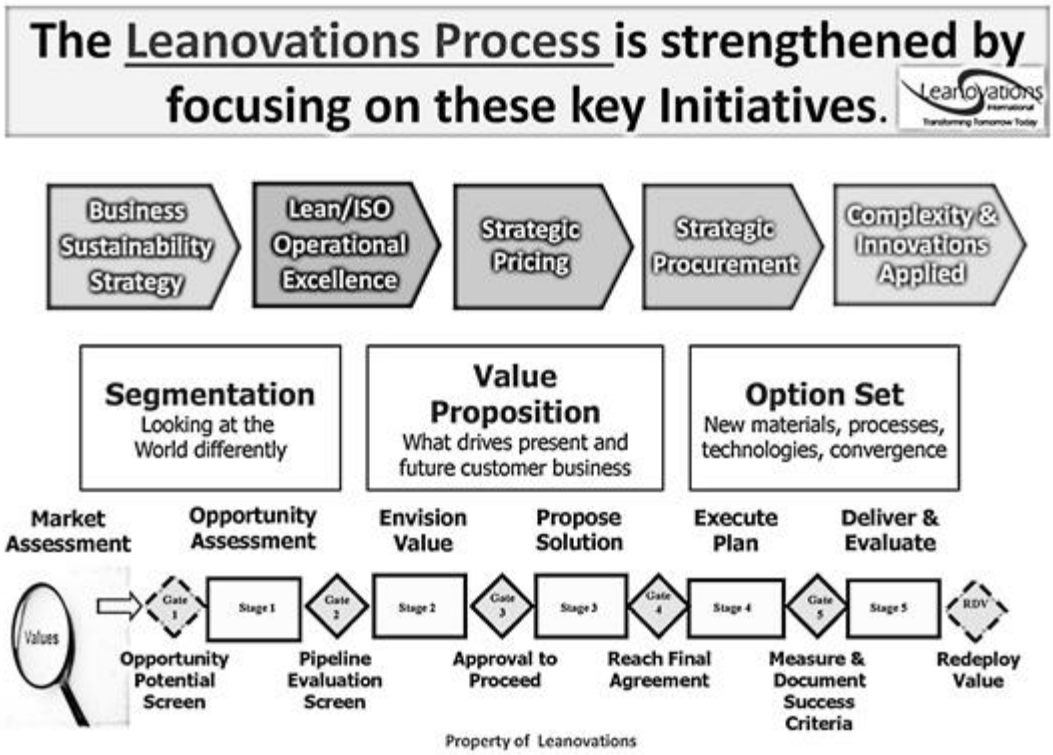


Figure 3: The innovation through lean system

Retrieved from http://www.leanovations.com/id4.html

Figure 4: Advantages of integrating ISO 14001 EMS in the organisation.

Retrieved from http://www.querium.nl/index-UK.php

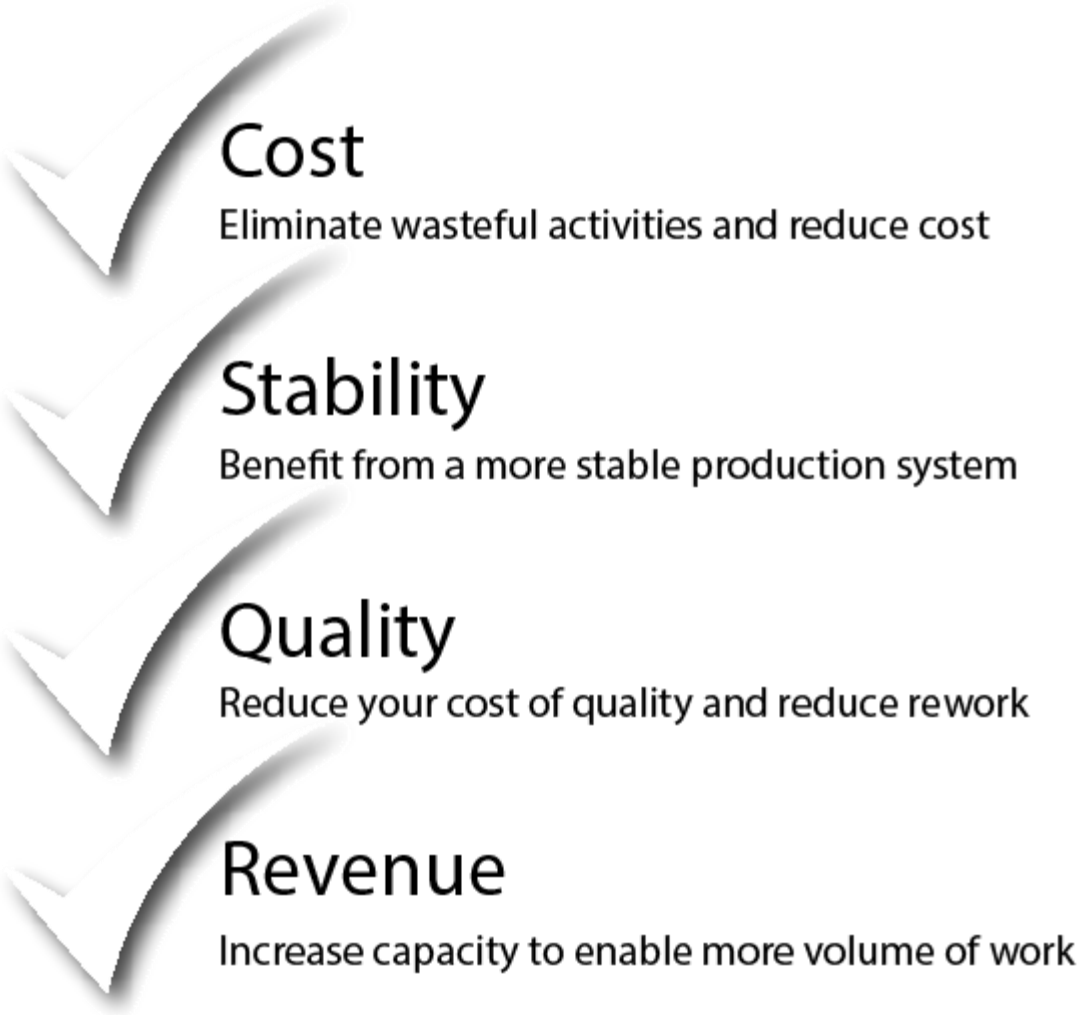


Figure 5: Core benefits of the Lean system

Retrieved from http://optimalprogression.com.au/maximise-your-operational-excellence-roi-with-subsidised-lean-training/

Figure 6: EMS Benefits of ISO 14001 EMS

Retrieved from *http://sustainablecitiescollective.com/glenn-vowles/164496/ems-environmental-plus-other-benefits*

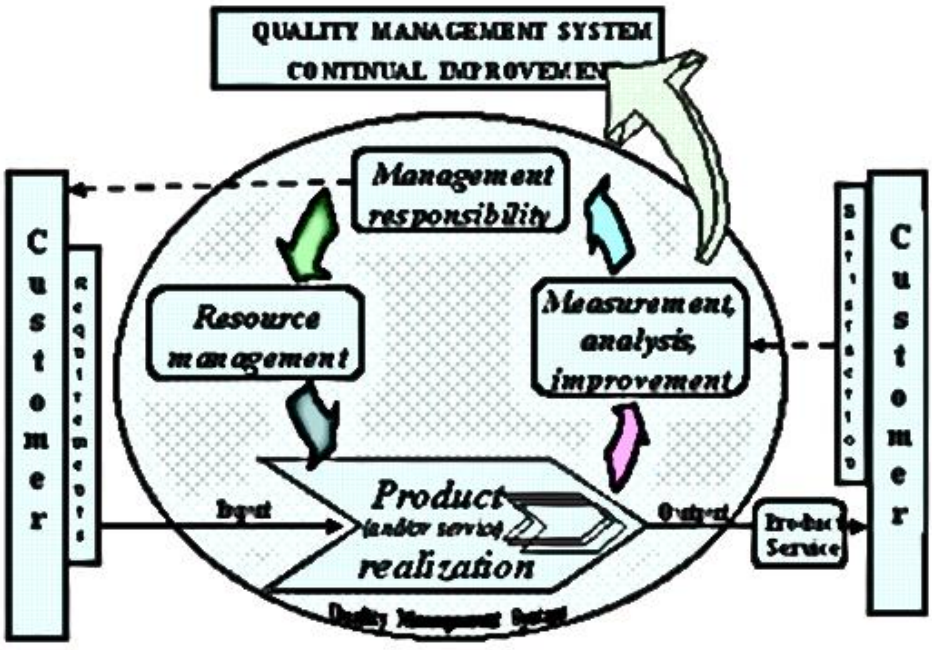
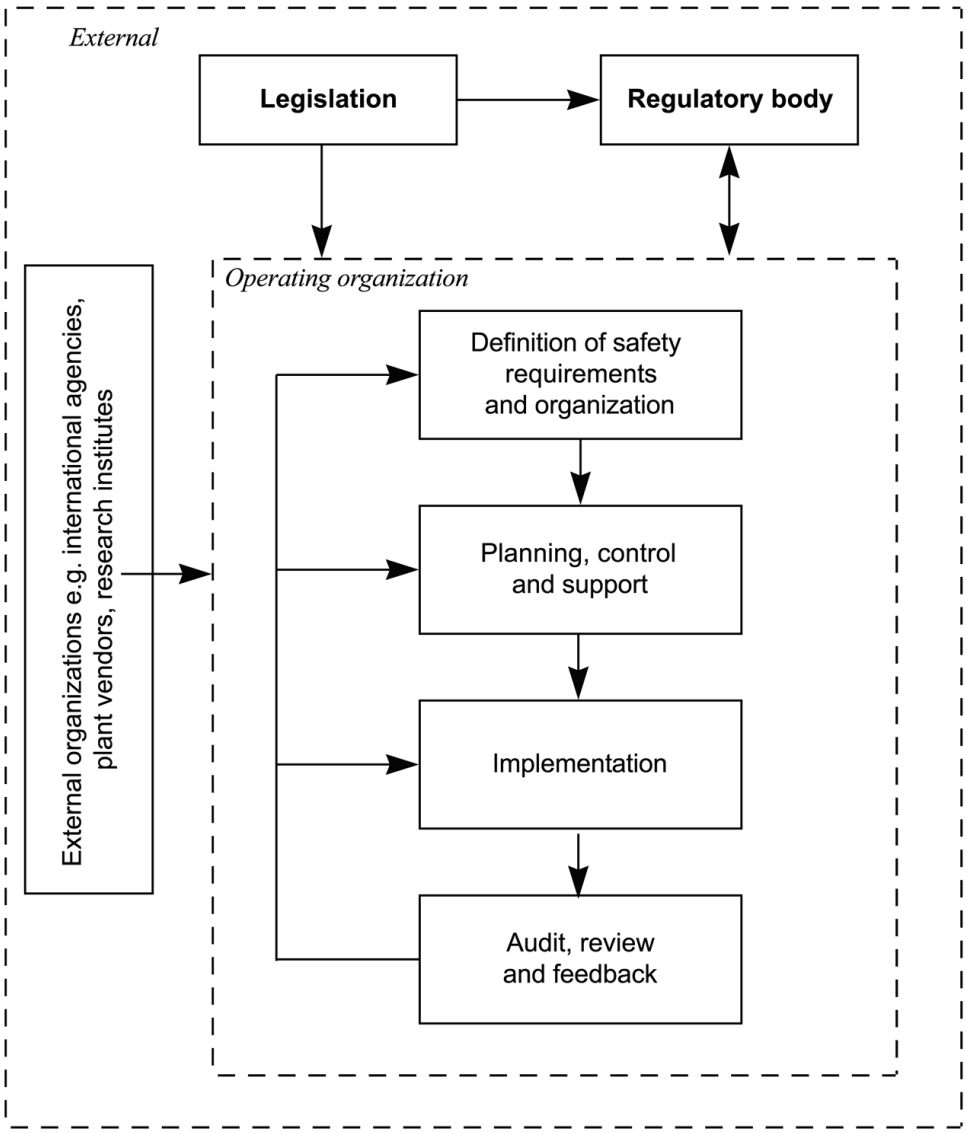


Figure 7: Quality management system for continuous improvement through ISO 14001.

Retrieved from *http://www.7formations.com/quality-management-system-implementation-services/*



Source: INSAG (1999)

Figure 8: The ISO 14001 integration in the organisation

http://www.emeraldinsight.com/journals.htm/journals.htm?articleid=840597&show=html&WT.mc_id=alsoread

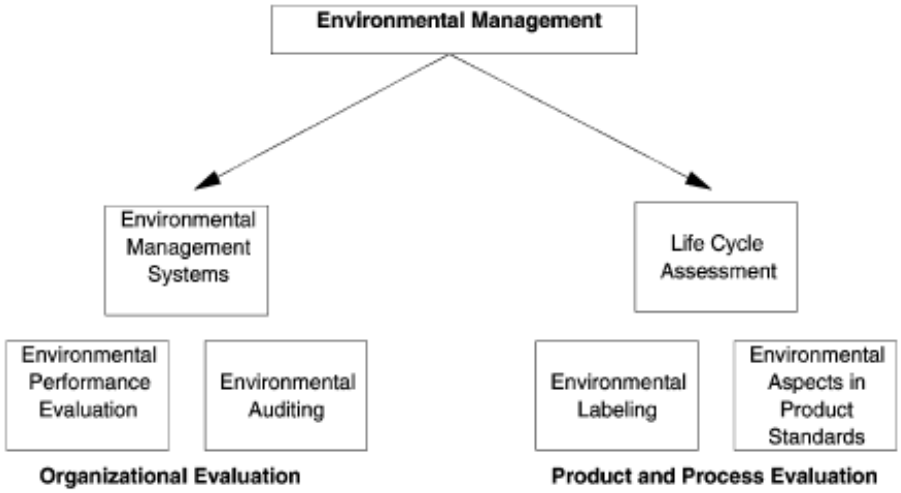


Figure 9: Environmental Management

Steven et al., 2003

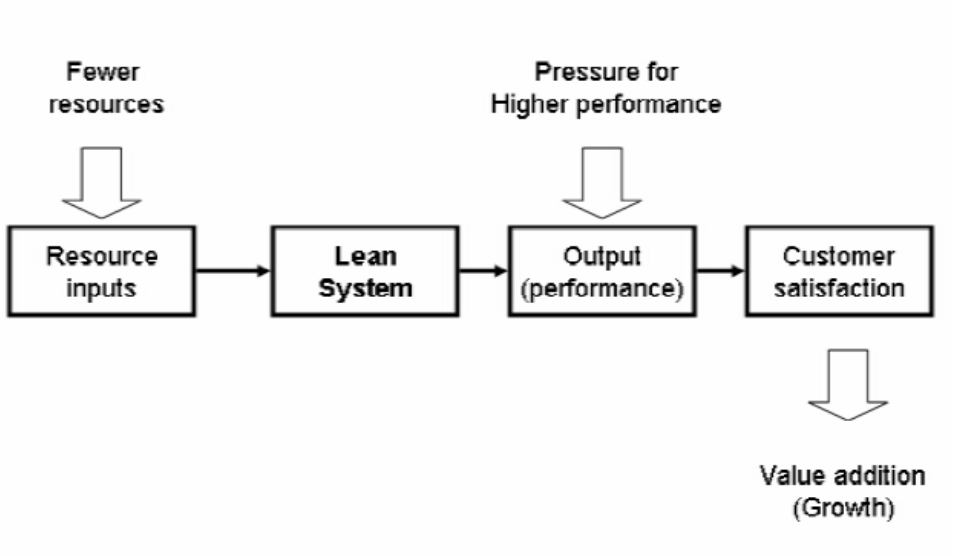


Figure 10. Lean Production System

(Paez et al., 2004)

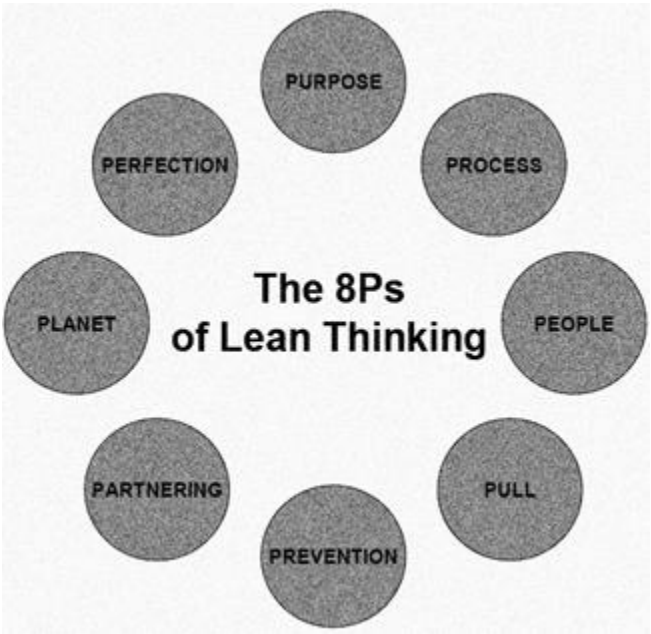


Figure 11: The 8Ps of the Lean Business System

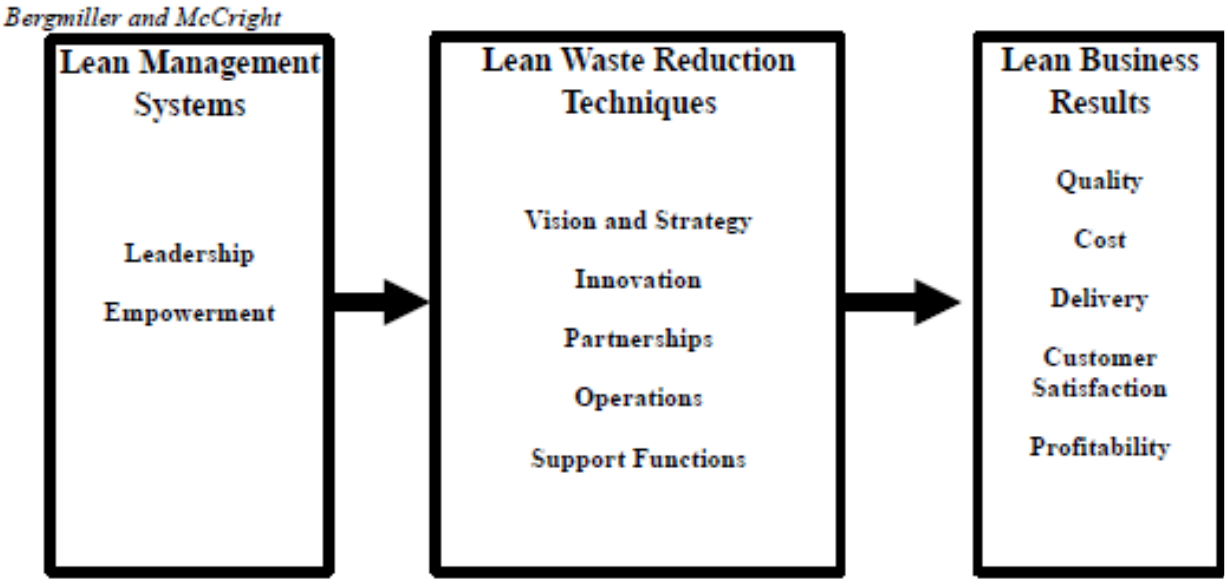


Figure 12: Advanced Lean System Model

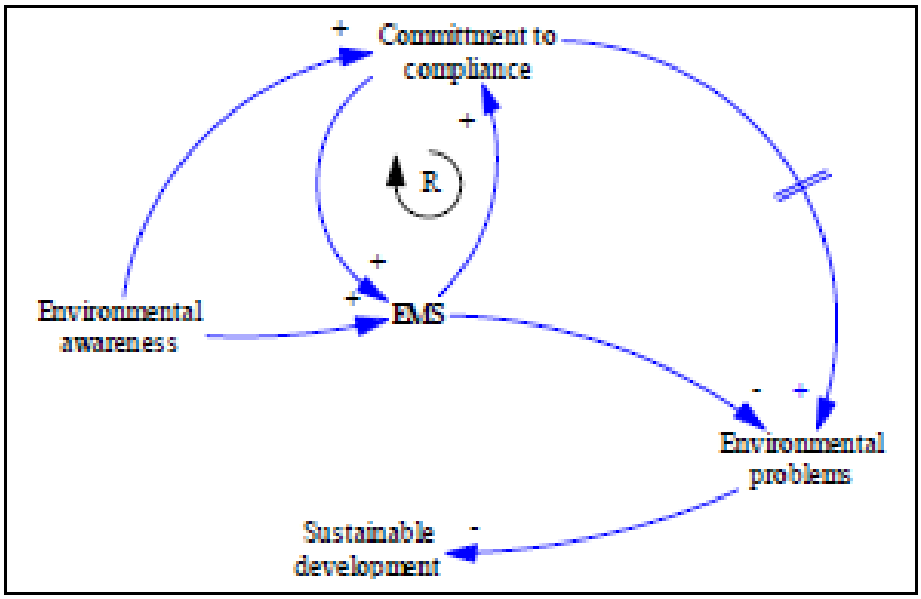


Figure 13: A CLD of a Problem

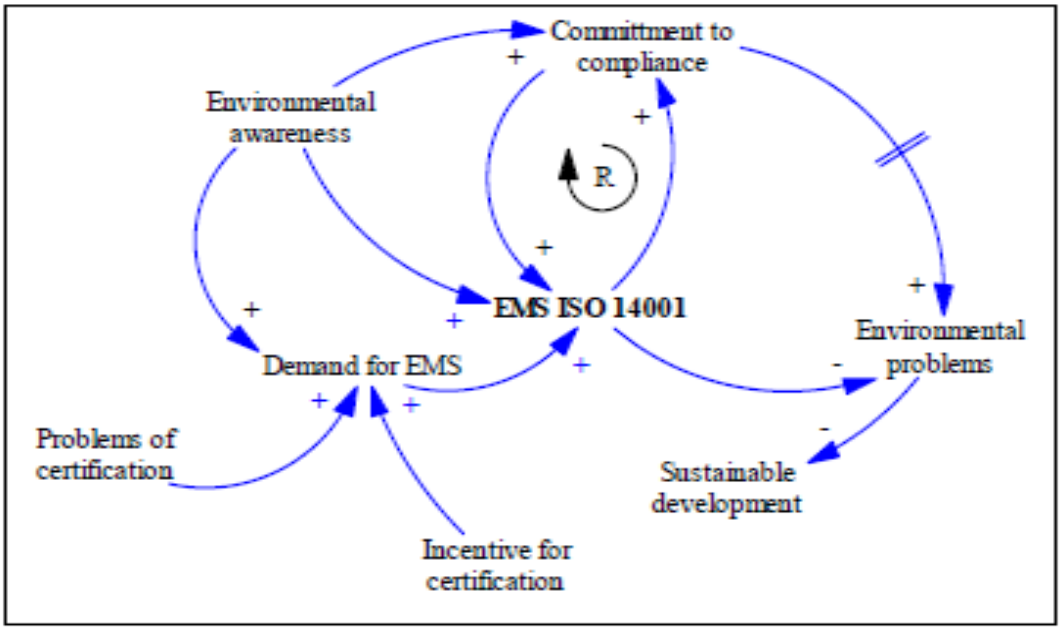


Figure 14: A CLD of the Conceptual Framework

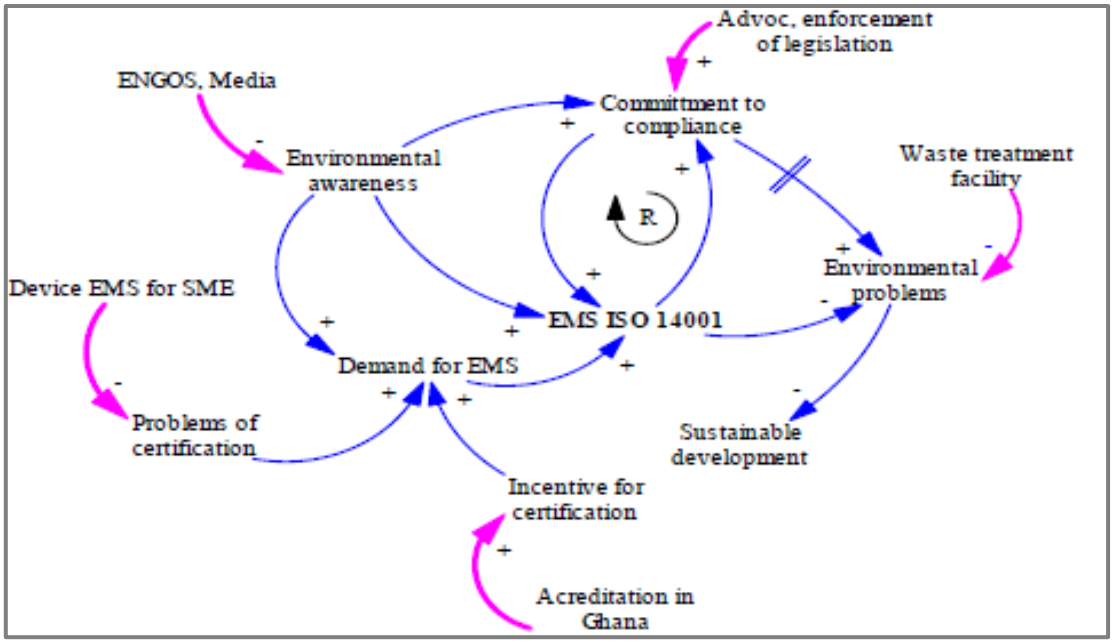
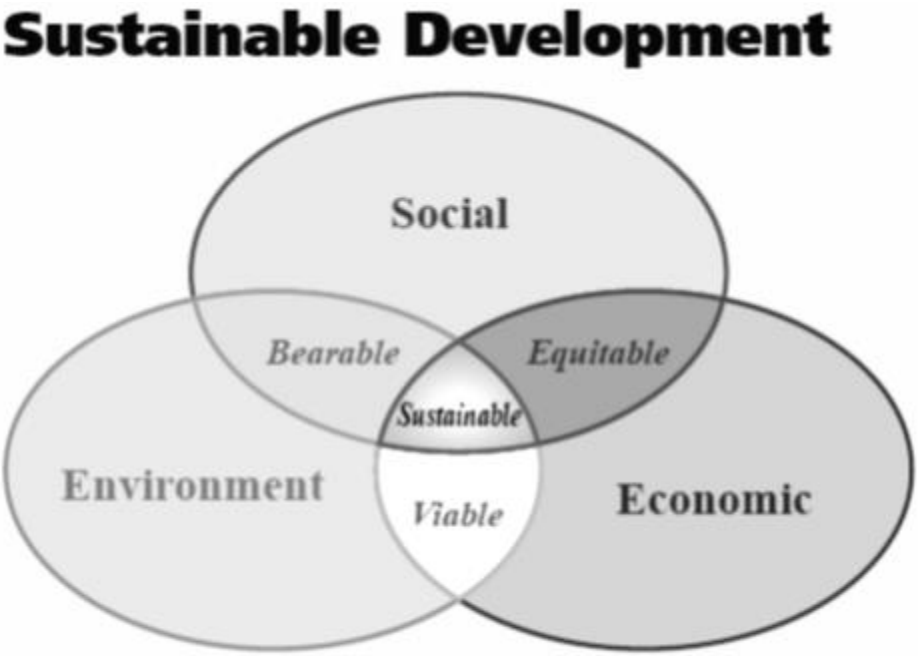


Figure 15: Ways to increase the use of EMS for sustainable development



Note. Sustainable development image by John Dreo, 2006, Wikimedia. Retrieved March 22, 2010, from http://commons.wikimedia.org/wiki/File:Sustainable_developments.svg.

Figure 16: Sustainability Development

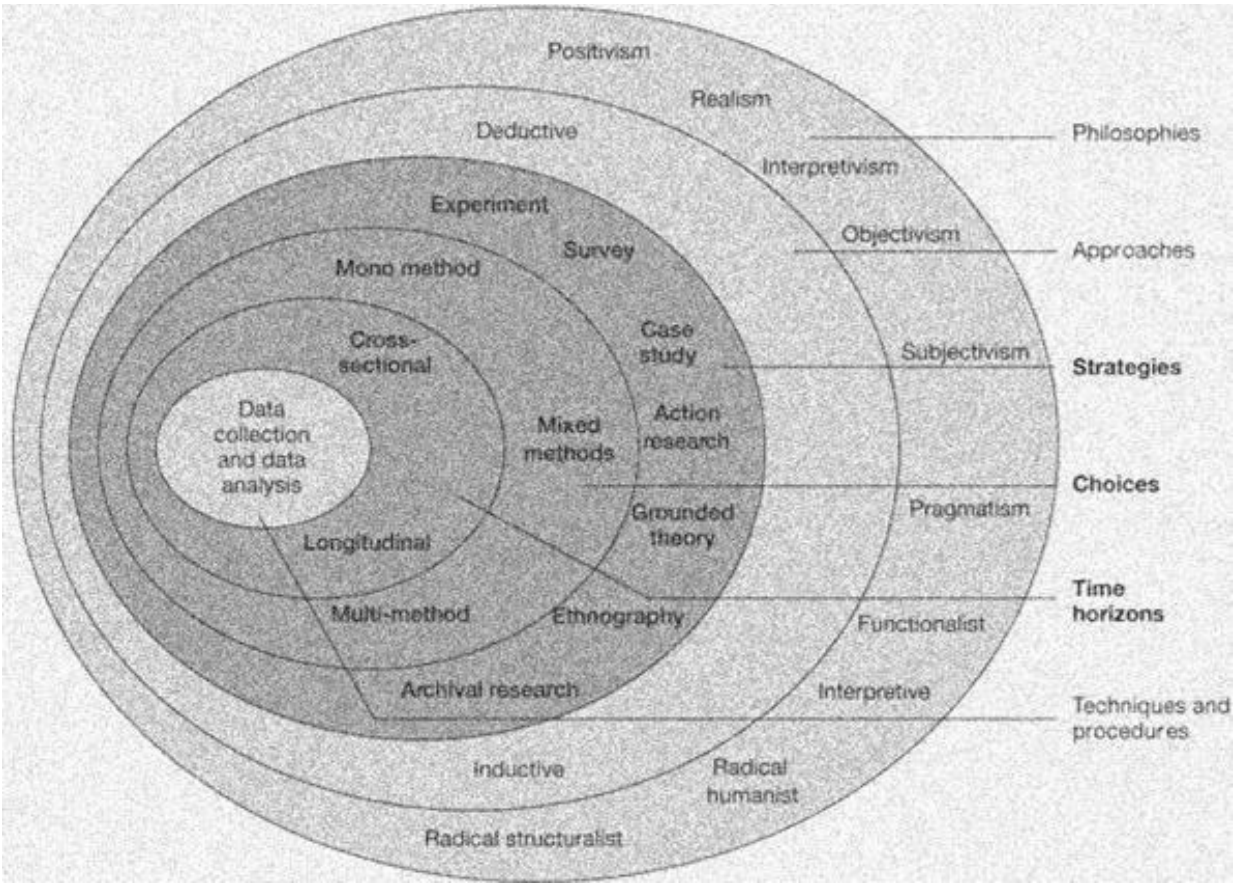


Figure 17: Research Onion,

Source: Saunders et al (2012)

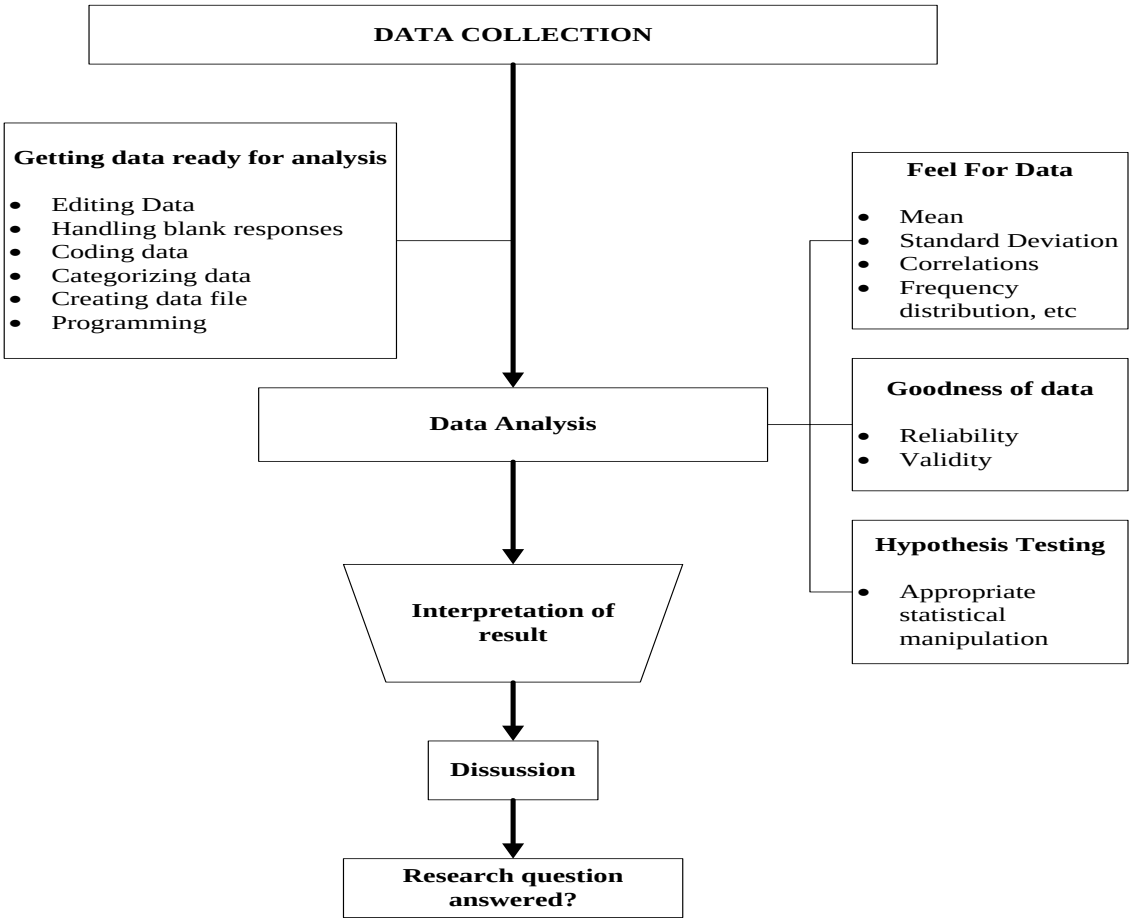


Figure 18: Data Analysis Flow Chart

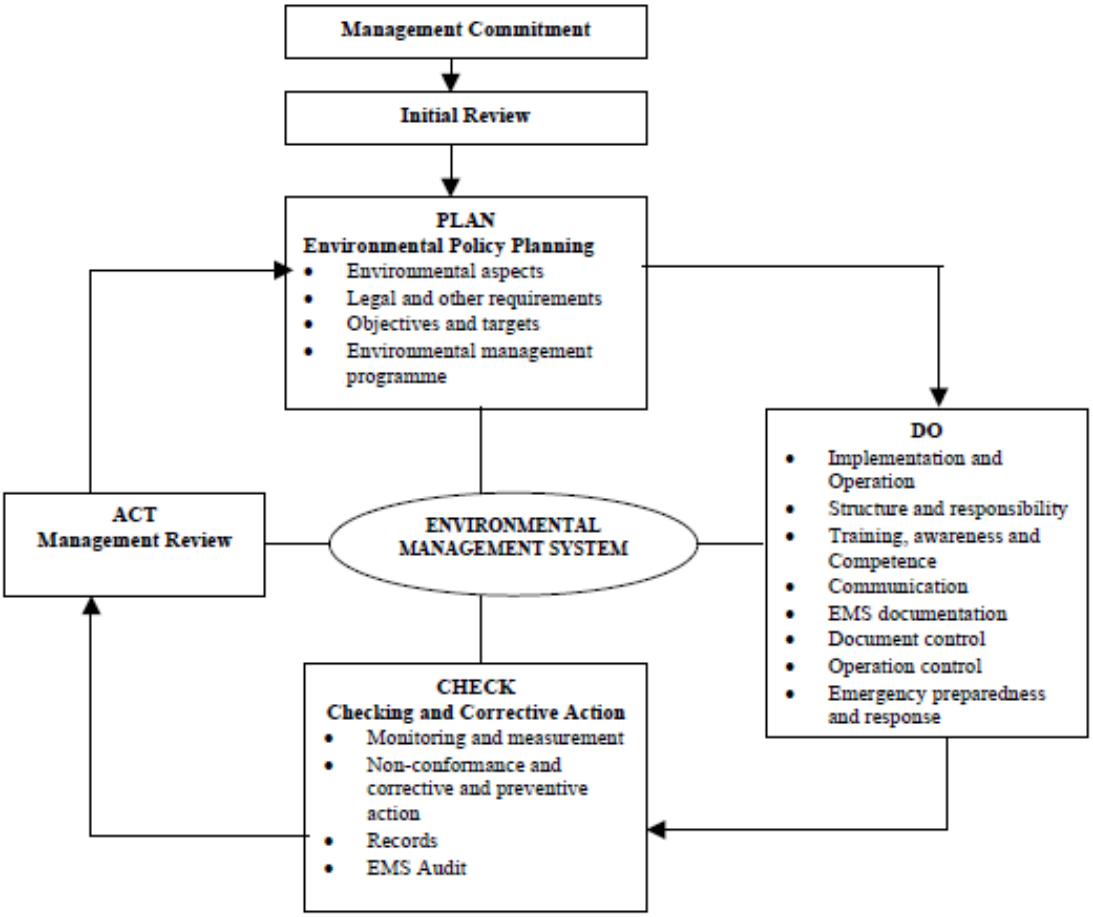


Figure 24: Environmental Management System (EMS) Cycle According to ISO 14001

Source: Kuhre (1995): ISO Certification- A Practical Guide for Formulating Effective Environmental Management System (EMS).

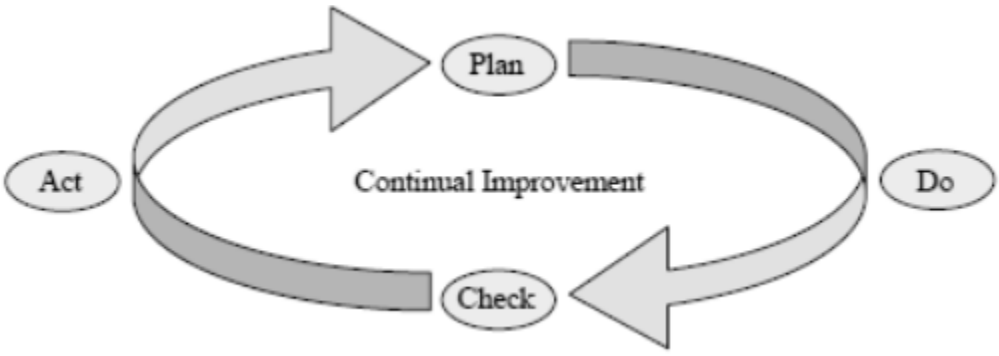


Figure 25: Cycle of continual improvement

Source: Roberts, 1998

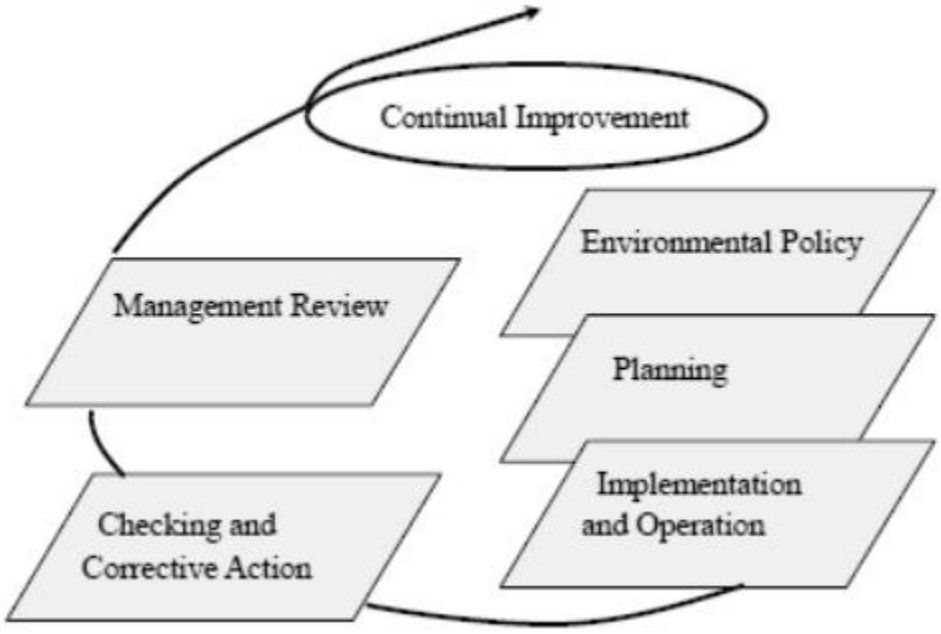


Figure 27: Five steps of ISO 14001

Source: BS EN ISO 14001, 1996