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SERIES L: ENVIRONMENT AND ICTS, CLIMATE CHANGE, E-WASTE, ENERGY EFFICIENCY; CONSTRUCTION, INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT

E-waste and circular economy

General principles for the green supply chain management of information and communication technology manufacturing industry

Recommendation ITU-T L.1060

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ENVIRONMENT AND ICTS, CLIMATE CHANGE, E-WASTE, ENERGY EFFICIENCY; CONSTRUCTION, INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT

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Recommendation ITU-T L.1060

General principles for the green supply chain management of information and communication technology manufacturing industry

Summary

Recommendation ITU-T L.1060 focuses on establishing general principles for the green supply chain (GSC) management of information and communication technology (ICT) manufacturing industry. It mainly gives the general principles for the green properties including upstream and downstream suppliers, logistics, recycling and utilization based on the product whole life cycle. General requirements such as the green supply chain management strategy, implementation, green production, recycling, and green information disclosure will be proposed as well.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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Keywords

Green supply chain, ICT.

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FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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General principles for the green supply chain management of information and communication technology manufacturing industry

1 Scope

This Recommendation specifies the general principles for the green supply chain (GSC) management of information and communication technology (ICT) manufacturing industry and also the requirements for planning, implementation and control, performance evaluation, management review and continuous improvement of the product life cycle.

This Recommendation applies to the GSC management of ICT products manufacturing enterprises, covering the entire life cycle of ICT products, including green design, green procurement, green logistics and warehousing, green sales and after-sales service, and green recycling and integration. It also could be used by upstream and downstream suppliers (e.g., suppliers, logistics providers, distributors, after-sales service providers, recyclers, and enterprises from other industries.)

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T L.1032] Recommendation ITU-T L.1032 (2019), *Guidelines and certification schemes for e-waste recyclers.*

[ITU-T L.1400] Recommendation ITU-T L.1400 (2011), *Overview and general principles of methodologies for assessing the environmental impact of information and communication technologies.*

[ITU-T L.1410] Recommendation ITU-T L.1410 (2014), *Methodology for environmental life cycle assessments of information and communication technology goods, networks and services*.

[ITU-T L.1420] Recommendation ITU-T L.1420 (2012), *Methodology for energy consumption and greenhouse gas emissions impact assessment of information and communication technologies in organizations.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 ICT goods [ITU-T L.1400]: The tangible products deriving from or making use of technologies devoted to or concerned with (a) the study and application of data and the processing thereof; i.e., the automatic acquisition, storage, manipulation (including transformation), management, movement, control, display, switching, interchange, transmission or reception of a diversity of data; (b) the development and use of the hardware, software, and procedures associated with this delivery; and (c) the representation, transfer, interpretation, and processing of data among

persons, places, and machines, noting that the meaning assigned to the data must be preserved during these operations.

3.1.2 ICT services [ITU-T L.1400]: The combination of ICT goods and ICT networks. An ICT service is produced in one or more nodes of the network and provided to users or other ICT systems over the ICT network.

3.1.3 product [b-ETSI TR 103 679]: Goods or services.

3.1.4 reuse [b-EU WFD]: Operation by which products or parts that are not waste are used for the same purpose for which they were conceived by another user.

NOTE – The transfer of ownership is an essential part of the concept of reuse.

3.1.5 recycling [b-Glossary Basel]: Material recovery from waste.

NOTE – Recycling operations usually involve the reprocessing of waste into products, materials or substances, though not necessarily for the original purpose. Resources are saved by recovering material benefits from the waste. Recycling is to be distinguished from operations that recover energy from the waste. In some countries, where material is used once merely for its physical properties e.g., for backfilling, this does not amount to recycling. An example is used lubricating oil re-refined which could result in high grade oil which is valuable for its chemical properties and hence that would be a recycling operation. Used oil could also simply be used as a fuel so that the recovery operation would be energy recovery and not recycling. Recycling may be defined by national legislation differently in each country.

3.1.6 supply chain [b-ITU-T M.3050.4]: Entities and processes (external to the enterprise) that are used to supply goods and services needed to deliver products and services to customers.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 green supply chain: Environmental protection focused supply chain.

NOTE – The concept of environmental protection and resource conservation is put through the supply chain management of enterprises to coordinate the economic activities of enterprises with environmental protection.

3.2.2 Information and communication technology (ICT) product: Information and communication technology (ICT) goods or ICT service.

3.2.3 manufacturer: Organization which has the financial and organizational control of the design and production of information and communication technology (ICT) goods.

NOTE – [ITU-T L.1400] refers specifically to ICT manufacturer.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CE	Circular Economy
CO_2	Carbon Dioxide
CO_2e	CO_2 equivalent
GHG	Greenhouse Gas
GSC	Green Supply Chain
ICT	Information and Communication Technology
LCA	Life Cycle Assessment
RoHS	Restriction of Hazardous Substances
WEEE	Waste Electrical and Electronic Equipment

5 Conventions

None.

6 General requirement

The concept of green supply chain (GSC) was first proposed in 1996 [b-Harland]. GSC means an effective use of resources and energy along the supply chain in each link and intersection. GSC is an important means to realize a sustainable development of manufacturing and enterprises. Its purpose is to make the whole supply chain resource utilization efficiency as high as possible, with minimal negative impact on the environment.

The ICT manufacturing industry is one of the most powerful driving forces for global economic development in the 21st century. GSC is of great significance to manufacturers.

This Recommendation will outline requirements for GSC management of ICT products in order to:

– Integrate a GSC into a company's development strategy and integrate it into the product's life cycle. Factors such as environmental protection, resource conservation, energy conservation and consumption reduction in the life cycle are incorporated into the supply chain management system to establish a complete GSC management system;

– Establish an effective organization and provide the necessary resources such as human resources, financial resources, equipment, information and knowledge, or integrate existing institutions and resources to meet the management needs of the GSC;

– Make plans for green logistics and implement them;

– Formulate management policies and objectives that are quantifiable, measurable and evaluable for the GSC of ICT products;

– Establish relevant process management procedures and standards for the life cycle of ICT products;

– Provide training for employees' awareness of GSC management, knowledge and ability, and transmit relevant information to the supply chain relevant parties in time, so that GSC management requirements are understood and supported by employees and related parties;

– Regularly conduct performance evaluations of GSC management of ICT products, and formulate improvement measures for supply chain;

– Establish an information management platform for GSC of ICT products.

7 Planning

7.1 System planning

The company integrates environmental awareness into its overall planning of supply chain management in accordance with its own overall target policy, laws and regulations, market and user requirements, combined with its own actual conditions.

The manufacturer should:

• Collect and organize relevant policies and regulations of the latest GSC.

• Integrate GSC concepts and requirements of related policies and regulations into enterprise business processes and supply chain management systems.

• Integrate resources and do system planning for the GSC.

• Combine process methods and risk thinking, establish and improve relevant management standards and management systems, and improve the supply of electrical and electronic products enterprises supply chain system.

- Integrate requirements of GSC management with quality, environment, energy, occupational health, safety management, supply chain management and information management,
- Improve management procedures and management system documents, establish GSC management system.
- Formulate guidelines and objectives according to policies and regulations, market and user requirements, environmental issues that could be improved in the supply chain and existing technology and management conditions.

Objectives should be specific, quantifiable, measurable or evaluable.

7.2 Green scheme

Companies design a GSC management scheme from specific operational links such as procurement, logistics, sales and after-sales service, recycling and comprehensive utilization.

The manufacturer should:

- Develop requirements for each link of the GSC.
- Clearly define and establish the standards and management documents for each link of the GSC.
- Clarify environmental information requirements, clarify environmental information categories and data acquisition, statistics and other requirements, and establish a GSC information disclosure system.

NOTE – Some manufacturers clearly put forward the company's "Green supply chain plan" in the "Company annual sustainability report". They pay attention to sustainable products and solutions, incorporate ecological design and circular economy elements into product life cycle management, establish a circular economy business model, and carry out the "cradle to cradle" circular economy practice to achieve sustainable use of resources.

7.2.1 Develop requirements for green procurement links

The manufacturer should establish green procurement links, including raw material control requirements and green supplier management requirements, including (but not limited to):

– Selecting environmentally friendly, energy-saving and consumption-reducing materials;
– Establishing a bill of materials and control mechanisms;
– Sampling raw materials and necessary quality inspections;
– Developing certification, rating, auditing for green suppliers and develop requirements and systems performance management for green suppliers.

7.2.2 Develop requirements for green logistics links

The manufacturer should establish green logistics links, including green transportation requirements, green storage requirements and reverse logistics requirements, including (but not limited to):

– Logistics plan optimization;
– Packaging minimization and use of reusable shipping packaging [b-Andrae];
– Pallet optimization [b-Andrae];
– Integrated transportation management implementation;
– Warehouse size optimization;
– Waste recycling by reverse logistics.

7.2.3 Develop requirements for green sales and after-sales services

The manufacturer should establish green sales and after-sales services, including (but not limited to):

– Developing a green marketing plan;

– Regular green product promotion and publicity;

– Using environmental protection means, preferentially in the maintenance process;

– Providing recycling services during sales and after-sales services.

7.2.4 Develop requirements for recycling and comprehensive utilization

The manufacturer should establish recycling and comprehensive utilization, including (but not limited to):

– Taking responsibility for recycling;

– Building recycling channels;

– Handing over recycled waste products to qualified processing companies for standard treatment;

– Establishing recycling information management system.

8 Implementation and control

8.1 Procurement

An increasing number of organizations have introduced green requirements to both upstream and downstream supply chain activity – purchasing clauses, targets, practices, and technologies.

NOTE – Some manufacturers always require ISO 14001 certification of downstream companies. Some manufacturers have also actively passed certifications and standards to reach the favour of upstream customers.

ICT manufacturers should make continuous requirements for procurement.

8.1.1 Raw material control

a) The choice of raw materials made by ICT products companies should meet requirements that are environmentally friendly, energy efficient, low-cost and easy to use. Such requirements should fully consider environmental benefits, and take into account economic and social benefits.

b) Establish a complete bill of materials and hazardous substances management regulations for the procurement of raw materials.

c) Perform the necessary inspections and tests on the samples supplied by the supplier and verify that they are qualified for mass production.

d) Sample materials or parts, and write test reports and verify that they are qualified for mass production.

e) ICT product companies should purchase recycled materials and establish management systems using recycled materials on the premise of quantity assured.

8.1.2 Supplier management

a) Develop green supplier certification principles and procedures to ensure that suppliers are consistently provide the materials in compliance with corporate green systems.

b) Evaluate suppliers, identify qualified suppliers, and establish environmentally relevant indicators in the evaluation content.

c) Distribute green procurement plans and requirements, and communicate with suppliers to obtain their understanding and support.

d) According to the evaluation indicators, review the document and conduct on-site audits regularly of qualified suppliers, and follow up the corrective action to a non-conformance term.

e) Establish a list of qualified suppliers and classify suppliers as needed.

f) Sign a technical agreement with a qualified supplier that identifies environmental items.

g) Include qualified suppliers in the supplier list and classify suppliers as needed.

h) Establish a supplier performance evaluation system to regularly evaluate the supplier's environmental performance and give corresponding incentives to suppliers with good performance.

i) Develop GSC capabilities for suppliers and offer regular training and coaching for suppliers as needed.

8.2 Green logistics

The main objective of logistics is to coordinate activities in a way that meets customer requirements at minimum cost. In the past, this cost has been defined in purely monetary terms. As concern for the environment rises, ICT companies should attempt to take into account the external costs [b-Steen] of logistics associated. As a society we should find ways of reducing these externalities and of achieving a more sustainable balance between economic, environmental and social objectives. There are many points at which products pass through a supply chain that have an impact on our environment. See the following examples:

1 ICT companies have built large-scale new energy fleets in different cities for green transportation.

2 ICT companies have implemented the application of distributed photovoltaic power generation systems on warehouse roofs.

3 ICT companies have developed new two-layer logistics labels, which can save hundreds of tons of paper each year.

4 ICT companies use biodegradable express bags and other packaging developed by downstream suppliers on a large scale. The use of new materials has eliminated hundreds of millions of traditional plastic bags every year.

8.2.1 Green transportation

Some examples of measures leading to green transportation are the following:

a) Develop and optimize logistics solutions to reduce energy consumption, pollutant emissions and noise pollution during transportation.

b) Implement integrated transportation management to save transportation costs and improve transportation efficiency.

c) Choose environmentally friendly transportation methods, and let enterprises use low-energy, low-emission transportation vehicles to make full use of logistics resources.

d) Establish a vehicle monitoring system to ensure transportation in time.

e) Regularly check the safety status of the transport to prevent leakage of dangerous goods during transport.

f) Staff with personnel who meet the needs of ICT products transportation services, and rationalize personnel allocation and management according to the different sales volumes of ICT products in the season.

8.2.2 Green warehousing

Some examples of measures leading to green warehousing are the following:

a) Arrange warehouses reasonably and improve the warehouse area utilization rate, cargo turnover rate and on-time delivery rate, and reduce logistics costs.

b) Adopt energy-saving green storage facilities and equipment to save energy and reduce consumption, so that the storage resources can be fully utilized.

c) Warehouses can be used to recycle used products to make the most efficient use of logistics resources.

d) Develop safety protection measures such as anti-pollution and fire prevention in the warehouse, and make a contingency plan to the pollution of warehouse materials and other safety issues.

e) Staff with personnel who meet the needs of warehousing services for ICT products, and rationalize personnel allocation and management according to the different sales volumes of ICT products in the season.

8.2.3 Reverse logistics

Reverse logistics refers to the logistics activities triggered by the movement of goods from the downstream to the upstream of the supply chain. With the development of ICT technology, people have a deeper understanding of reverse logistics. Reverse logistics plays an important role in GSC.

Some examples of reverse logistics roles in GSC are the following:

a) Establish a reverse logistics system for product recycling, customer returns and product recalls.

b) Design reverse logistics business processes, use return vehicles to transport used ICT products to ensure products recycling through reverse logistics.

Companies can organize their reverse logistics in several ways to improve circular economy (CE) [b-ITU-T L.1022]:

- Provide product return pickup and transport at no cost for any customer worldwide upon request;
- Establish alternative commercial models that promote product return, including, purchase trade-in, banked credit, leasing, and product-as-a-service;
- Offer comprehensive warranty, replacement, service and repair for all products to extend useful product lifetime and minimize obsolescence;
- Repurpose returned product, subsystems, components and commodities, including closed-loop return to new product manufacturing.

8.3 Green sales and after-sales service

One of the disputes between green marketing and customer relations is whether customers are really interested in environmentally friendly products [b-Yao]. Many studies have shown that although customers are interested in these kinds of products, other factors may be considered when actually buying, such as price and function. ICT manufacturers should guide consumers' green consumption concepts and provide improved green sales service and after-sales service.

8.3.1 Green sales

a) ICT products companies shall develop green marketing plans for green products.

b) ICT products companies should have special green product counters or franchise stores for selling products, and post posters to guide (e.g., Green energy-saving certified products,

national environmental label product certification, restriction of hazardous substances (RoHS) certified products, water-saving products, low-carbon products, etc.)

c) The company should regularly promote green products by different ways, such as community activities, self-media, public media, etc.

d) The company should regularly promote green products by a variety of methods, such as trade-in and green product discount activities.

e) The company shall collect all the non-conforming products in the sales process and submit them to the qualified enterprises for comprehensive utilization.

f) The company should provide ICT product recycling services in the sales chain, establish a reverse logistics system for trade-in, build the relationship with green recycling, hand over the waste products to the qualified processing enterprises for green environmental protection.

g) The company should establish a green sales channel for vendors. Establish a list of qualified vendors through screening, identification, evaluation and management.

8.3.2 Green after-sales service

a) After-sales service of ICT products shall be carried out in accordance with the corresponding standards.

b) The extended warranty service for ICT products shall be implemented in accordance with the corresponding standards.

c) The company should adopt environmental protection facilities and means to reduce the emissions of hazardous waste during the maintenance process, and under the repair process. If the emissions of the replaced parts are dangerous or may pollute the environment, the parts shall be handed over to a qualified disposal enterprise in accordance with the relevant regulations of the national environmental protection department. They shall be handled properly.

d) The company should ensure the availability of recycling services in green after-sales service, and the products recycled should be delivered to qualified processing enterprise.

e) The company should ensure that the scrapped products in the after-sales service are fully recycled, and that the information management of spare parts use and waste recycling is established. The company should make sure that waste products enter the qualified processing enterprises for environmental protection.

f) If the after-sales service is outsourced, the company shall regularly evaluate the third-party after-sales service providers.

8.4 Recycling and comprehensive utilization

The manufacturer should assess the life cycle environmental impacts related to the specific service or product. A detailed analysis of the environmental impact of ICT products should be conducted in line with [ITU-T L.1410]. Manufacturers should pay attention to the recycling and comprehensive utilization of ICT products.

The activity of collecting, classifying and sorting out the products and parts after the products are discarded, and handing them over to the qualified treatment enterprises for treatment is very important. They carry out decontamination, dismantling and recycling of waste products, so that the products or parts can be recycled or reused, so as to reduce environmental pollution and improve resource utilization.

On the one hand, recycling and comprehensive utilization involves the second creative utilization of some items that have lost their original practical value to reduce the output of waste; on the other

hand, it also advocates people to choose more biodegradable and renewable materials to reduce waste pollution and reduce the pressure of waste treatment.

8.4.1 Recycling

Batteries are crucial for the functioning of ICTs. Improving their recyclability and preventing the dumping of waste batteries can lower their overall energy consumption, reduce exposure of hazardous substances to people and the environment and reduce global greenhouse gas emissions. ITU-T Study Group 5 is developing guidance on the sustainable management of batteries used in ICT equipment and the environmentally responsible management of waste batteries from ICT products, including waste prevention, minimization, recycling, recovery and final disposal.

a) ICT products manufacturing enterprises shall bear the responsibility for the main recycling of products, including products after scrapping, wastes generated during the process, products damaged, parts and components damaged during storage, sales, and maintenance.

b) The company should establish recycling channels by itself or by third parties (industry organizations, recyclers, etc.).

NOTE – [ITU-T L.1032] can be referred to by the recyclers. It considers requirements for recyclers of waste ICT addressing in particular the informal sector that is involved in waste electrical and electronic equipment (WEEE) collection and dismantling.

c) ICT products companies shall recycle used ICT products in accordance with the domestic requirements. The products recycled shall be collected, stored and identified, and the products shall not be dismantled during the recycling process.

d) The company should establish a recycling and dismantling information management system, recording information such as recycling, processing and reuse for product traceability.

e) The company should establish a green recycling management mechanism for all aspects of the enterprise GSC. The company should establish connections for each link such as sales, after-sales service and recycling.

8.4.2 Comprehensive utilization

a) The company should ensure that the waste products recycled are delivered to qualified processing enterprises for standard treatment, and that the information (such as treatment process, processing time, disassembled product traceability) is recorded.

b) The ICT enterprise shall release the guidance information for technical disassembly, and the product shall be easily dismantled by the enterprise.

c) The company shall ensure that the parts or materials after the dismantling are recycled in the order of reuse, remanufacture and recycle.

d) The company shall ensure that hazardous waste generated after dismantling is disposed of by enterprises with hazardous waste qualifications and relevant records retained.

8.5 Document requirement

The manufacturer should establish document control procedures related to the GSC and retain the documents to ensure the effectiveness of the GSC management and the traceability of hazardous substances.

The documentation requirements are as follows:

8.5.1 Document control

a) Review the documentation prior to release to ensure its correctness.

b) Make sure to mark the changes to the file and the current revision status.

c) Withdraw obsolete documents on the site. Prevent the misuse of obsolete documents, which shall be marked clearly.

8.5.2 Traceability control

a) Design process documents.
   - Bill of materials that are under control of the manufacturer;
   - Dismantling information after the product is scrapped (disassembly method, path, material information, etc.).

b) Procurement process record documents.
   - The technical agreement signed by both parties;
   - Sample test records or test reports provided by the supplier;
   - A material decomposition table provided by the supplier;
   - Hazardous substance exemption statement provided by the supplier;
   - Third party test reports of hazardous substances provided by the supplier;
   - Relevant material procurement records provided by the supplier;
   - A record of the operation of the supplier's hazardous substance management system.

c) Logistics control documents.
   - Incoming and shipping records of ICT products;
   - Record of transit waste product information.

d) Sales and after-sales service control documents.
   - Product sales records;
   - Product after-sales service records;
   - Recycling product information (source, destination) records in sales and after-sales service.

e) Recycling and comprehensive utilization control documents.
   - Cooperation agreement with recycle venders and treatment venders;
   - Recording documents for the recycling of waste ICT products provided by recycle venders and treatment venders;
   - Qualification certificate of the venders.

f) Product delivery documents
   - Product life cycle assessment (LCA) data; (Assessment method can refer to [ITU-T L.1410])
   - Third-party testing report on hazardous substances in products;
   - Declaration of conformity of hazardous substances in products and declaration of exemption;
   - Product material recyclability description or identification;
   - Declaration of product reuse, remanufacturing and recycled materials;
   - Necessary product recycling and disassembly instructions.

8.6 Information

The manufacturer should establish a GSC information management platform and GSC information management process.

Collect energy consumption, pollutant emissions, greenhouse gas emissions, and comprehensive utilization efficiency of resources of the enterprise and suppliers.

Collect product information of enterprises and suppliers, information on the use of hazardous substances, reusable materials, and recycled materials use information, main process flows and corresponding environmental information such as energy consumption, greenhouse gas emissions, and "three wastes" emissions.

Collect product recycling status.

The enterprise regularly publishes social responsibility reports and announces the performance of GSC management. The disclosure information includes (but is not limited to):

– Use of hazardous substances;
– Energy resource usage;
– Pollutant emissions (solid waste discharge, wastewater discharge, exhaust emissions, particulate matter emissions);
– Carbon emission reduction;
– Product recycling rate.

8.7 Emergency preparedness and response

The manufacturer should establish emergency preparedness and response procedures, and formulate response measures for abnormalities in ICT products, and timely control or reduce the impact on the environment, people and society.

9 Performance evaluation

The manufacturer should establish a GSC management performance evaluation mechanism and procedures, including evaluation indicators and evaluation methods.

Evaluation indicators include quantitative indicators and qualitative indicators, which may include:

– Environmental performance indicators; (CO_2/revenue, "air in the truck", x/m^3, y/cm^2, (Assess method of some indicators can refer to [ITU-T L.1420]).

  Examples from industry could include:

  • ICT manufacturer provides suppliers incentives to set and meet their own goals.
  • The environmental criteria for supplier management include specific GHG emissions reduction targets and third-party verification of GHG emissions.

In this way, the manufacturer can measure their own GHG emissions Scope 3. Table 1 lists some GHG emissions indicators for the ICT manufacturer.

Table 1 – Some GHG emissions indicators for an ICT manufacturer Source: [b-HP]

	2015	**2016**	**2017**	**2018**	**2019**
GHG emissions from operations (tonnes CO_2e)	388700	328400	249200	229600	215800
Americas	274400	174500	54700	51500	49600
Europe, Middle East, Africa	60700	60900	65700	66200	57900
Asia Pacific and Japan	53600	93000	128800	111900	108300
GHG intensity (tonnes CO_2e/$ million net revenue]	7.6	6.8	4.8	3.9	3.7

– Operational performance indicators

  ICT manufacturer collected the operational data that they increased the energy efficiency of their main products by up to 22%; Cut CO_2 emissions intensity by 32.7% compared with the base year; Recycled 86% of returned products; and used 1.25 billion kWh of clean energy, reducing emissions by 570,000 tons [b-Huawei].

– Economic efficiency indicators

  ICT manufacturer tracked more than $ 1.6 billion in sales wins (total contract value) in which sustainability criteria were a known consideration and were supported actively by their sustainability and compliance organization, an estimated 69% increase over the $ 900+ million reported in 2018 [b-HP].

– Environmental investment indicators, etc.

  The manufacturer should:

  - Collect, collate and evaluate relevant information and data.
  - Evaluate GSC management performance based on identified evaluation methods, procedures, indicators and related data.

Higher levels of environmental collaboration have inspired higher levels of small enterprises' financial performance. Small enterprises can succeed financially through the influence of enhanced environmental collaboration, which emanates, in part, from the adoption and implementation of GSC management practices. [b-Mafini]. Figure 1 shows environmental collaboration effects on financial performance for small enterprises.

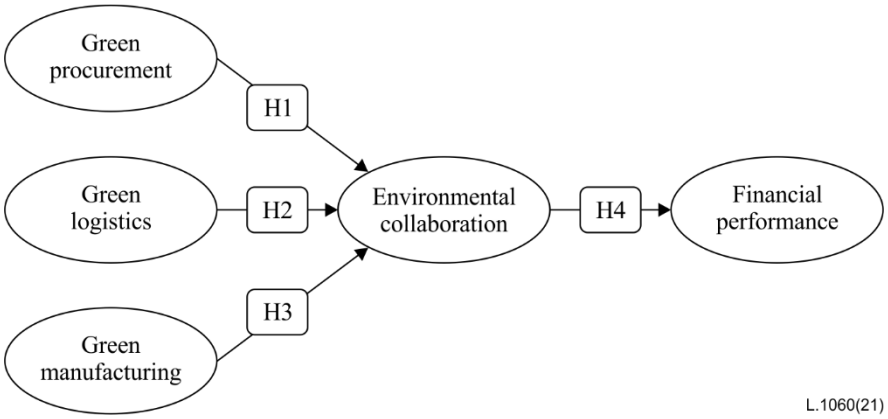

Figure 1 – Environmental collaboration effects on financial performance for small enterprises Source: [b-Mafini]

10 Management review and continuous improvement

The manufacturer should perform a management review of GSC on a regular basis based on the objectives of GSC management (could be conducted with another management review), reviewing the adequacy, effectiveness, and suitability of management, and the problems and improper implementation of the operation process.

The measures are corrected and recommendations for improvement are made. The review includes:

– The extent to which goals and targets are achieved;

– Implementation and effectiveness of each phase of the life cycle;

– The economic and social benefits achieved;

– The effectiveness of corrective actions;

– Exchange of information from external parties (such as customers, suppliers, etc.);

– Compliance with relevant laws and policies;
– Suggestions for improvement, etc.

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