Question 7/5 – E-waste, circular economy, and sustainable supply chain management

(Continuation of Question 7/5 and part of Question 13/5)

1 Motivation

New and emerging telecommunications/ICTs (including existing solutions) are at the centre of a new economic model that is based on a knowledge and information society. Mobile phones, tablets and computers are giving people access to social, public and financial services that otherwise would not be available to them. ICTs also provide the communication functions allowing digital platforms and IoT devices to communicate with one another.

All this implies there is a steady growth in global production and sale of electrical and electronic equipment (EEE), particularly those related to ICT - computers, printers, mobile phones, fixed phones, and tablets. Compounded by rapid innovation and lowering costs, this increasing demand for EEE has become a major source of waste (e-waste).

E-waste has already become the fastest growing waste stream. In 2022, a record 62 billion kg of e-waste was generated globally (equivalent to an average of 7.8 kg per capita per year); 22.3 per cent of this e-waste mass was documented as formally collected and recycled in an environmentally sound manner.[1,2] Improperly disposing of e-waste poses serious risks to the environment and to human health.

This Question seeks to address the e-waste challenge by identifying the environmental requirements of new and emerging telecommunications/ICTs including IoT, end-user equipment and ICT infrastructures or installations, based on the circular economy principles and improving the supply chain management to ensure securing stable resources.

The circular economy creates and captures new value for businesses and adds extra dimensions to supply chains.

Supply chain management involves the management of the entire lifecycle process of goods or services, from selecting raw materials, and applying design principles to delivering the final product. Given this scope, supply chain management plays a critical role in improving the environmental performance of most technologies including ICTs. This means optimizing energy efficiency, improving circularity and reducing the environmental burden linked to the manufacture, use and recycling of these technologies including ICTs.

Developing a 21st century, high-quality recovery process for the valuable materials from electronic waste is very important, especially when considering the global e-waste volumes and their flows. This offers a variety of potential opportunities in urban mining which are based on the global quantities of e-waste, as well as measures that can be taken to establish appropriate infrastructures to reduce the toxicity of some e-waste fractions.

By promoting sustainable urban mining and recycling, such valuable resources not only support a more circular economy but also drive new opportunities in social businesses.

In addition, it is recognized that counterfeit telecommunication/ICT products and devices have become a growing problem in the world. This is known to adversely affect all stakeholders in the ICT field (vendors, governments, operators and consumers).

NOTE – Counterfeit ICT devices include counterfeit and/or copied devices and equipment, as well as accessories and components.

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[1] The Global E-waste Monitor 2024, https://www.itu.int/en/ITU-D/Environment/Pages/Publications/The-Global-E-waste-Monitor-2024.aspx.

[2] World Economic Forum (2019), A New Circular Vision for Electronics: Time for a Global Reboot, https://www3.weforum.org/docs/WEF_A_New_Circular_Vision_for_Electronics.pdf.

In this regard along with impeding innovation, these counterfeit devices affect economic growth and intellectual property rights. These counterfeit devices are also often hazardous to health and safety and have a negative impact on the environment and the increasing amount of harmful e-waste. In addition, this Question will work on the development of eco-rating programmes which will help users to make more informed choices. This will offer opportunities for companies to define a common approach regarding the enhanced environmental performances of goods, networks and services in line with the principle of conscious development and user information.

The circular economy principles hold great potential in improving sustainability in cities and communities. Sharing, recycling, refurbishing, re-using, servitizing, replacing and digitizing are identified as some of the circular actions that can be applied to a wide range of ICTs and city assets. Any practices that enable more sustainable environmental styles of life are essential. City assets in this case may refer to city infrastructure such as buildings, public spaces, water, energy, and mobility infrastructure, city resources such as natural resources and private sector assets, and city goods and services such as economic goods and services consumed in a city that embeds ICTs.

Circular and sustainable actions in different city assets allow the unlocking of a wide range of economic, environmental and social benefits that would greatly improve the sustainability of a city or community and building climate resilience at the same time. Circular actions increase city assets' and products' efficiency and effectiveness by extending their utilization and lifetimes. As a result, less material is needed to produce the same products with less waste being generated.

In a circular and sustainable city or community, materials and resources stay in use for as long as possible. Buildings and public infrastructure (i.e., city assets) are designed to be more energy efficient, durable, adaptable and easy to maintain. Natural rainfalls and liquid waste would be recovered as much as possible by green roofs or other urban spaces, while smart meters reduce water wastage and optimise water distribution. Green spaces may be used for different social activities at different time. Extra electric vehicle charging stations may be added along with an effective and efficient public transport system to promote smart mobility. Renewable energy would also be primarily form of energy supply that power a circular city. This Question is also in line with the Sustainable Development Goal 12, target 12.5: by 2030, substantially reduce waste generation through prevention, reduction, recycling, and re-use.

Promoting circular design combined with responsible e-waste management will not only reduce e-waste but will also help curb the other negative impacts related to the use of ICTs worldwide.

The following Recommendations, handbooks and supplements, in force at the time of approval of this Question, fall under its responsibility:

– ITU-T L.24, L.1000, L.1001, L.1002, L.1005, L.1006, L.1007, L.1010, L.1015, L.1017, L.1020, L.1021, L.1022, L.1023, L.1024, L.1027, L.1028, L.1030, L.1031, L.1032, L.1033, L.1034, L.1035, L.1036, L.1040, L.1050, L.1060, L.1061, L.1070, L.1071, L.1100, L.1101, L.1102; L.1604, L.1610; 1620, L.1630, L.1631;
– L-series Supplements 4, 5, 20, 21, 27, 28, 32;
– Handbooks on the preservation of wooden poles carrying overhead telecommunication lines;
– Handbooks on protection of telecommunication buildings from fire.

2 Questions

Study items to be considered include, but are not limited to:

– How to ensure the health and environmental performance of new and emerging telecommunications/ICT equipment, services and facilities, including the avoidance of virgin and hazardous materials and final disposal through standards?

- How to ensure that new and emerging telecommunications/ICT equipment and facilities cause minimum environmental and health impact on the entire lifecycle including design, production, usage and use of materials applying the circular economy concept?
- How to mitigate the environmental and health impacts caused by improper handling of e-waste?
- How to measure and predict the e-waste reducing effect of ICT induced by dematerialization?
- What are the guidelines and design frameworks required to new and emerging telecommunications/ICT products that are in favour of end-of-life easy dismantling and high level of re-use of its components and materials (e.g. to promote eco-designs)?
- How to implement the circular economy principles (reduce, re-use, recycle and recover) into e-waste management with a special focus on developing countries?
- How to implement the circular economy principles (reduce, re-use, recycle and recover) to achieve a sustainable supply chain to ensure the availability of stable resources?
- How to include circular design criteria into product design and manufacturing?
- What are the requirements and sustainable solutions to deal with counterfeit ICT devices and reduce e-waste?
- What are the programmes (such as eco-labels or DPP) that would encourage users to take responsible purchasing decisions?
- What are the solutions and information that are needed to implement digital product passports covering the sustainable performance of ICTs including facilities equipment and solutions?
- How to evaluate and guide the upgrades and replacements of key elements of the existing ICT network infrastructure to achieve higher environmental efficiency and lower material usage and environmental footprint?
- What rare metals or raw materials are the prime targets for urban mining? What guidelines or Recommendations are needed to ensure safe extraction of these metals when urban mining? What guidelines are needed to the ICT sector to comply with regulatory requirements?
- What guidelines or Recommendations are needed for battery recycling and optimizing battery solutions?
- How can we provide guidelines to stakeholders to ensure they accurately communicate information about the effects and opportunities in e-waste management?
- How can the integration and re-use of existing network elements, even from previous generations, be studied and promoted to ensure compatibility with the latest new and emerging telecommunications/ICTs (including existing solutions) while minimizing energy consumption and environmental impact?
- What guidelines need to be developed for creating green and low-carbon new product iterations for the global ICT industry and supply chains? Additionally, what guidance can be provided for the technological evolution pathway to phase out outdated, inefficient, and high-technologies and product?
- What is the impact of implementing circularity in cities on improving sustainability?
- What are the guidelines, frameworks and best practices required to apply circular economy principles into different city assets (i.e., buildings, transport, water, energy, digital and public infrastructures, waste management, natural resource management)?
- What Recommendations, supplements and technical reports should be developed for supporting the transition to a circular city?

– How to utilize the circular economy as a means of securing stable resources to cope with supply chain risks?

3 Tasks

Tasks include, but are not limited to:

– Develop Recommendations and/or supplements and/or technical reports to determine processes to minimize the environmental (including health) impact of products (including avoidance of hazardous and virgin materials). This may also include Recommendations and/or supplements on manufacturing processes, operational procedures, and disposal of end-of-life equipment;

– Develop Recommendations, supplements and/or technical reports to identify new technologies and/or compounds/materials and operational processes to use that minimize environmental (including health) impact. This may require the identification of market needs and provide timely standardization solutions;

– Develop Recommendations, supplements and/or technical reports on solutions to mitigate e-waste, which encourage the re-use of product common parts and helps to unlock the full potential of the circular economy;

– Develop Recommendations, supplements and/or technical reports on battery optimization including recycling impacts and solutions to reduce battery waste. This should cover the stationary battery in ICT networks and battery packs external to devices, as well as internal batteries;

– Develop Recommendations, supplements and/or technical reports on circular lifecycle approach for ICT equipment to minimize environmental and health impact;

– Develop Recommendations, supplements and/or technical reports on material supply chains, including rare metals, and guidance and solutions to reduce the impact of new and emerging telecommunications/ICTs (including existing solutions) organizations and achieve a circular economy;

– Develop supplements and/or technical reports that provide effective guidelines on e-waste management for different ITU regions and aim to achieve a circular economy;

– Develop standardized training modules to provide guidance on e-waste management/circular economy standards and guidelines;

– Develop Recommendations, supplements and/or technical reports on circular economy requirements and how new and emerging telecommunications/ICTs could contribute to a circular economy;

– Develop Recommendations, supplements and/or technical reports on safe and eco/energy-efficient re-use and recycling practices and technical requirements for managing e-waste in a socially responsible manner including guidance to the informal sector[3] on environmentally sound management of e-waste;

– Develop Recommendations, supplements and/or technical reports to study and analyse the effects of counterfeit equipment in relation with e-waste and their environmental impact;

– Develop Recommendations, supplements and/or technical reports on requirements for sustainable batteries used in ICT products considering the EoL cycle and the material usage;

– Develop Recommendations, supplements and/or technical reports on circular economy metrics/key performance indicators (KPIs) within telecommunications/ICTs;

[3] OECD Report " Tackling Vulnerability in the Informal Economy" (2019) https://www.oecd-ilibrary.org/development/tackling-vulnerability-in-the-informal-economy_103bf23e-en and IIED "The informal economy and sustainable development" (2016) https://www.iied.org/informal-economy-sustainable-development.

– Develop Recommendations, supplements and/or technical reports on key eco-rating programmes aimed to raise awareness on sustainability with a view to harmonize existing eco-rating schemes;
– Develop Recommendations, supplements and/or technical reports that assess and promote environmental sustainability within the ICT supply chain moving to a circular economy;
– Develop Recommendations, supplements and/or technical reports that promote and provide guidance on telecommunications/ICTs procurement practices that enhance environmental sustainability moving to a circular economy;
– Develop Recommendations, supplements and/or technical reports related to implement the circular economy principles in product design phases of ICT product;
– Develop Recommendations, supplements and/or technical reports related to circular design criteria into product design and manufacturing of ICT product;
– Develop Recommendations, tools, supplements and/or technical reports on guidelines to stakeholders giving correct information on e-waste management effects and opportunities;
– Develop Recommendations, supplements and technical reports on upgrades and replacements of key elements of the existing ICT network infrastructure to achieve higher energy efficiency and lower material and emissions footprint;
– Develop Recommendations, supplements and technical reports on the definition and implementation of digital product passports covering the sustainable performance of ICT including facilities equipment and solutions, e.g., cooling solution, power feeding solution site and data centre structure;
– Develop Recommendations, supplements and/or technical reports that contain requirements, technical specifications, and effective frameworks for applying circular economy principles for new and emerging telecommunications/ICTs applications in cities and communities;
– Develop Recommendations, supplements and/or technical reports that provide guidance on applying circular economy principles for new and emerging telecommunications/ICTs applications in the following areas: buildings, transport, water, energy, digital and public infrastructures, waste management, natural resource management, and more;
– Develop metrics and key performance indicators that establish baseline scenarios of circular cities and communities with the use of new and emerging telecommunications/ICTs applications;
– Develop Recommendations, supplements and/or technical reports on guidelines for enhancing supply chain transparency and managing risk to improve the circular economy;
– Maintenance and revision of existing Recommendations, supplements and technical reports.

An up-to-date status of work under this Question is contained in the ITU-T SG5 work programme (https://www.itu.int/ITU-T/workprog/wp_search.aspx?sp=18&q=7/5).

4 Relationships

Recommendations:

– ITU-T K- and L-series Recommendations

Questions:

– 1/5, 6/5, 9/5, 11/5, 12/5

Study Groups:

– ITU-T SGs
– ITU-D SGs
– ITU-R SGs

Other bodies:

– IEC TC46, TC100, TC 111
– CENELEC TC111X, CEN/CENELEC JTC 10
– IEEE
– ETSI TC EE, TC ATTM
– GSMA
– UNEP/Secretariat of the Basel Convention
– UNU
– ISO/TC 184

WSIS Action Lines:

– C2, C4, C7

Sustainable Development Goals:

– 11, 12, 13