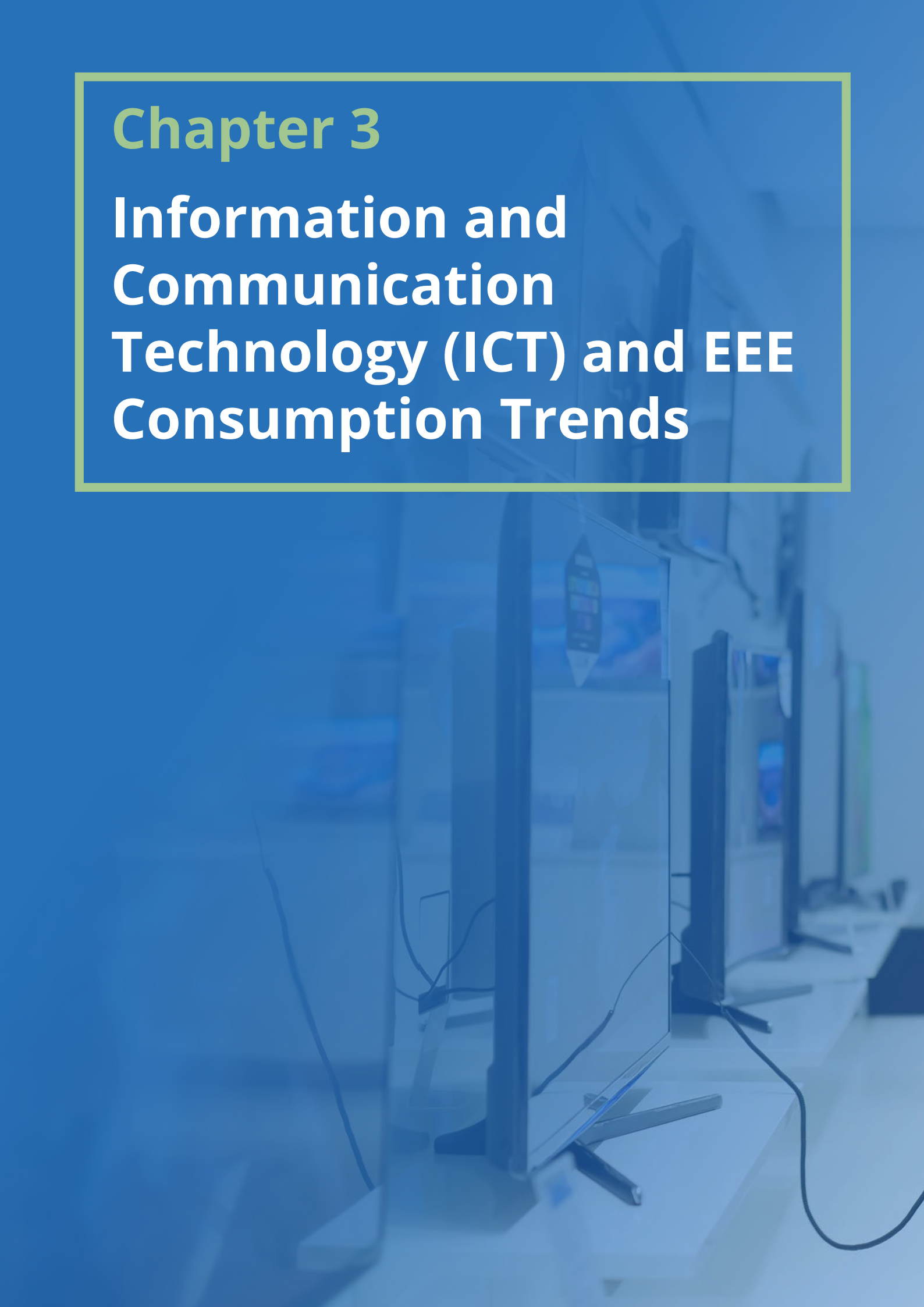


Chapter 3

Information and Communication Technology (ICT) and EEE Consumption Trends





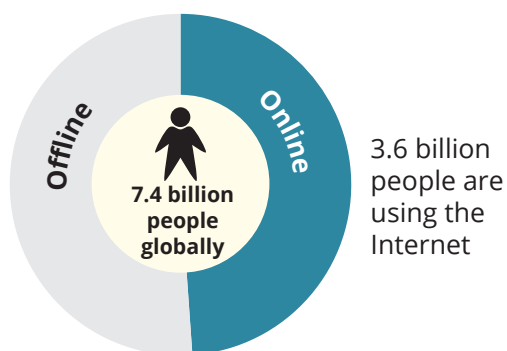
The global information society is growing at great speed. More and faster networks, and new applications and services delivered at increasingly high speeds, have brought new opportunities to many people, particularly in the areas of health, education, government, entertainment, and commerce. At the same time, higher levels of disposable income, urbanization, and industrialization in many developing countries are leading to growing amounts of electrical and electronic equipment, and consequently to e-waste.

Expanding Networks, More Internet Users, and Online Businesses

Mobile-cellular and broadband networks and services have expanded rapidly, and allow more people, especially in rural and previously unconnected areas, to have access to the internet.

- Some 3.6 billion people - close to half the world's population - are using the Internet.

Chart 3.1: Half the world's population is online



- The world counts 7.7 billion mobile-cellular subscriptions and 4.2 billion active mobile-broadband subscriptions².
- Over 80% of the world's population is covered by a mobile broadband signal.
- 54% of households have Internet access at home and 48% have a computer.

In parallel, an increasing number of enterprises have websites, receive orders over the internet, and cater to an online population. The United Nations Conference on Trade and Development (UNCTAD) estimates that in 2015:

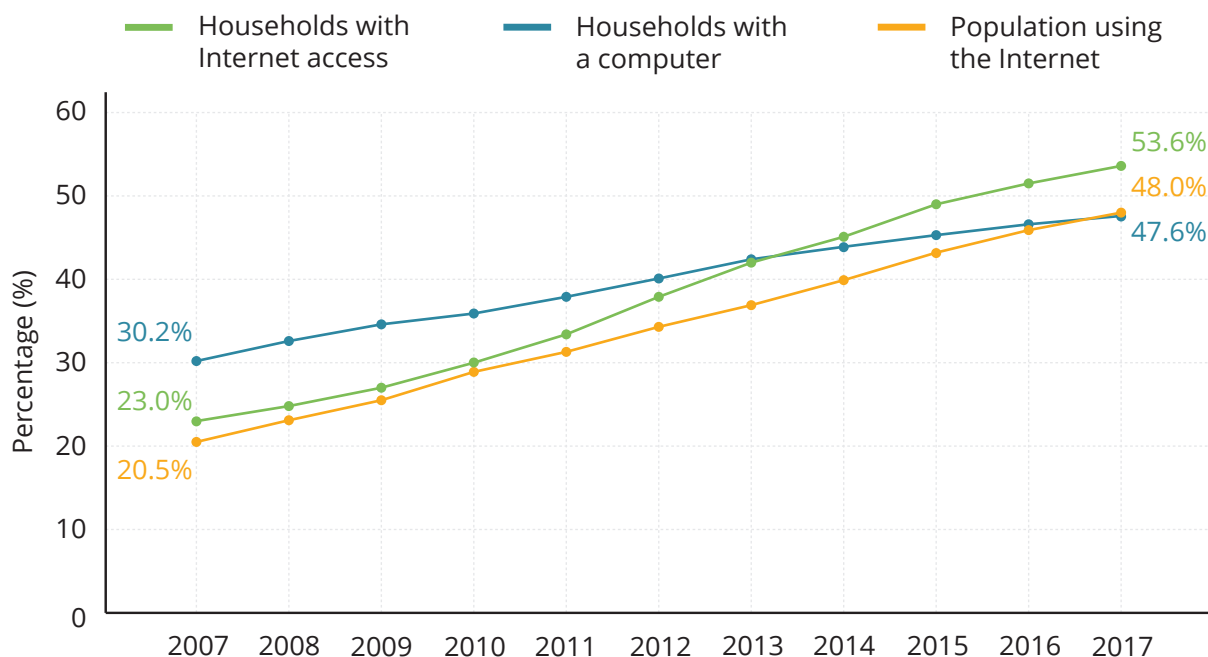
- The value of global business-to-business (B2B) e-commerce exceeded US\$22 trillion and business-to-consumer (B2C) value accounted for about US\$3 trillion.
- In the EU, on average 40% of large enterprises were receiving orders over the Internet.

Growth Rates of EEE

The consumption of EEE in general has also shown rapid growth over the period of 2000 to 2016.

This indicates that the emerging economies with a low Purchasing Power Parity (PPP) have shown the fastest annual growth rates in EEE consumption. The products that had the largest absolute growth of consumption in terms of weight were fridges, washing machines, electric furnaces, electric centralized heating units, and flat panel TVs. The demand for EEE goods, which for many people

Chart 3.2: Percentage of households with Internet access and a computer, and percentage of the population using the Internet, 2007-2017



Source: ITU

Table 3.1: Average annual growth rate of EEE per group of countries, by Purchasing Power Parity

Purchasing Power Parity range (USD/inh. in 2016)	Average growth rate per year	
Highest PPP	> 34000	1.6%
High PPP	34000 - 15280	5.2%
Mid PPP	15280 - 6740	13%
Low PPP	6740 - 1700	23%
Lowest PPP	< 1700	15%

represents a higher standard of living, is expected to grow further.

Over the same time period, some technologies became obsolete. The largest declines in sales were found for portable audio, portable video, the bulky cathode ray tube (CRT) monitors, and CRT televisions. This is because the technology is old and replaced by new technology. This is the case in the shift of the CRT monitors being replaced by flat panel displays. In some cases, a single device with single functionality is being replaced by items with multiple functionality, such as a mobile phone or laptop.

Prices Are Falling

Key factors for the success and spread of EEE and the Internet include a high degree of competition in the telecommunication market, technological advances, particularly in computing power and mobile broadband technologies, and decreases in the price of services and devices. Basic prepaid mobile-cellular services have especially become relatively affordable in the majority of countries, and prices of mobile-broadband services also continue to fall.

At the same time, the price of IT equipment, such as computers, peripheral equipment, TVs, laptops, printers, and mobile handsets are dropping. Lower handset prices in developing regions are the result of manufacturers' efforts to offer increasingly affordable entry-level smartphones for low-income users. Many

Illustration 3.1: ICT devices are becoming more affordable



budget, but still smart phones, are on sale for less than USD 200, and producers in India and China are promising even lower prices (ITU 2016). This means that more people will be able to afford purchasing new equipment, and that more equipment will eventually be discarded.

Other Trends Driving the Generation of E-Waste

There are a number of other trends that are driving the generation of e-waste. These include growing multiple device ownership, the tendency to electrify non-electrical equipment, growth in cloud computing services, a growing number of data centres, and shorter replacement cycles.

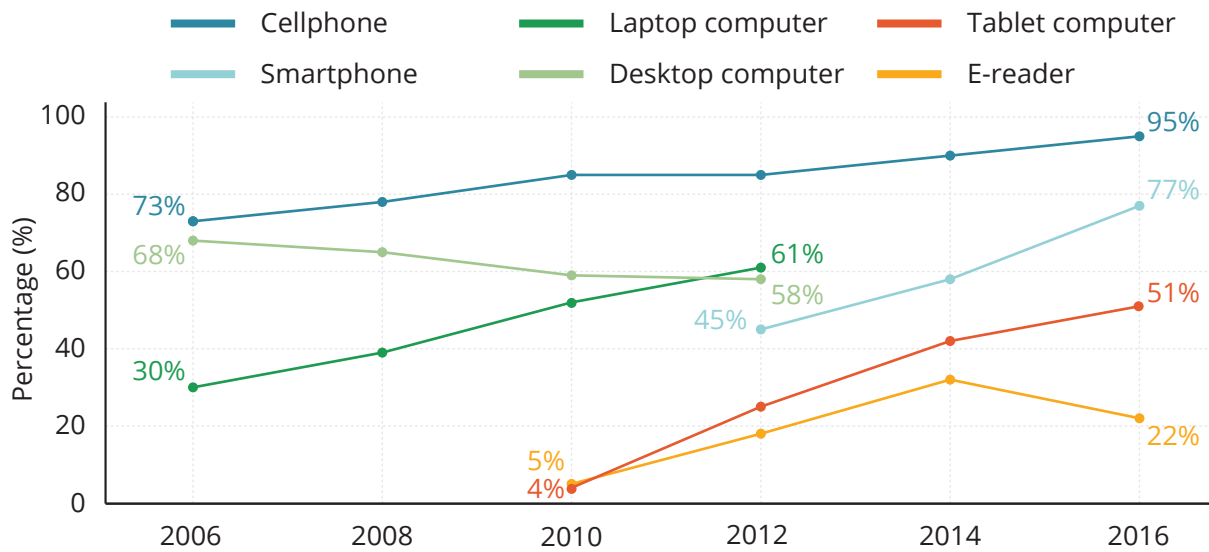
First, more people own more connected devices. In many countries, people own more than one phone and the number of people who own multiple devices, including phones, laptops, and e-readers, is growing. By 2016, almost every person in the United States owned a phone and every second person also owned a tablet computer. Close to 25% also owned an e-book reader (Chart 3.2). Between 2012 and 2015, the number of Americans who owned a smartphone, a computer, and a tablet doubled to 36% of adults (Anderson 2015).

Although cloud computing trends can lead to fewer devices because all services can be accessed from one device, more cloud computing also means more data centres and more e-waste. The amount of traffic, in particular from cloud services, and the number of data centres are increasing and will continue to grow in the coming years, according to the Cisco Global Cloud Index (GCI, Chart 3.4).

Illustration 3.2: Many people own multiple devices



Chart 3.3: Percentage of American adults who own different ICT devices



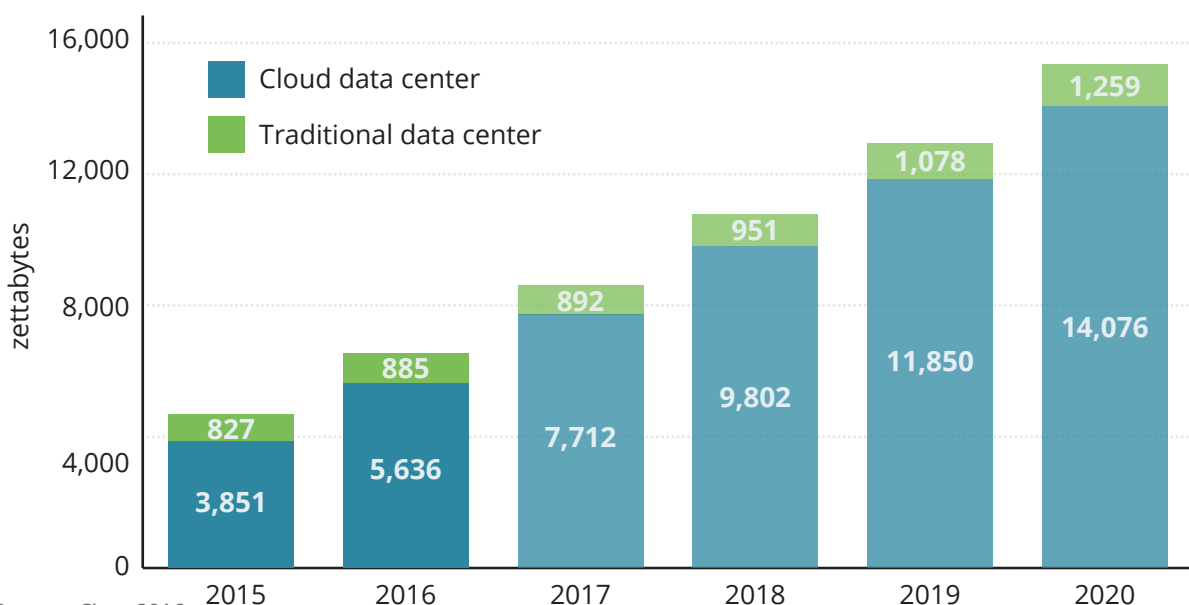
Source: Pew Research Center 2016

The amount of obsolete equipment is further driven by relatively short replacement cycles. Since technologies change quickly, many users change device, such as their mobile phone, regularly and often before it actually breaks. While the smartphone lifecycle is used as a measure of how close the average consumer's device is to the technical state-of-the-art version, it is also an indication of the growing amount of e-waste. Although data collected by Kantar World Panel indicates that between 2013 and 2015, smartphone users started to delay their phone upgrades, the average smartphone lifecycle in the USA, China,

and major EU economies does not usually exceed 18 months to 2 years (Table 3.2).

Smartphones are not the only devices that many consumers change frequently. To benefit from the latest upgrades, higher speeds, and the latest technologies, consumers and businesses regularly change their laptops, PCs, routers, TV sets, and other devices. In many cases, older equipment is replaced even if it is not broken or obsolete, but simply regarded as outdated. In the recent switchover, or conversion, from analogue to digital TV broadcasting, for example, many TV sets

Chart 3.4: Global data center traffic in zettabytes



Source: Cisco 2016

Table 3.2: Smartphone life cycles by countries, in months, for 2013 - 2015

	USA	China	EU5	France	Germany	Great Britain	Italy	Spain
2015	21.6	19.5	20.4	21.6	18.8	23.5	17.7	20.0
2014	20.9	21.8	19.5	19.4	18.2	22.0	18.7	18.2
2013	20.5	18.6	18.3	18.0	17.1	20.0	18.6	16.6

Source: Kantar World Panel 2016

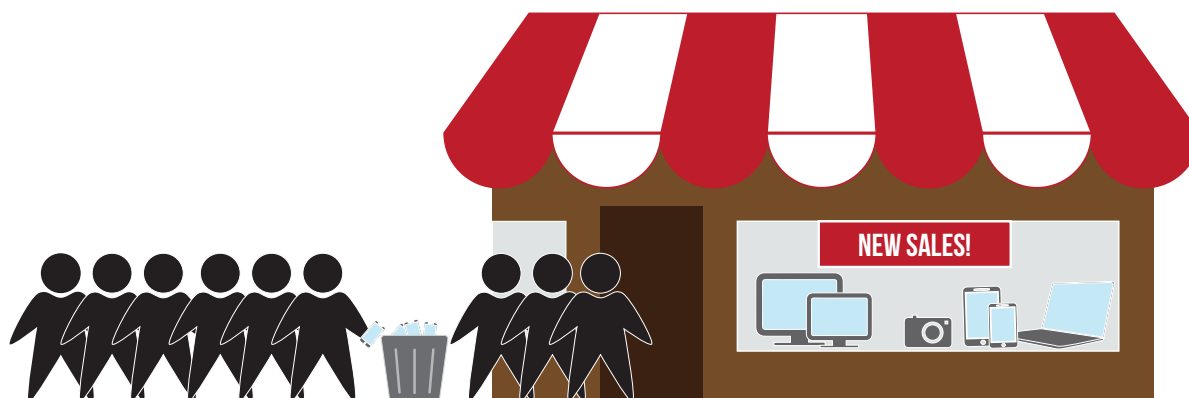
were unnecessarily discarded. While analogue televisions can receive digital signals simply by using a digital box, many consumers chose to upgrade to new TVs, and the switchover had an important environmental impact that left the world with a mountain of Carbon-Ray-Tube TVs (ITU 2015; ITU 2017a)³.

Additionally, there has been much debate and criticism of the growing ‘throwaway society’, characterized by consumerism and the trend to throw away and buy something new rather than keep and repair. A growing global middle-class with higher incomes often prefers to purchase a new product or device, since in many cases this holds a status symbol and provides social recognition.

Some users may decide to buy new products to avoid any hassle due to warranty and data security issues of repaired products.

There are many efforts underway to limit the amount of obsolete devices and equipment and to reduce the amount of energy needed for EEE and especially ICT devices. This includes the development of universal power adapters and chargers (ITU 2012; ITU 2016b; ITU 2017b). The amount of e-waste will continue to grow, though, and clear policies, solutions for recycling, and better data is needed.

Illustration 3.3: Users change their devices more often to keep up with technological changes



Box 3.1: How Universal Power Adapters and Chargers Reduce E-waste

One million tons of external power supplies are manufactured each year. This highlights the importance of efforts to reduce the number of such power supplies, and to make them more sustainable. In this regard, environmentally friendly standards for power adapters by the International Telecommunication Union (ITU) are an important step towards reducing greenhouse gas emissions, increasing energy efficiency, and reducing the amount of e-waste generation. In one of its latest eco-standards, ITU identifies specific principles for the eco-design of laptop chargers to reduce power consumptions, and to make them compatible with more devices. This will help increase a charger’s lifetime and reduce the amount of e-waste resulting from their disposal.⁴

Source: ITU 2012 and ITU 2016b