RIT

Design and Implementation of Environmental Management System (EMS) using ISO 14001:2015 standard in a Medical/Healthcare Organization

By

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Abstract

Environmental Management Systems (EMS) have been widely implemented by organizations across various industries since late 1980s. The system comprises of policies, procedures, processes, and various documents and formats that are essential not only to attain governance within organizations but also to establish a robust management system. In the last decade, the need to enhance environmental performance and achieve sustainability objectives has become a business imperative for organizations across the world. Organizations are mandated to comply with environmental requirements and regulations through contractual agreements between customers and their business partners. Globally, the ISO 14001:2015 standard in its current version is the most implemented environmental management system (EMS) across organizations. It is a framework based on 'PDCA-Plan, Do, Check, Act' cycle.

Medical and healthcare organizations are varied in nature from hospitals, emergency care centers, clinics to humanitarian aid supply establishments. In this capstone paper, we will present a practical, real-world example of how an environmental management system (EMS) was implemented in a medical supply organization in the UAE. The organization caters to customers in humanitarian aid and relief domain by supplying a range of medical products in their projects, often in intricate and challenging geographic locations.

Key words: Sustainability, Humanitarian, management system, environmental management system

Introduction

Environmental Management Systems (EMS) have been widely implemented by organizations across various industries since the late 1980s. The system comprises of policies, procedures, processes, and various documents and formats that are essential not only to attain governance within organizations but also to establish a robust management system. In the last decade, the need to enhance environmental performance and achieve sustainability objectives has become a business imperative for organizations across the world. Organizations are mandated to comply with environmental requirements and regulations through contractual agreements between customers and their business partners. Globally, the ISO 14001:2015 standard in its current version is the most implemented environmental management system (EMS) across organizations. It is a framework based on 'PDCA-Plan, Do, Check, Act' cycle.

Medical and healthcare organizations are varied in nature from hospitals, emergency care centers, clinics to humanitarian aid and supply establishments. In this capstone paper, we will present a practical, real-world example of how a team implemented an environmental management system (EMS) within a medical supply organization in the UAE. The organization caters to customers in humanitarian aid and relief domain, by supplying a range of medical products in their projects, often in intricate and challenging geographic locations.

The EMS project became a cornerstone to answer two questions on environmental status of the organization, 1) What are the environmental issues arising due to their business activities and how EMS is beneficial to the organization? 2) How an organization can plan, measure, monitor, and mitigate environmental risks in a medical supply chain?

This report provides a detailed information to implement an EMS within a medical supply/healthcare organization.

About Organization

International SOS is a medically led company with 35 years' operating experience supporting governmental and international organizations globally. Led by 13,000 multi-cultural security, medical, logistics and digital experts in 90 countries, International SOS directly employs over 5,400 medical professionals across its offices, clinics, and remote sites.

There are various type of medical supplies and distribution services rendered by International SOS' company capability brand, MedSupply. It assembles, distributes, and packs medical supplies and kits in accordance with in-country regulations and client requirements. In 2021 alone, International SOS delivered 300,000 new medical kits, 200,000 refurbished medical kits, and 3,500,000 pharmaceuticals, consumables, and equipment shipments through its medical services capabilities.

Considering above example of a medical supply organization, the nature of the products procured within the organization are distinct and requires specific type of storage, packaging, and transportation requirements. The products are classified as outlined below and depicted figure 1 below.

Figure 1: Product classification in a medical supply organization

MedSupply International FZCO (MIF) is a fulfillment center located in DAFZ-Dubai, UAE, and serves as a center of excellence (COE) within International SOS to cater customers in government services, military, and NGO business segments. The primary activity of the organization is supply and distribution of pharmaceutical, medical devices, medical equipment, medical kits, and consumables to various clients in the domain of government services. MedSupply's sourcing and procurement strategy is global in nature, hence suppliers are based across the globe; therefore, the company needs significant amount of transportation services to transport products from supplier origin countries to final customer destinations. The business activities of MedSupply have a significant environmental impact due to transportation and distribution, and packaging of the products. Hence, a project was launched to develop and implement an EMS at MedSupply Dubai in accordance with the ISO 14001:2015 standard. The primary goal of this project is to enhance environmental performance and showcase it through well-defined environmental processes.

Project Problem Statement

The medical supply organization faces a critical challenge in effectively managing and reporting its environmental impact and sustainability practices. Without a structured environmental management system in place, the company lacks a comprehensive approach to address environmental issues, such as transportation and distribution, packaging, and waste management. This hinders the organization from meeting regulatory requirements, adopting best environmental practices, and demonstrating its commitment to environmental responsibility to stakeholders and customers. Therefore, the urgent need was to implement the ISO 14001:2015 standard to establish a robust framework for environmental management, enhance environmental performance, and pave the way towards a more sustainable future for the organization and the communities it serves.

Transportation and distribution, Packaging, and Waste Management are the three areas identified and considered with respect to MedSupply's business operations, since these activities caused significant environmental impacts. In the later sections of this report, details of methodology adopted by the organization to derive the environmental impacts have provided.

By implementing an EMS at MedSupply, and obtaining ISO 14001 certification, the organization intends to increase environmental performance, and to exhibit effectiveness of operational control processes.

a) The environmental impacts such as air pollution and carbon-di-oxide (CO_2) emissions caused due to transportation of shipments attributed to burning of fossil fuels, predominantly in air mode of transport is known to MedSupply.
b) Packaging of goods is needed for the products procured from suppliers. Shipments are packed by suppliers using secondary packing materials. Shipper cartons made up of paper-based materials. In addition, goods must be palletized for safe handling during transportation, therefore pallets made up of wooden and plastic are used by suppliers and 3PL service providers.
c) Waste management or disposal of pharmaceutical products that have either expired or found defective must be disposed and destructed according to local environmental

regulations in the UAE. The organization orders product upon winning tenders from customers, hence orders are placed for the materials based on customer project needs. This approach of not keeping any inventory of products helps the organization in avoiding obsolescence of materials or expiration of pharma products.

Project Justification

MedSupply's customer base is primarily into humanitarian aid and relief, these organizations are pioneers in leading and stipulating environmental and sustainable development goals. Firstly, compliance to environmental requirements of customers is one of the key criteria to conduct business with such customers. Secondly, by implementing an EMS, MedSupply is committed to fostering workplace awareness and respect for the environment among all levels of the organization to ensure environmental protection. Lastly, considering five market forces (figure 2) this project was undertaken. There was a need to be ISO 14001 certified not only to meet customer requirements but also to fulfill tender participation and scoring criterion administered during tendering process of large medical supply projects.

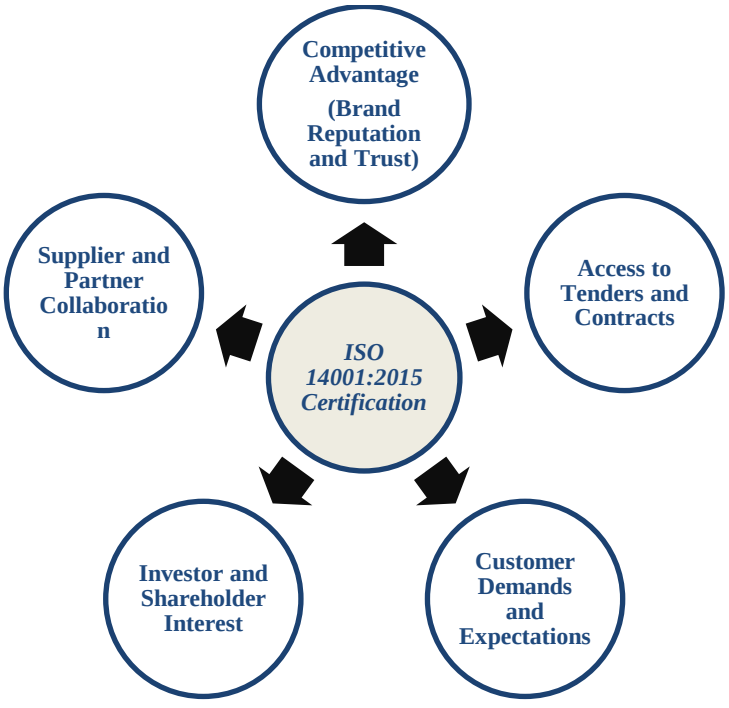

Figure 2: Market forces for EMS implementation project

1) ***Competitive Advantage:*** ISO 14001 certification can provide a significant competitive advantage through brand reputation and trust in which customers may prefer to work with environmentally conscious partners, leading to increased market share and revenue growth.
2) ***Access to tenders and contracts:*** Governmental agencies and large aid and relief corporations often stipulate environmental and sustainability requirements in their tender RFQ's, including ISO 14001 certification. Fulfilling such requirements will help the organization get higher score during tender evaluation thus opening new business opportunities.
3) ***Customer Demands and Expectations:*** Globally, there has been a steep increase in customers' demands to supply products and services from environmentally responsible companies. ISO 14001 certification can be a strong market differentiator, attracting customers who prioritize sustainability and ethical practices.
4) ***Investor and Shareholder Interest:*** Environmental, social, and governance (ESG) factors are given importance by investors and shareholders when making their investment decisions. Therefore, ISO 14001 certification can attract investors and improve an organization's reputation with stakeholders.
5) ***Supplier and Partner Collaboration:*** Sourcing and procurement is a core business process within the medical supply organization. ISO 14001 certification can lead to enhanced collaboration with other environmentally responsible suppliers and partners to bolster mutually beneficial business relationships.

Considering these market forces, the ISO 14001 implementation project presents an opportunity for the medical supply organization to align its environmental practices with market demands and position itself as a responsible and competitive player in the industry.

Project Aim and Objectives

Mission & Overview:

The organization did not have any expertise with EMS; therefore, a team was formed to implement EMS with a goal to design and develop environmental management system (EMS) in MedSupply International FZCO-Dubai and to obtain ISO 14001 certification as shown in table 1.

Overall Objectives	**Measures**
To establish and develop policies, procedures, and documents applicable for ISO 14001 certification, in line with business needs of MedSupply entity	Implement EMS documents
To implement ISO 14001:2015 system, and train MedSupply employees prior to certification audit	Implementation and training of employees
To appoint a certification body and complete ISO 14001 system certification audit requirements	Project status update reports and obtain certification

Table 1: EMS Project objectives

Literature Review

Environmental management system and ISO 14001 standard

Environmental management system (ISO 14001 clause 3.1.2 (ISO-International Organization for Standardization, n.d.)) is defined as a part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects. A management system includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources. The ISO 14001 standard was first published in September 1996; Updated 2004 and it was restructured and revised in the year 2015.

In an article published in environmental science and technology, the authors.

(Massoud & Kamleh, 2010) present the inter-relationships of various stages of implementing an ISO 14001 EMS, shown in below figure 3. The environmental policy objectives can be achieved when there is cross-functional participation within organizations. Therefore, creating awareness and training sessions is a crucial element while implementing ISO 14001 EMS standard in organizations.

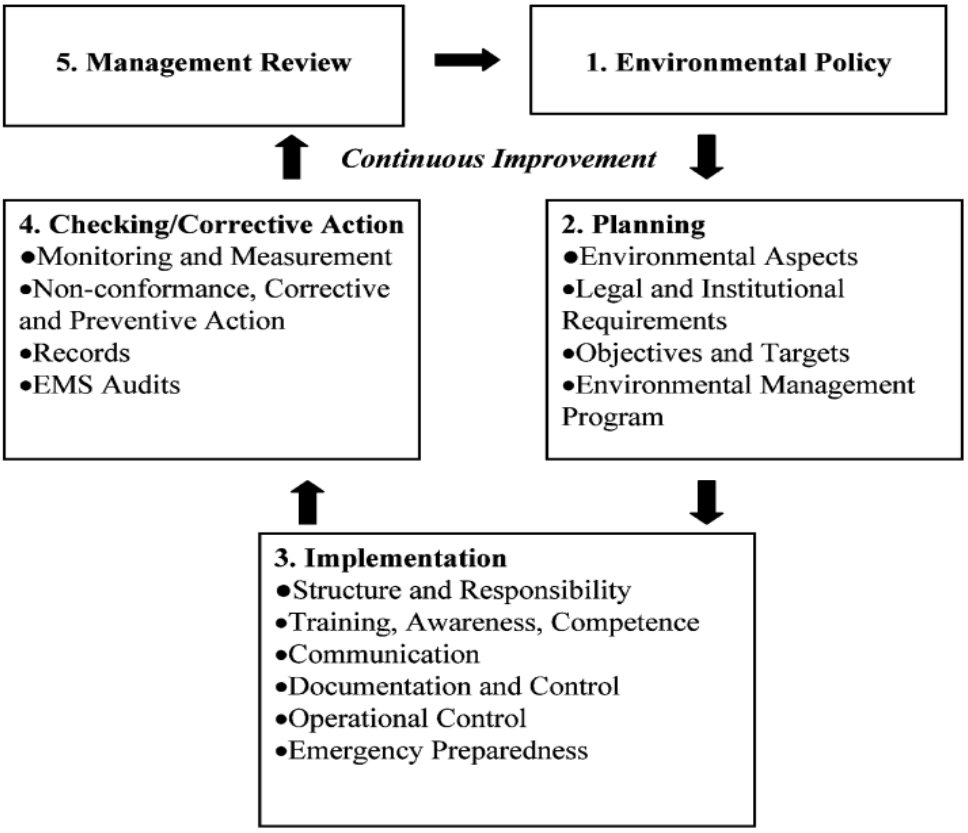

Figure 3: Inter-relationships of implementing an ISO 14001 EMS (Massoud & Kamleh, 2010)

Key Concepts (Environmental aspects and impacts) in EMS

The author (Fet, 2023) in their book 'Business Transitions: A Path to Sustainability', summarized the key concept of an EMS wherein the environmental aspects are the only ones considered in EMS, however social and other governance aspects could be considered using a similar environmental aspect and impact evaluation approach. Figure 4 (Fet, 2023) illustrates the pathway for determining environmental impacts caused by an aspect which is, the use of fossil fuel in transportation. The burning of fossil fuel causes a few emissions into the air, e.g., NO_x, SO_x, particulate matters (PAM), CO_2, VOC, and others. For the

example of emissions above (Fig. 4), CO_2-emissions will have global impact through global warming, while SO_x may cause acidification with a regional impact.

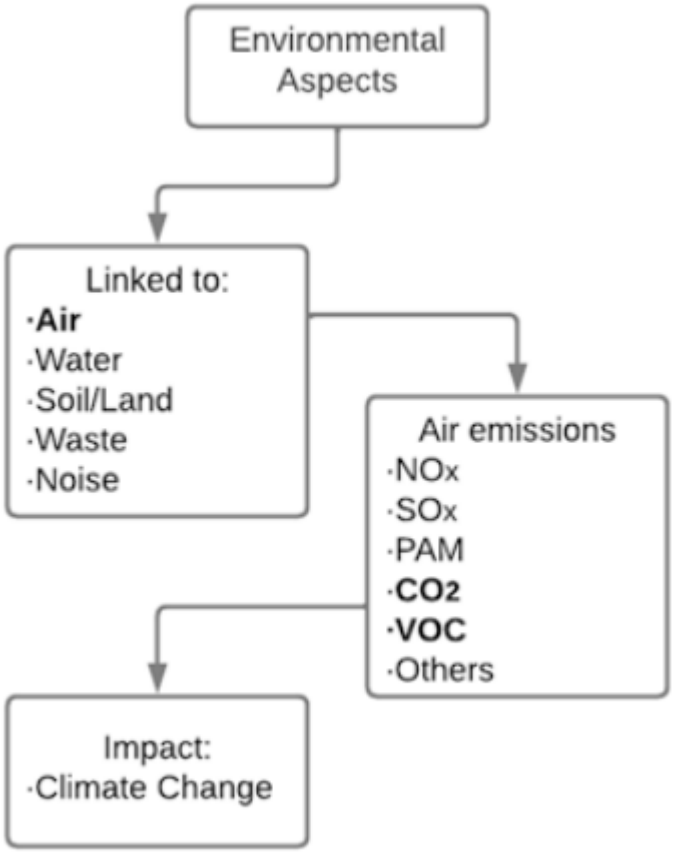

Figure 4: Illustration of pathway from aspects to impacts: emissions from the use of fossil fuel in transportation to the impact on climate change caused by CO_2 and VOC-emissions. (Fet, 2023)

During the project execution, the identification of MedSupply's environmental aspects and their associated impact applies to all activities, products, and services within the EMS scope, including its facilities and infrastructure. The environmental aspects associated with each stage of product lifecycle considering a life cycle perspective is listed below,

- Procurement of materials
- Assembly, supply, and distribution of medical kits
- Transport of the product to customer's delivery destinations
- Use of the product or service
- End-of-life treatment and final disposal

The process for identifying environmental aspects and its impact is documented and detailed in procedure for 'Identification of Significant environmental aspect and impacts.' A register of significant environmental impacts is compiled and maintained within

MedSupply which forms an integral part of EMS. Identifying environmental aspects is an ongoing process. The rate of change within the organization's activities, products and services dictates how often the environmental aspects will be re-assessed, however review shall be conducted at least annually.

The identified and registered significant environmental impacts correspond both to the activities of MedSupply and to those performed by outsourced service providers and suppliers, where MedSupply can have an influence over them. Incidents, accidents, emergency situations, past activities (when their impacts towards the environment have persisted until the present), current activities and planned activities can be considered.

Organization Context in developing EMS.

Understanding the organization and its context

MedSupply has considerable experience in the provision of medical supplies to governments, inter-governmental organizations such as NATO and several UN agencies as well as non-governmental organizations, from national to state level. MedSupply end-to-end service offering includes:

- The procurement, supply and distribution of pharmaceutical, medical devices, medical equipment, and consumables to various clients in the domain of government services. Logistics services and consultancy is another service offering.
- MedSupply is also a provider of assembly, supply, and distribution of medical kits. The kits are designed by sourcing products from approved suppliers following requirements of customers. The kits are prepared by assembling products according to customer requirements and specifications.
- Value-added services such as medical devices and equipment installation and training is also offered by MedSupply for the medical equipment's supplied by the organization to their clients.

MedSupply is committed to supply products and services that meet QMS ISO 9001:2015 system. This is ensured through a competent team of skilled professionals who are subject matter experts in different functional areas namely – Sales and Business development, Bid management, Sourcing, Quality, Finance, Key Account management and Supply Chain Operations-Purchasing, Warehousing and Transportation. The team works collaboratively to ensure meeting customer needs and expectations. MedSupply has a network of approved suppliers who are qualified through a well-developed quality approval process. The products offered by the suppliers are verified and approved by quality team to ensure that it meets technical specifications and any other applicable standards.

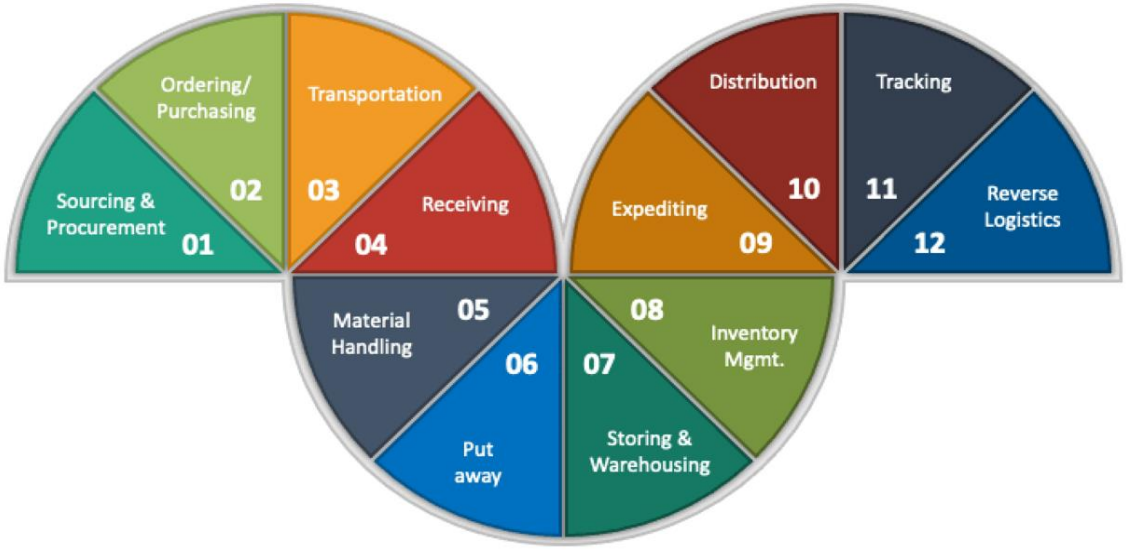

Figure 5: Business processes in a medical supply organization

The scope of each function is established within the organization, and each function performs its distinct roles and responsibilities pertaining to respective business processes (figure 5), ultimately to reach a common customer satisfaction goal.

Environmental Management System of MedSupply

The environmental management system of MedSupply International FZCO is the environmental part of management systems. The EMS of MedSupply is compliant with the requirements of ISO 14001:2015-EMS - specification with guidance for use.

The system covers all the activities of the company from office administration and management, bid management, Quality, Sourcing, Supply Chain Operations which includes Purchasing, Warehousing, and transportation. The EMS is based on information gathered after internal review of business operations and activities that enabled the organization to identify the environmental impacts arising from its activities and the relevant legal responsibilities. The EMS is documented according to the following structure, shown in figure 6.

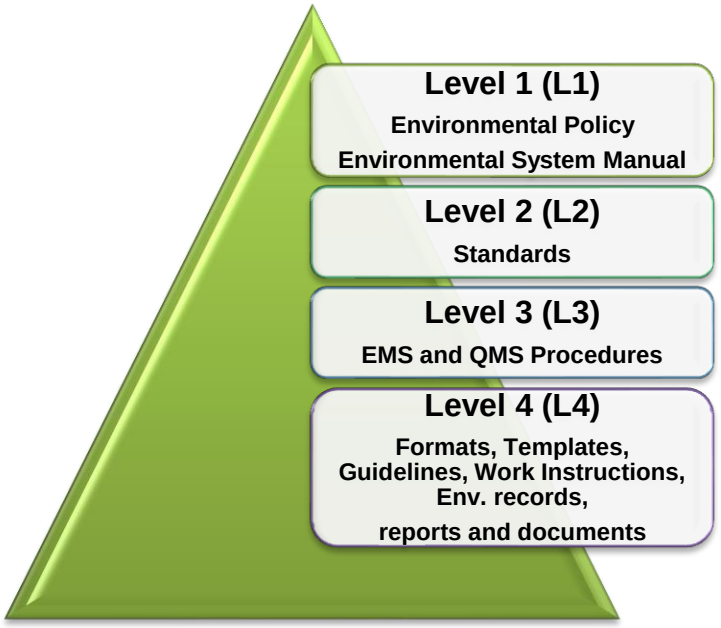

Figure 6: EMS Documentation structure

Developing EMS in a medical supply chain organization

Understanding the needs and expectations of interested parties.

Stakeholder mapping process (figure 7) was adopted in identifying key stakeholders and to determine the requirements and relationships with each other. Therefore, interested parties are stakeholders who have an interest in the project, and are either affected or affected by the EMS implementation project. The needs and expectations of interested parties related to environmental regulations from business activities conducted by MedSupply is shown below in figure 7 and table 2. The various internal and external

interested parties are tabulated in below table 2, along with priority numbering to manage stakeholder expectations.

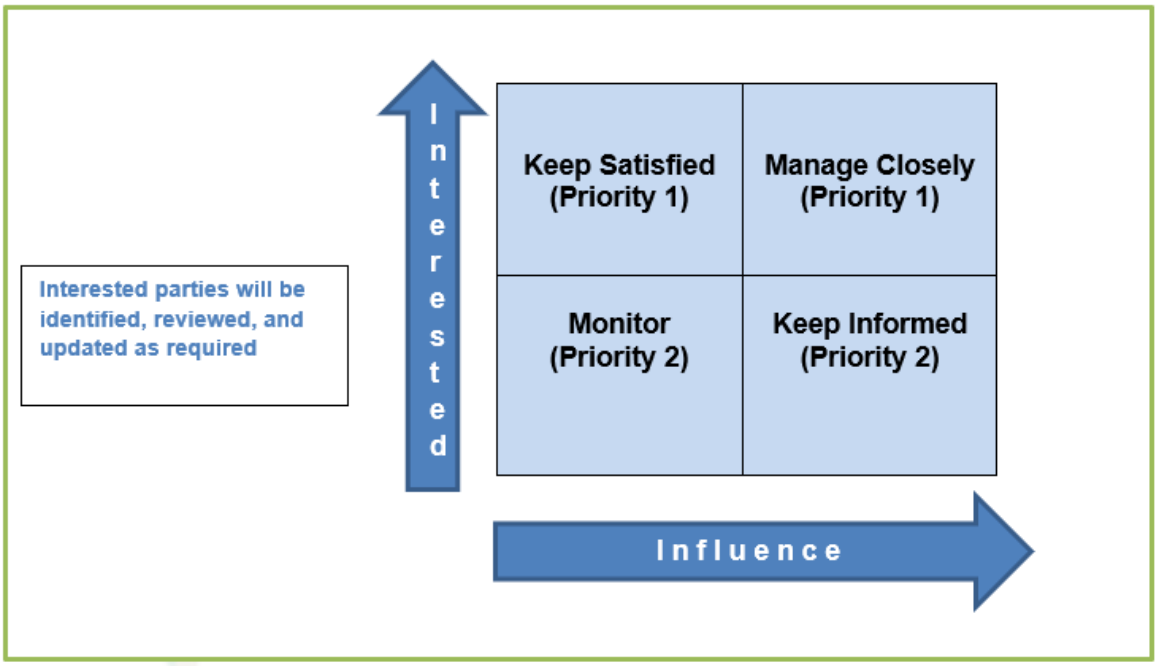

Figure 7: Stakeholder mapping

S/N	Interested Parties	Needs and Expectations	How do we communicate/monitor	Priority Numbering
1	Top Management, Shareholders, and Investors	• Deliver strategic objectives- Ecofriendly image. • Efficient use of resources and raw materials • Deliver expected profitability. • Transparency	• Board meeting and updates • Annual reports	**Keep Satisfied (Priority 1)**
2	Government agencies (DAFZ) and regulatory bodies, MOHAP, Dubai Municipality (Environmental legal and safety)	• Compliance with permits and legal requirements • Applying best practices • Carbon reduction	• Periodic reporting • Site visits by regulatory authority • Internal and external audits • Regulatory reporting • Compliance to permit	**Keep Informed (Priority 2)**
3	Customers	• Compliance to ISO standards (QMS/EMS) • Customer visits • Sustainable sourcing	• Tender and bid submissions. • ISO certification • Customer visits	**Keep Satisfied (Priority 1)**
4	Suppliers	• Continuity of relationship, mutual benefits in supply chain	• Supplier assessments and meetings • Third-party audits	**Monitor (Priority 2)**

		• Supplier assurance audits • Mutual sustainable sourcing		
5	Outsourced services provider	• Reducing the amount of potentially hazardous substances • Reduction of air pollution • Reduce carbon emissions. • Technical support and audit	• Tender/contract • Verification audit • Quality certification of products and services offered	**Manage Closely (Priority 1)**
6	Employees	• Ethical practices • Responsible use of material and resources • Safer internal environment	• Team briefings and townhall meeting • Environmental campaigns & newsletters • Annual reports • Intranet and recruitment	**Keep Informed (Priority 2)**
7	Other interested local organizations and groups (NGO), Emirates Environmental Group (EEG)	• Assurance of environmental compliance • Noise monitoring • Support to local interested groups • Company insurers and loss prevention advisors	• Support local environmental groups. • Site visits and perimeter surveys • Prompt response to complaints	**Monitor (Priority 2)**

Table 2: EMS – Needs and Expectations of interested parties.

There is a likelihood that the environmental expectations of the determined interested parties will directly corelate to MedSupply's compliance obligations. MedSupply will consider the relevant needs and expectations of interested parties that are known to them or have been disclosed by them, while taking decisions or modifying activities related to its environmental performance and when there is likelihood that the interested party might get affected by this.

The needs and expectations become mandatory when they have been incorporated into laws, regulations, permits and license condition by regulatory bodies. The organization may also decide to voluntarily agree to or adopt other requirements of interested parties such as UN SDG's, UN Global compact, and environmental best practices and regulations with

transportation and outsourced service providers. Whenever applicable such compliance obligations shall be evaluated by the Environmental Management Representative (EMR) and considered when planning the environmental management system.

Scope of the Environmental Management System (EMS) in MedSupply

The environmental management system applies to activities related to office administration and management, bid management, Quality, Sourcing, Supply Chain Operations which includes Purchasing, Warehousing, and transportation.

MedSupply has its office in Dubai-UAE, however the organization is not in the business of selling any products domestically in the UAE. Projects awarded by their customers are executed by the organization in various global locations. Procurement of products takes place both locally and from a global supplier base. Shipments are imported in the UAE to our outsourced 3PL service provider, which is a freezone entity. Shipments are then delivered to consignee address in the UAE freezones or exported to international delivery destinations as outlined in the customer issued contracts.

<u>EMS Scope of Certification / statement is.</u>
"Supply and Distribution of pharmaceuticals, vaccines and medical products including medical devices, medical equipment and consumables."
"Assembly, supply and distribution of medical kits"
"Management of installation and training services for medical equipment"

Figure 8: Scope of EMS in MedSupply

The scope of EMS in MedSupply is shown in figure 8 and their key business activities are shown in figure 9. The organization relies on outsourcing as a business strategy, the key outsourced processes of MedSupply are outlined below: -

- ***Storage and Warehousing:*** Storage and packaging of products with a 3PL service provider (Hellmann Calipar Healthcare Logistics) in Dubai South, Jebel Ali.
- ***Transportation and Distribution services*** for shipment deliveries rendered by approved freight forwarders of MedSupply.
- ***Assembly of medical kits by 3PL*** service providers whenever applicable.
- ***Installation, commissioning, and training services*** for medical equipment's.

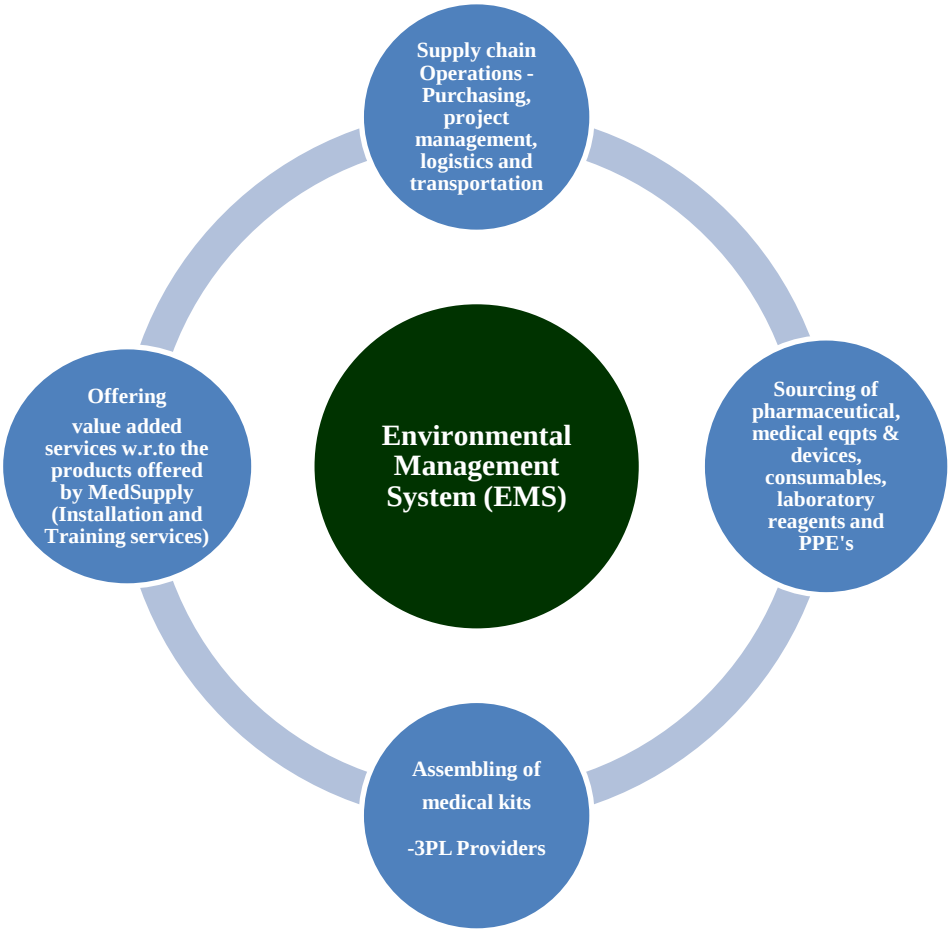

Figure 9: Key Business activities of MedSupply

Developing EMS effectiveness for MedSupply

MedSupply Supply chain and its impact on the Environment

The organization's business operations have a global reach, products are procured from one country and delivered to another, depending on customer, and agreed contractual requirements which is mentioned by referencing to appropriate incoterm, as per incoterms 2020. MedSupply has followed a process approach and listed all their activities, products, and services in the 'EMS Register of Aspect and Impacts.' Evaluation of significance of aspects and impacts through technical analysis and judgement by the organization was conducted. By following, a risk-based scoring technique, the significant environment impact processes were identified. As an outcome of above evaluation of activities, it was determined that Transportation, Packaging, and waste management are the three areas identified and considered with respect to MedSupply's business operations, and the impact of these activities to the environment.

Transportation and Distribution

MedSupply procures products by ordering from different suppliers who are based across the globe; therefore, the company needs significant amount of transportation services to transport products from origin country of supplier i.e., inbound transportation. Depending

on the project scope and supply chain operations execution plan, the products are stored at 3PL storage partner locations either for storage or for consolidation of shipments. Through outbound transportation process, products from interim storage locations are transported to final customer destinations, often in intricate and challenging to reach countries.

The transportation services are rendered through a network of approved freight forwarders/transportation service providers. The mode of shipment is adhered, as requested by customers, or restricted by agreed contractual delivery dates and lead-time. Air and sea freight is mostly used as a mode of transport by the organization. The company strives to partner with logistics service providers who have implemented environment friendly transportation solutions. Using Greenhouse Gas (GHG) protocol (figure 10), Scope3 emissions caused due to transportation and distribution is emphasized within MedSupply.

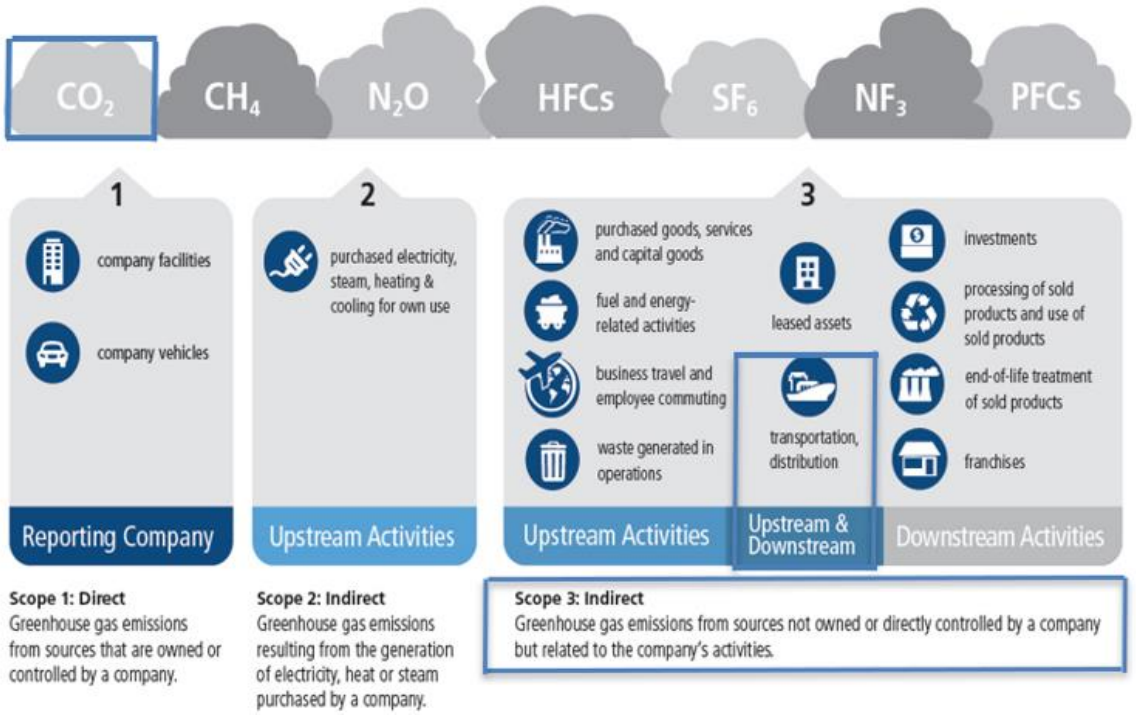

Figure 10: GHG Emissions protocol

Packaging

To ensure the integrity of products and shipments during transportation, the organization instructs suppliers to use proper packaging prior to transportation of shipments. Packaging of goods using shipper cartons made from paper is used by suppliers and 3PL

service providers. Pallets made from wooden and plastic materials are used not only by suppliers, but also by 3PL service providers to pack and ship products. Therefore, packaging makes up a significant environmental impact area within the organization.

MedSupply procures products such as a vaccines and temperature-controlled pharmaceuticals requiring transportation in cold chain packaging solutions to ensure temperature control so that products are not damaged prior to delivery of shipments to customer destinations. Hence, use of shipper cartons, wooden and plastic pallets as a packaging material is another area that MedSupply considers having direct impact on environmental front. Cold chain packing materials (passive or active) are used for packing cold chain shipments whenever needed. In a medical supply organization, product characteristics has a significant role on product packaging costs and on transportation. Some of the medical product related logistics aspects that are critical and considered as a part of logistics execution and transportation planning is mentioned in below table 3.

Product	Nature of Product	Product Packaging
- Pharmaceutical **- Vaccines**	- High weight-bulk ratio - Prone to environmental conditions such as pressure, temperature, and humidity	- Requires suitable packaging requirements such as temperature-controlled containers and pallets - Products needs to be packed in jar, bottle, or a box
- Medical equipment & devices	- High weight-bulk ratio and value-weight ratio - Medical equipment has dangerous goods such as batteries, chemicals, electrical and electronic parts, gases, etc. in it	- Requires special packaging according to hazardous/DG goods regulation of IATA. - Some of the medical equipment can only be transported by sea freight as a mode of shipment, hence packaging must be done accordingly,
- PPE **- Consumables** **- Laboratory reagents**	- High weight-bulk ratio - This product category is varied in nature ranging from general cargo to cold chain products	- Generally, very bulky shipment after palletizing of goods, hence, must be transported by sea freight to optimize total cost of ownership
- Medical kits	- High weight-bulk ratio and value-weight ratio - Medical kits could range from couple of products to hundreds of items depending on type of kit	- Packaging requirements vary depending on type of kit, some kits can be assembled in a bag, others in a carton and pallets.

Table 3: Typical products, product characteristics and packaging in a Medical Supply Organization.

Waste Management

Waste management or disposal of pharmaceutical products that have either expired or found defective are destructed according to local environmental regulations in the UAE. Disposal of pharma products is performed whenever required by 3PL service provider. To minimize the impact disposing of pharmaceutical products has on the environment, trainings, and awareness sessions for employees on good practices for air pollution, packaging materials and waste management and disposal is conducted on a regular basis. Pharmaceutical products destruction and management procedure is followed within MedSupply whenever there is a need to dispose expired pharmaceutical products. Dubai (Dubai Municipality, 2023)Technical Guideline No 28, waste minimization, year 2000 is a

legal obligation that organization has reviewed to ensure compliance to stipulated regulations.

Internal and External Issues of MedSupply

The environmental issues and details mentioned in earlier sections is used as an input to identify, analyze, monitor, and review the external and internal issues that are relevant to the organization's purpose and may affect their ability to comply with environmental regulations and environment management topics. The internal and external factors outlined below are determined in table 4. The factors identified could result in risks and opportunities to the organization.

Using PESTEL analysis tool, strategic analysis was performed. Refer below table 4 for the analysis and classification of internal and external factors.

Area	Factors	Factor Type	Issues
POLITICAL	Political trend, elections, stability in government	External	If sustainability is not a high priority, potentially may not meet established objectives or maintain compliance
POLITICAL	Donations/regional funding	External	Lack of funding committed to meet environmental objectives
POLITICAL	War/Conflict/Terrorism events	External	Increased or abrupt demand of products, without facility upgrades or partnerships with outsourced service providers could potentially affect compliance with permit conditions
POLITICAL	Federal policies/Regulations on climate change	External	Regulatory changes that require newly established environmental objectives
ECONOMICAL	International customer demand	External	Increased or abrupt demand of products, without facility upgrades or partnerships with outsourced service providers could potentially affect compliance with permit conditions
ECONOMICAL	Customer priorities	Internal	Customer requirements to meet energy/fuel efficient products/services

SOCIAL	Media view	External	Negative PR if environmental objectives are not met
SOCIAL	Demographics/workforce	Internal	Training, competence, and awareness conformance
TECHNOLOGICAL	Waste Handling and disposal	Internal	Waste storage and disposal permit compliance
TECHNOLOGICAL	Process Capacity limitations	Internal	An increase in throughput without necessary capacity upgrade increases potential for waste and permit excursions, as applicable
TECHNOLOGICAL	Obsolete Equipment	Internal	Increased risk of spills, leaks, and permit excursions
ENVIRONMENTAL	Weather/climatic conditions	External	Changes in shipment delivery schedules
ENVIRONMENTAL	Use of transportation service providers	Internal	Minimizing impact to environment due to transportation activities of business
LEGAL	Environmental Regulations	External	Lack of awareness of regulatory changes could increase potential for non-compliance with compliance obligations/penalties
LEGAL	Compliance agreement/federal consent decrees/agreed order of consent	External	Lack of communication may directly impact compliance towards compliance obligations

Table 4: PESTEL Analysis of External and Internal Issues

Discussion on EMS Project Methodology, Deliverables, and Implementation

Project team, Roles, and responsibilities

Environmental management system (EMS) was a subject matter for which there was no expertise available within the organization. Therefore, a team (figure 11) comprising of four cross-functional team members was formed in alignment with instructions from top-management. EMS project manager, being an ISO 14001 certified Lead auditor was assigned for this project who would report to the top management of MedSupply. In addition, three staff members from other functions were also embarked in the project so that

those individuals could also acquire skills and knowledge about EMS and effectively contribute towards success of the project.

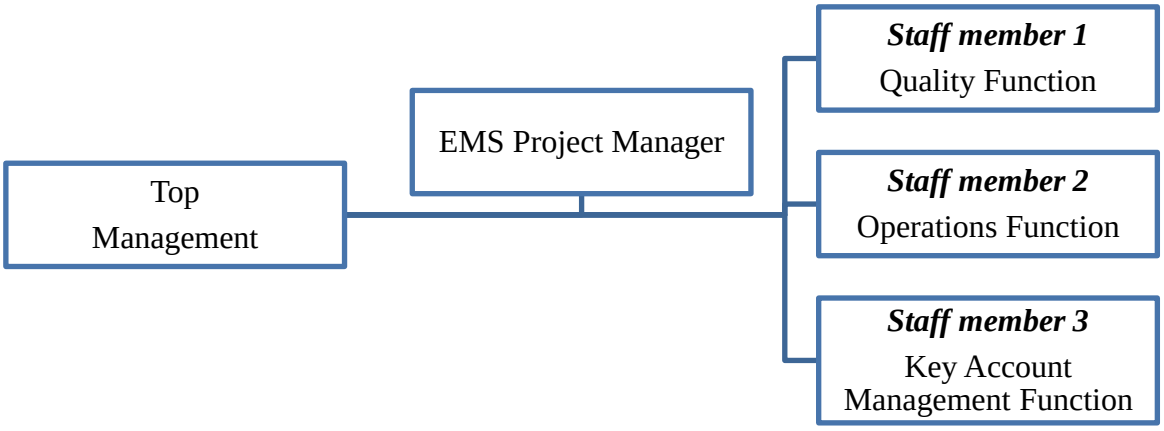

Figure 11: EMS Project team

EMS project manager is also an Environmental management representative (EMR) appointed by the management of the organization. He has the responsibility and authority for:

a) ensuring that EMS requirements are established, implemented, and maintained in accordance with latest edition of ISO 14001 standard.
b) ensuring that sufficient resources are allocated for the proper implementation of the environmental policy and the EMS.
c) regularly reviewing the policy and the effectiveness of the EMS and ensuring that the necessary changes are made.

EMR also leads the EMS group and has the responsibility and authority for:

a) leading the EMS group to establish and implement the EMS according to ISO 14001 standard and monitoring the performance of EMS.
b) coordinating external and internal EMS audits to ensure EMS has been adequately implemented and maintained.
c) managing and investigating nonconformity and ensuring corrective and preventive actions have been taken to mitigate any impacts caused.

d) reporting on the performance of the EMS to the top management for review and as a basis for improvement to the EMS.

Gap Analysis and Assessment

ISO 14001 standard has 32 core clauses which must be complied by the organization to successfully pass the audits conducted by the third-party certification body. EMS project manager along with the team compiled the list of clauses in the standard and started to assign questions to conduct a thorough gap assessment. Below mentioned is the snapshot from a section of gap analysis assessment.

Total GAP Analysis Ques.		**64**	**100.00**	
YES		**6**	**9.38**	
NO		**58**	**90.63**	
ISO 14001:2015 Standard Clauses	**Q.**	**Gap Analysis Question**	**Finding**	
			Yes	**No**
7 Support **7.1 Resources**				
The organization shall determine and provide the resources needed for the establishment,implementation, maintenance and continual improvement of the environmental management system.	34	Does your organization determine and provide resources needed for the establishment, implementation, maintenance and continual improvement of the EMS?		✓
7.2 Competence	35	Does your organization operate a process to determine necessary competence, training and documented information to support the EMS?	✓	

This assessment provides an ‘As-is’ status of organization’s status about environmental management. These questions also prove to be a significant source of information for effective designing of EMS within organization. Policies, procedures, control measures, and governance mechanisms are few outcomes which were implemented within the EMS to address the gap assessment questions.

Environmental Policy of MedSupply

Leadership and commitment from the management is pivotal to implementing an EMS within the organization. Implementation projects such as EMS often need an effective change management approach, hence clear communication within the organization from management to all the employees is essential. MedSupply International FZCO (MIF) strives to improve environmental performance continually and effectively through the implementation of an environmental policy as shown below.

Project Implementation methodology and Deliverables

The project management methodology used to implement EMS in MedSupply is a traditional approach using progressive elaboration of scope during project implementation. Table 5 shows the project methodology with segregation of workstreams, task descriptions, and key deliverable (s), which is an output of respective workstream. The weightages assigned to each task is based on relative importance of tasks, as an example environmental policy, scope statement, main list of EMS documents, and identification of environmental aspects and impacts carries more weightage than other tasks.

Implementation Phases	**SL**	**Task Description**	**Key Deliverable (S)**	**Weightage in %**
Obtain management Support and approval	1	Approval received from management	-	0
Workstream 1: Project initiation	2	Project team training and awareness session	Impart EMS awareness trainings	5
	3	Conduct project kick-off meeting	-	
Workstream 2: Gap Analysis and identification of organization's legal and other requirements	4	Prepare high level project plan and stakeholders register.	Stakeholder mapping	2
	5	Identify interested parties.	List of EMS need and expectations of interested parties	2
	6	Identify Risks and Opportunities of the EMS.	Risks and opportunities register	2
	7	Register - Identify applicable legal and environmental regulations/requirements.	Legal and environmental compliance obligations register	2
	8	Identify the requirements of interested parties.	List of EMS need and expectations of interested parties	2
Workstream 3: Scope definition, leadership and commitment, and responsibilities	9	Develop EMS Scope Document and prepare an EMS manual.	EMS Scope statement EMS manual	10
	10	Formulate Environmental Policy.	Environmental Policy	10
	11	Finalize environmental Objectives and targets	List of environmental objectives and targets	5
Workstream 4: Developing Environmental processes and procedures	12	Identify all processes and develop procedures necessary for the EMS.	Main list of documents	10
	13	Identify all environmental aspects and impacts of organization's processes.	Environmental aspect and impact register	10
	14	Develop procedure for communication w.r.t environmental incidents.	Environmental Communication procedure	1
	15	Develop procedure for internal audit.	Internal audit procedure	1

	16	Develop procedure for corrective action.	CAPA procedure	1
	17	Develop procedure for Preparedness and Emergency Response.	Emergency response procedure	2
Workstream 5: **Processes, procedures,** and controls	18	Implement all the processes, procedures, and controls defined for the EMS.	Procedure approvals and sign-off	2
	19	EMS implementation records	Approved EMS documents	3
Workstream 6: Conduct training and awareness programs	20	Perform training for all employees who lack required skills	Development of training modules	3
	21	Perform awareness programs for all employees and third parties that have a role in EMS	Assign trainings on Learning management system (LMS)	2
Workstream 7: EMS in operation mode	22	Monitor EMS system and performance	-	2
	23	Measure EMS objectives and targets	Analysis reports of transportation	3
Workstream 8: Internal audit	24	Conduct training on EMS ISO 14001:2015 Internal auditors (3 Employees)	Certified Internal auditors	2
	25	Develop the audit program.	Annual audit Plan	1
	26	Conduct internal audit and perform corrective actions	Internal audit report	2
Workstream 9: Management review	27	Conduct management review meeting and maintain records	Management review meeting report	3
	28	Ensure continual improvement initiatives are captured	-	2
Workstream 10: Certification audit	29	Selection of certification body and pre-assessment audit	Pre-assessment audit report	2
	30	Stage 1- Documentation review audit	Stage 1 audit report	4
	31	Stage 2- Main audit for certification	Stage 2 audit report	4
				100%

Table 5: Project Methodology and deliverables of EMS

As shown in table 5, project deliverables are defined within each workstream. Majority of project deliverables are related to EMS documentation. EMS project team in consultation with respective business functions was responsible to develop and write EMS specific procedures. In addition to policies, procedures, risks, and opportunities register, legal register, and environmental aspects and impacts register was developed by EMR. EMS training was another crucial element designed within the organization using a learning management (LMS) system. Participants who were assigned trainings would

complete the training and pass assigned quiz to obtain training certificates. During project implementation, project status update reports were shared with stakeholders, and meetings were conducted to address any roadblocks. Thus, by achieving deliverables mentioned in each workstream, overall project deliverable of organization getting certified to ISO 14001 standard was reached.

Lack of in-house EMS expertise was a critical barrier that was encountered during project implementation, however by gradually understanding scope and standard requirements, and addressing deliverables at an activity level in a workstream helped the organization to navigate such hurdles. EMS project team worked synergistically, hence there were no disruptions during implementation of the project. In the next section of this report, we will delve in detail on how operational planning and control processes were implemented within the organization.

Operational Planning and Control in MedSupply

Identifying and Evaluating Environmental Aspects

Operational controls are one of the important ways environmental impacts and other adverse effects are prevented. Controls are also used to assure compliance with obligations and to implement improvements. Operational controls are put in place to ensure the environmental policy commitments are achieved.

The organization establishes, implements, control and maintain processes to:

- Meet EMS requirements.
- Implement actions planned for significant environmental aspects.
- Implement actions planned to satisfy compliance obligations.
- Implement actions planned for risks and opportunities to achieving the intended outcomes of its EMS.
- Implement actions planned for achieving environmental objectives.

The processes established supports:

- ❖ Operational controls for business processes are defined within the QMS.
- ❖ Stipulate operating criteria for the affected activities, products, and services.
- ❖ Have adequate controls to ensure the processes are implemented in accordance with the operating criteria.

Using a three-step process, identification and evaluation of environmental aspect and impact is conducted within the organization. The three-step process is explained below.

Step 1: Identification of Environmental Aspects and Impacts

The first phase involves compiling a comprehensive list of all adopted environmental aspect categories within the organization. Following this, the activities, products, and services of the organization are meticulously outlined for each respective aspect category. The environmental aspect categories are presented in Table 6.

SL No.	Environmental Aspect Category	Description
1.	Emissions to Air	an emission into the air
2.	Releases to Water (Surface & Groundwater)	a discharge to surface water
3.	Releases to Land	use of ground and contamination of the soil
4.	Raw Materials and Natural Resources	Preventing materials from being discarded and the use of raw materials and natural resources (including energy and water)
5.	Energy Used and Emissions (Utilities) including Buildings/Community (Use of Space)	office space and electricity consumption
6.	Generation of Waste/and or by-products (Includes Packaging materials, Medical & Hazardous waste)	Medical and hazardous waste generated from business activities

Table 6: Environmental aspect category of EMS

Step 2: Scoring of Environmental Aspects and Impacts

Organizational activities have been categorized under their respective environmental aspect categories. Leveraging the subject matter expertise of the project team, environmental aspects and their corresponding impacts have been systematically documented. Total significance score has been computed and is displayed in Table 7 within the 'Rating' column.

Step 3: Determining of Significant Environmental Aspects

In the EMS Aspect and Impact Register, after assigning scores to all aspects, significant environmental aspects are determined, as indicated in Table 7.

- ❖ An aspect scoring 80 or higher is categorized as a significant environmental aspect.

					RISK BASED METHODOLOGY									
			DIRECT (D) OR INDIRECT (I)		COMPLIANCE OBLIGATIONS	ACTIVITY FREQUENCY	ASPECT PROBABILITY	IMPACT SEVERITY	ENVIRONMENTAL IMPACT (B x C x D)	DIRECT CONTROL OR INFLUENCE	INTERESTED PARTIES	INFORMATION (DATA AVAILABILITY)	RATING = A + (B x C x D) + E + F + G	SIGNIFICANT ENV. ASPECTS
1. Aspect Category - Emissions to Air														
Ref.	Activities, Products and Services	Environmental Aspect	Aspect Type	Environmental Impact	(A)	(B)	(C)	(D)	(B x C x D)	(E)	(F)	(G)	A + (B x C x D) + E + F + G	*SIGNIFICANT ENV.ASPECTS* If Rating > = 80
1.1	▶Inbound and Outbound Transportation and last-mile distribution through freight forwarder and service providers	▪Emissions of particulates, combustion of fossil fuels emitting CO_2 and other (e.g. NOx, SO_2) due to sea and air transport of shipments	I	✸Air Pollution ✸Climate Change	0	3	3	9	81	10	10	0	101	Yes

					RISK BASED METHODOLOGY									
			DIRECT (D) OR INDIRECT (I)		COMPLIANCE OBLIGATIONS	ACTIVITY FREQUENCY	ASPECT PROBABILITY	IMPACT SEVERITY	ENVIRONMENTAL IMPACT (B x C x D)	DIRECT CONTROL OR INFLUENCE	INTERESTED PARTIES	INFORMATION (DATA AVAILABILITY)	RATING = A + (B x C x D) + E + F + G	SIGNIFICANT ENV. ASPECTS
1. Aspect Category - Emissions to Air														
Ref.	Activities, Products and Services	Environmental Aspect	Aspect Type	Environmental Impact	(A)	(B)	(C)	(D)	(B x C x D)	(E)	(F)	(G)	A + (B x C x D) + E + F + G	*SIGNIFICANT ENV.ASPECTS* If Rating > = 80
1.8	▶Use of reefer trucks for temperature controlled shipments	▪Release of CFC gases due to inbuilt temperature control/air conditioning systems	D	✸Air Pollution ✸Climate Change ✸Ozone Depletion	0	2	2	9	36	10	0	0	46	No

Table 7: EMS Register of Aspects and Impacts and Scoring

Environmental Objectives

The organization has made plans at an extremely prominent level within the environmental management system (EMS) to address significant environmental aspects, its compliance obligations (AbuDhabi, 1999) , and the risks and opportunities identified that are kept on priority by the management to achieve the intended outcomes of its environmental management system. The actions are planned through establishing environmental objectives and targets as well as operational control procedures for environmental management system processes, either individually or in combination.

Driving improvement starts with establishing a goal, developing an actionable plan, and then garnering support within organization to achieve the goal. Environmental goals are aligned and support the overall business goals. EMS group is responsible for setting the environmental objectives. It is done annually during the month of August.

The functional managers for each function are responsible for setting the targets required to fulfill objectives relevant to their areas during the first quarter of each fiscal year. They shall ensure that objectives and targets are met in their areas of responsibility. Environmental objectives and targets are defined and agreed by the EMS group and captured in document 'Environmental Objectives and targets.' The objectives must be clearly defined, measurable, realistic, but achievable. Timelines must be set for the achievement of the objectives; it should therefore be set with a view towards achieving long-term improvements in performance. Objectives may be a combination of short-term and long-term improvement actions. The top management shall approve the objectives and targets. Table 8 shows environmental objectives set for the last fiscal year; these objectives pertain to significant environmental aspects of the organization.

Objective Type	Management Area	Objective Description	Indicators/Criteria	Fiscal FY2022-2023 Target date	Function/Department responsible
Qualitative	Legal compliance	Proper disposal of medical waste in accordance with Dubai Muncipality laws and any other local regulations	Complying ***100%*** for any disposal of medical waste products that are stored at 3PL service provider or disposed in other countries	30/Jun/2023	Supply Chain Operations
Qualitative	Dangerous goods (DGR) management	Safe transportation of shipments involving DGR products	Comply with IATA standards for DGR products packaging	30/Jun/2023	Supply Chain Operations
Qualitative	Logistics management	Promote energy conservation in logistics	Explore energy conservation by analyzing and achieving for efficient transportation through strengthening ties with freight forwarders and carriers.	30/Jun/2023	Supply Chain Operations
Quantitative	Transportation and Distribution	Data compilation and analysis of CO_2 emissions on a periodic basis	Monitoring and reporting of CO_2 emissions on a ***Quarterly basis*** to track changes	30/Jun/2023	Supply Chain Operations
Quantitative	Packaging	Data compilation and analysis of pallet types used for shipments	Monitoring and reporting of pallet types used on a ***Quarterly basis*** to track changes	30/Jun/2023	Supply Chain Operations
Qualitative	Bid Management	Propose environmental friendly transportation options to customers during bidding/proposal stage	Formulate plans and processes for the objective before the end of ***June-2023***	30/Jun/2023	Bid Management
Qualitative	Sustainable supplier management	Deliver a comprehensive supplier management program to gather information on environmental standards	By the end of ***June-2023***, Formulate a methodology and framework to gather information and analysis purposes	30/Jun/2023	Supply Chain Operations
Qualitative	Environmentally-Friendly products	Strategic Sourcing of environmentally-friendly pallets	Identify and evaluate the opportunities for sourcing environmentally-friendly pallets by end of the ***June-2023***	30/Jun/2023	Supply Chain Operations

Table 8: Environmental Objectives

While the organization had set twelve environmental objectives, to demonstrate actions taken for these objectives, analysis of two environmental objectives in subsequent sections is considered and explained in the next sections.

Transportation and Distribution- Shipment data analysis

The organization has implemented a methodology to measure CO_2 emissions caused due to transportation and distribution of shipments. Figure 12 depicts the methodology adopted by the organization.

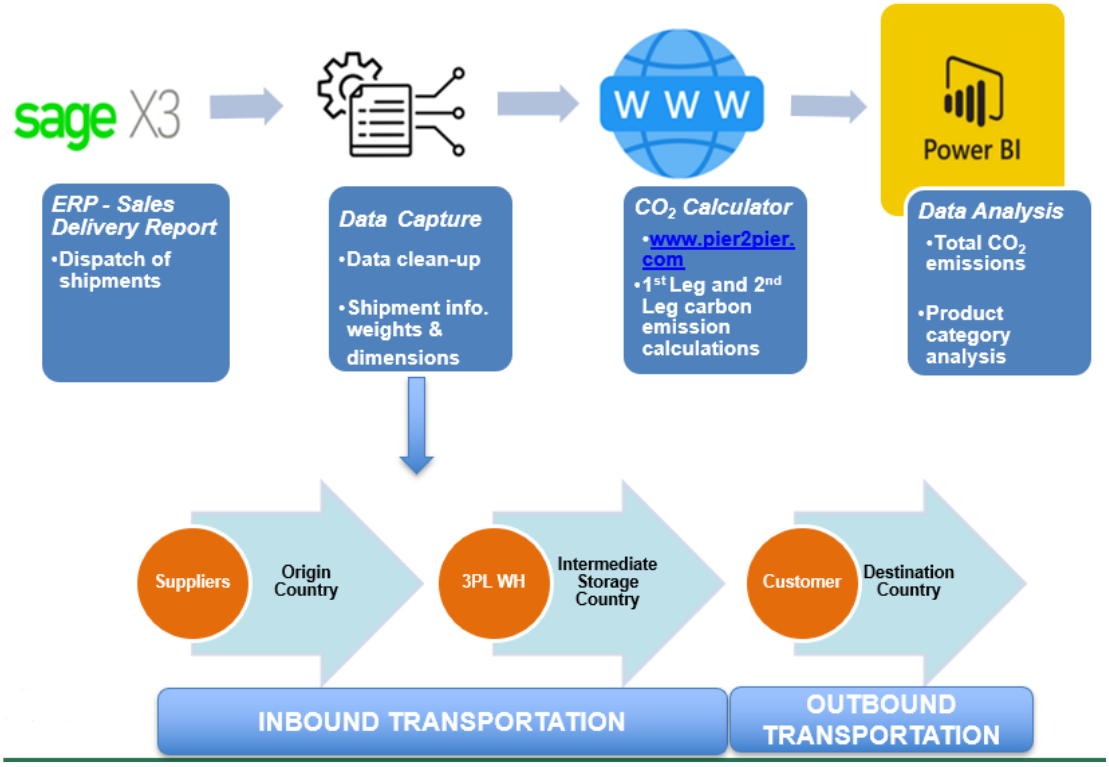

Figure 12: Shipment data analysis methodology

1) ***SAGEX3 (ERP):*** A system generated report of shipments delivered in each period (quarterly) is extracted from the ERP system.
2) ***Data capture:*** Individual shipment related information is captured in a file. Shipment details such as mode of transport, shipment weight, origin of shipment, and destination country are included in the file.
3) ***CO_2 calculator:*** The organization uses a CO_2 emission calculation platform (www.pier2pier.com) to calculate their CO_2 transportation emissions. Upon entering mode of transport, shipment origin, destination country and weight, CO_2 emission values for a particular shipment is obtained from software. Emission values retrieved are then entered in the file against respective shipments.
4) ***Data analysis:*** Using MS power BI analytics software, analysis of CO_2 data is performed. An output from PowerBI software is shown in below figure 12.

Mode of Transport	Delivery Year	Weight (Kg)	Total (Carbon Emission) in Tonne	Total (Carbon Emission) Kg
Air	2022	197,259.00	617.22	617,216.00
Road	2022	116,542.90	9.87	9,872.18
Sea	2022	36,400.00	8.79	8,792.62

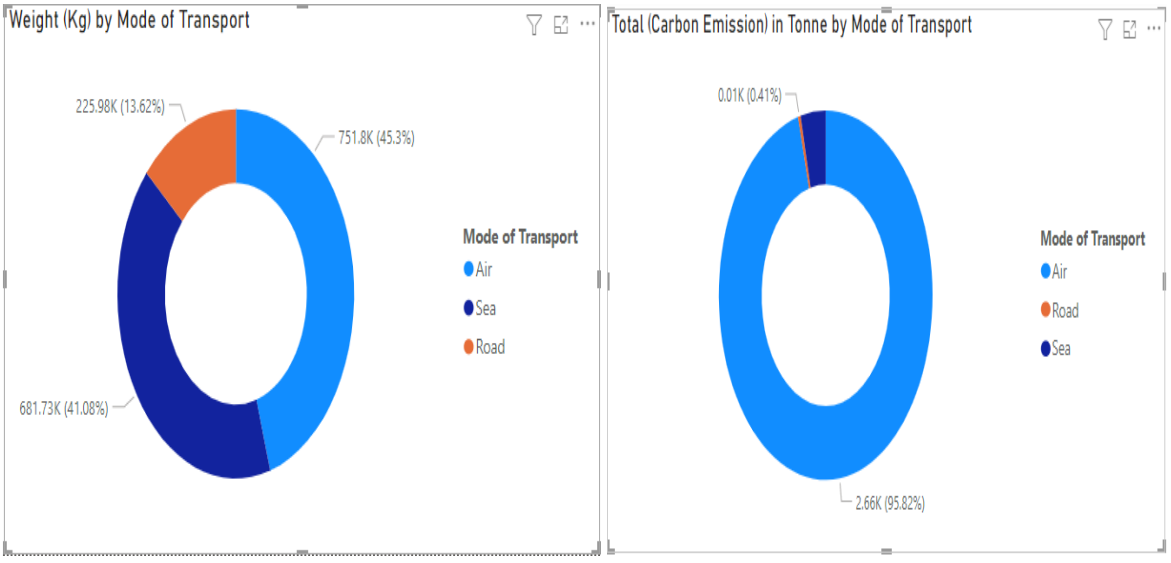

Figure 13: Total Carbon emission (Ton) of shipments in the year 2022

The mode of transport in humanitarian aid and relief projects is advised by customers, it must be adhered, this is mainly due to its urgent need of supplying medical products in the affected regions or areas. Therefore, as seen from the above figure 13, airfreight constitutes highest proportion of shipment movement. With the EMS implementation project, this data has provided a baseline information of their CO_2 emissions. The organization is striving to explore multi-modal transportation options wherever feasible by not compromising on the customer requested delivery dates.

Packaging Analysis

Pallets constitute a considerable proportion of packaging material in a medical supply organization. These pallets are delivered in logistically challenging locations; hence a reverse logistics process to get those pallets cannot be implemented. Pallet's end-up for sole use and more importantly safe disposal of pallets considering environmental protection cannot be achieved. The organization follows a packaging data-analysis methodology process like the one mentioned in figure 12. The summary of pallet data analysis is shown in below table 9.

Type of Pallets		**Shipment Origin Country**	
Description	2021	**Description**	2021
Wooden	76%	Country A	63%
Plastic	24%	Country B	13%
Total	100%		76%

Table 9: Pallet data analysis

From the above table, wooden pallets constituted a sizable proportion (76%) of inbound shipments from suppliers. Further, a staggering 76% of shipments came from just two origin countries. The organization is striving to explore sustainable palletization

solutions to minimize negative impacts to the environment due to single use of pallets made up of wooden and plastic. The details of planned environmental initiatives are mentioned in continual improvement section of this report.

Certification Audits and outcomes

Certification audits by an accredited body constitute the final phase of the project. These audits were scheduled based on agreed-upon dates with an external auditing firm. The audit process involves two stages:

1. ***Stage 1 Audit:*** During this audit, all EMS documents maintained within the organization are scrutinized by the auditor to assess compliance with the ISO 14001 standard. This stage is also referred to as a preparation audit. Successfully passing the stage 1 audit confirms the readiness to go ahead with the stage 2 final EMS audit.
2. ***Stage 2 Audit:*** The stage 2 audit involves auditing functional managers to ensure complete alignment with EMS standards. Additionally, documentary evidence is thoroughly examined during this audit phase.

MedSupply successfully completed both audits and attained their ISO 14001 certification, as shown below. The organization's attainment of the ISO 14001 standard has significantly enhanced its position in tender bid evaluations. The certification highlights the organization's commitment to environmental responsibility and sustainability, aligning perfectly with the priorities of many tender evaluators. This achievement allows the organization to demonstrate its dedication to meeting environmental standards, translating into a higher score in tender bid evaluations and an increased competitive advantage in the market.

Bureau Veritas Certification

MEDSUPPLY INTERNATIONAL FZCO

Dubai Airport Freezone, Building 7W, Block B, 2nd floor, Office 2094, P.O. Box 54757, Dubai, United Arab Emirates

Bureau Veritas Certification Holding SAS - UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 14001:2015

Scope of certification

SUPPLY AND DISTRIBUTION OF PHARMACEUTICALS, VACCINES AND MEDICAL PRODUCTS INCLUDING MEDICAL DEVICES, MEDICAL EQUIPMENT AND CONSUMABLES. ASSEMBLY, SUPPLY AND DISTRIBUTION OF MEDICAL KITS. MANAGEMENT OF INSTALLATION AND TRAINING SERVICES FOR MEDICAL EQUIPMENT.

Original cycle start date:	13 June 2023
Expiry date of previous cycle:	NA
Certification / Recertification Audit date:	10 April 2023
Certification / Recertification cycle start date:	13 June 2023
Subject to the continued satisfactory operation of the organisation's Management System, this certificate expires on:	12 June 2026

Certificate No.: DU005270 Version: 1 Issue date: 13 June 2023

MARWAN ARIDI

UKAS MANAGEMENT SYSTEMS 0008

Signed on behalf of BVCH SAS UK Branch

Certification Body Address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom

Local Office: Bureau Veritas - Dubai Branch, 2nd Floor, Block C, Al Hudaiba Awards Building, Jumeirah Road with 2nd December Interchange, Dubai, U.A.E.

Further clarifications regarding the scope and validity of this certificate, and the applicability of the management system requirements, please call: +971 4 307 4400

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Management Review process

The organization identifies several specific inputs and outputs for the management review. A management review is a forum for top management to perform an overall evaluation of the progress achieved and to drive future actions. It also drives actions to address changing circumstances that can affect the EMS. This might be related to the changes in the organization's context, interested party requirements, its compliance obligations, or significant environmental aspects. EMS management review meetings are conducted biannually. Figure 14 shows management review inputs and outputs.

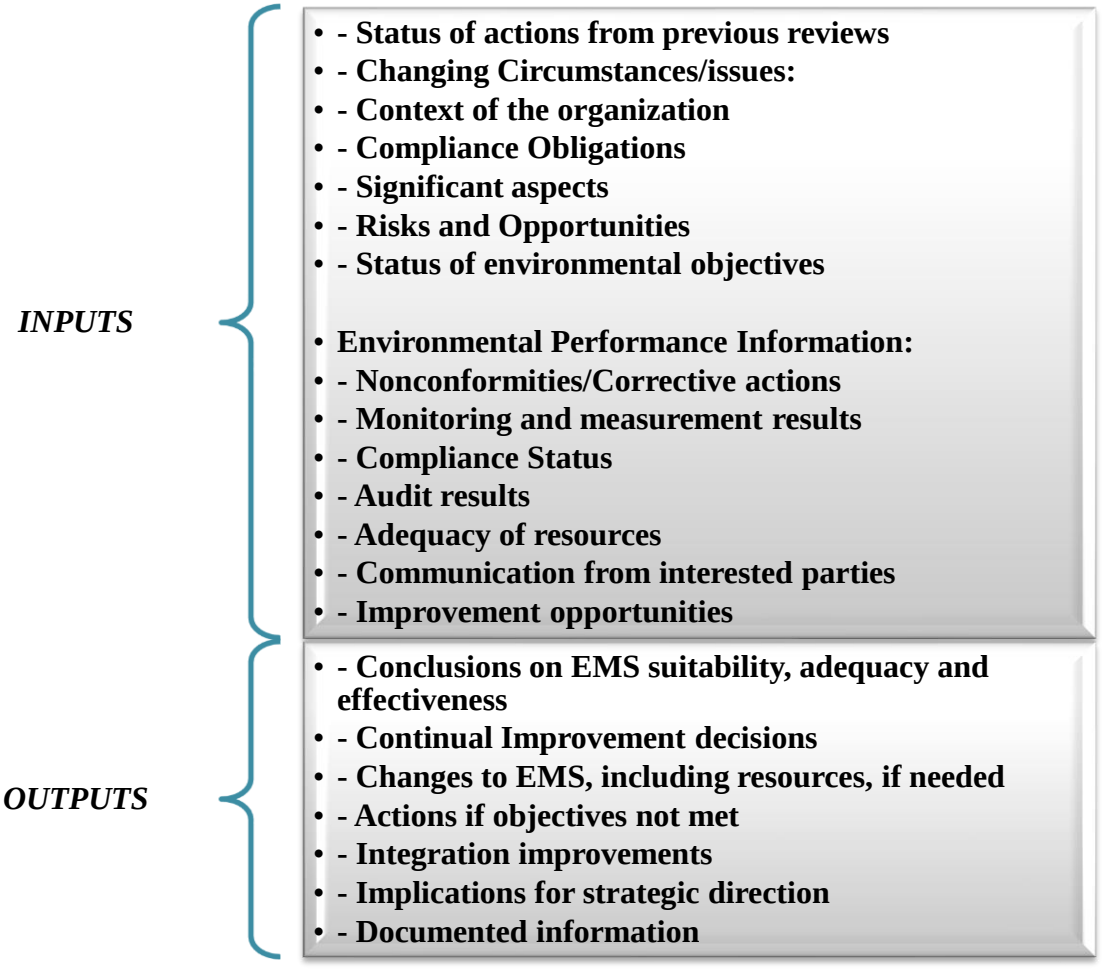

Figure 14: Management review inputs and outputs

The goal for a management review is to make decisions on a path forward based on conclusions about how well EMS is currently performing, and how expected changes can affect its performance in the near-term future.

Continual Improvement of Environmental Performance in a medical supply chain

Lifecycle Assessment (LCA)

Planet, a critical element of triple bottom concept has become an area of scrutiny due to drastic change in climatic conditions across the world. Conventional products and systems in all the industries are scrutinized by organizations for its efficiency and more importantly on how such products and systems aid in sustainable development. Lifecycle assessment (LCA) (Grahl, 2014) is a scientific methodology widely adopted by industries and in research since late 1970s. LCA studies provides the organization with critical information of environmental impact categories.

Using 'Lifecycle Inventory Analysis-LCIA' concepts, product system, Bill-of-materials and manufacturing processes involved in manufacturing a product can be determined. This information can be entered in software's such as 'Sustainable minds' to give results on various lifecycle phases such as manufacturing, use-phase, transportation, and end-of-life. Therefore, in a medical supply chain organization, LCA can be effectively adopted to measure the impacts particularly in cradle-to-gate i.e., manufacturing phase of the product. As a continual improvement initiative, LCA, a science-based methodology can be introduced and proposed to the management in the management review meeting. The organization should consider high spend products procured from suppliers to conduct LCA studies, thus giving us vital information of environmental impacts from a product perspective. Currently, LCA is not a mandatory requirement to comply with ISO 14001:2015 standard, however in the next revision of this standard, ISO could embed LCA requirements mandatorily.

Sustainable Packaging materials

Conservation of natural resources is considered a foundational element for sustainable development. Packaging materials contribute significantly from product's primary packaging to its secondary and tertiary packaging in shipper cartons and pallets. There is

tremendous scope to implement sustainable packaging materials in a medical supply chain. There are numerous factors driving the increased demand for sustainable medical supply packaging. These are some examples:

- ***Environmental Concerns:*** As people become more aware of the environmental impact of wooden, paper, and plastic materials, customers and consumers more often stipulate the need for alternative packaging materials which are sustainable. Sustainable packaging decreases waste and the use of nonrenewable resources, aiding in the reduction of the healthcare industry's environmental imprint.
- ***Regulatory Requirements:*** The European Union's Single-Use Plastics Directive, for example, and the US Food and Drug Administration's (FDA) Drug Supply Chain Security Act both mandates environmentally sustainable medical packaging.
- ***Cost Reduction:*** Sustainable packaging can aid healthcare providers in lowering waste management and disposal expenses. Healthcare providers can save cost on waste disposal and improve their overall carbon footprint by minimizing the amount of waste generated.

Sustainable packaging materials are widely available in global supply chain, however thorough due diligence of supply chain and products is essential before using such products and solutions. Below mentioned are some of the sustainable pallet solutions that the organization intends to explore in future. A dedicated project team will be formed within the organization to conduct and complete sustainable packaging solutions.

- ***Coco pallets:*** Coco pallets refer to a type of pallet used in the transportation and storage of various goods. These pallets are made from coconut fibers, which are obtained from the outer husk of coconuts. Coco pallets are becoming increasingly popular as an alternative to traditional wooden pallets because of their sustainability and eco-friendliness.

- ***Bamboo pallets:*** Bamboo pallets are a type of pallet made from bamboo. It is a fast-growing sustainable material that is increasingly being used as a replacement for traditional wooden or plastic pallets. Bamboo pallets are known for their strength, durability, and eco-friendliness. Bamboo pallets are made by processing bamboo into boards, which are then formed into a pallet shape and secured with adhesive or fasteners. Bamboo pallets are available in a range of sizes and load capacities and can be customized to meet specific needs.
- ***Sustainable Cardboard pallets:*** Sustainable cardboard pallets are pallets made from recycled paper and cardboard that are designed to be eco-friendly and sustainable. Sustainable cardboard pallets are made from recycled paper and cardboard materials which reduces the amount of waste that ends up in landfills, hence reduces natural resource consumption.

Environmental audits of Supply chain partners

Environmental auditing is a process of conducting EMS audit at suppliers or logistics service providers premises to ascertain compliance to environmental and sustainability standards. Audits are a win-win proposition for both suppliers and customers. It provides a pathway for shared learning, application of best practices, and benchmarking against industry standards. Organizations in medical supply chain can effectively adopt environmental auditing as a tool to monitor and report environmental performance of their business partners and their supply chain.

Development of Environmental digital dashboard

Digitalization of business processes is at the forefront in a rapidly changing business environment. Digital dashboards are visual tools to demonstrate various performance measures in an organization. Typically, organizations depend on various sources of data to develop a dashboard. In a medical supply organization, environmental dashboard could potentially provide a visual representation of their CO_2 emissions,

sustainable initiatives, and its progress along with status of other environmental objectives. Traditional software tools such as MS excel can be conveniently mapped using MS Power BI software to develop dashboard which would provide a holistic view of an organization's environmental performance.

Conclusion

An array of topics from sustainable engineering (KreithandKrumdieck, 2013) (World Resources Institute, 2021-2023) (Robertson, 2017) (RIT,Dubai-EMS Lecture Notes and Presentation, 2022), project management, and supply chain and logistics subjects were referred during implementation of EMS in a medical supply chain organization. Firstly, a methodical approach to determine environmental aspects and impacts of an organization's business process is crucial to for an effective EMS implementation. Secondly, compliance obligations (environmental and legal) and its imperatives both from an organization and business activities standpoint is another area that needs to be addressed. Lastly, cross-functional team members must be involved in an EMS implementation project, hence EMS team would play a significant role in successful implementation of EMS.

Greenhouse gas emission (CO_2) (World Resources Institute, 2021-2023) causes severe environmental impacts from global warming to widespread changes in climatic conditions. Fossil fuels used in various transportation systems affect the environmental performance of an organization. However due to the nature of projects in humanitarian aid and relief, mode of transport (air and sea) can only be minimized wherever possible by exploring other multi-modal transportation options. Use of primary, secondary, and tertiary packaging materials creates a sizeable opportunity to implement sustainable packaging materials such as use of cocoa, bamboo, and cardboard pallets. Sustainable packaging solutions have ample scope for improvement in a medical supply chain.

Continual improvement initiatives such as lifecycle assessment (LCA) studies for high spend products, conducting environmental audits of business partners, and implementation of digital environmental dashboard for visibility are some of the areas of improvements which can be pursued in a medical supply organization.

References

1) AbuDhabi, P. p., 1999. *Federal law No. (24) of 1999 for Protection and Development of the Environment,* Abu Dhabi: UAE Federal Authorities.

2) Dubai Municipality, 2023. *Health and Safety Technical Guidelines.* [Online] Available at: https://www.dm.gov.ae/municipality-business/technical-guidelines-list/ [Accessed 2021-2023].

3) Fet, A. M., 2023. *Business Transitions: A Path to Sustainability.* Ålesund: Springer.

4) Grahl, K., 2014. *Life Cycle Assessment.* s.l.:Wiely, VCH.

5) ISO-International Organization for Standardization, 2023. *ISO-International Organization for Standardization.* [Online] Available at: https://www.iso.org/home.html

6) ISO-International Organization for Standardization, n.d. *ISO 14001 and related standards.* [Online] Available at: https://www.iso.org/iso-14001-environmental-management.html [Accessed 2021-2023].

7) KreithandKrumdieck, 2013. *Principles of sustainable energy systems.* s.l.:CRC press.

8) Massoud, F. & Kamleh, E., 2010. Environmental Management System. *Environmental Science & Technology,* Volume VOL. 44, NO. 6, 2010, p. 4.

9) RIT,Dubai-EMS Lecture Notes and Presentation, 2022. *EMS Lecture Notes and Presentation.* Dubai: s.n.

10) Robertson, T., 2017. *Sustainability Principles and Practices.* First edition ed. s.l.:s.n.

11) World Resources Institute, 2021-2023. *GHG Protocol.* [Online] Available at: https://ghgprotocol.org/about-us [Accessed 2021-2023].