

ICT user behaviour study

Intermediate Report

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Centre (JRC)



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Introduction

1.1 Background and key objectives of the study

Acknowledging the rapid advances in technology and the urgency of the global climate change crisis, the European Union has already prioritised digital development and environmental preservation in its policy making. By focusing on “technology that works for people”¹ and the establishment of the foundations of an “open, democratic and sustainable digital society”² the European Commission has been working towards better convergence between the digital world and its green objectives. At this backdrop, the expanding role of Information and Communications Technology (ICT) has made it an integral part of EU’s strategic planning. With the steady increase of online activities, ICT devices have become even more sought after by customers on the European market. This has created the need for more appropriate regulation of the impact of digital devices on the environment.

As outlined in the communication ‘Shaping Europe’s Digital Future’³, the way ICT devices are purchased and consumed as well as their design should comply with environmental considerations and should be in line with the policy framework for sustainable products. This already creates certain expectations regarding the energy and material efficiency of these products. Given the fact that consumer preferences play a key role in determining the wider demand for certain ICT devices, it is essential to acquire an in-depth understanding of the ways in which consumers choose and utilise digital devices. Obtaining comprehensive insight on users’ purchase preference and consumption patterns would allow for better forecasting of their needs and adequate policy planning that would ensure that both user demand and environmental obligations are satisfied in equal measure.

Taking into account the aforementioned circumstances and policy-making goals of the EU, this study commissioned by the Directorate General Joint Research Center (DG JRC) aims to acquire improved understanding of the user behaviour and awareness in regards to the consumption of audio and video multimedia through internet connected ICT devices. Specifically, this study looks into:

- how the performance of internet audio/video multimedia affects the consumer purchase decision of ICT devices
- the relevance of factors such as energy and material efficiency, as well as end-of-life in the purchase decisions of consumers
- use of ICT devices for internet multimedia – in particular the correlation between type of media, type of connection and type of device
- Consumers’ awareness of the impact of their streaming and general device usage behaviour on the environment

¹ <https://ec.europa.eu/digital-single-market/en/content/technology-works-people>

² <https://ec.europa.eu/digital-single-market/en/content/open-democratic-and-sustainable-digital-society>

³ https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en#three-pillars-to-support-our-approach

- Which factors are taken into consideration by consumers when deciding to replace a device, and how long consumers expect to use a device before replacing it

Obtaining in-depth information and understanding of the aforementioned indicators is much needed given the prominent role that internet access and digital devices currently play in consumers' lives. To gather the relevant data, a survey was conducted among a representative sample of consumers in a selection of European Member States, asking consumers about their purchase, usage and streaming behaviour with regards to five ICT devices which are commonly used for the streaming of AV content: laptops, smartphones, tablets, smart TVs and gaming consoles.

1.2 Scope and structure of this report

This intermediate report presents a detailed overview of the results of the consumer survey. Specifically, the report focusses on a descriptive presentation of the quantitative findings of all survey indicators, at the overall level of the average consumer, as well as comparing different subgroups of consumers where relevant (i.e., in terms of sociodemographic background, the usage behaviour of ICT devices, as well as general digital competence and knowledge of the environmental impact of streaming and ICT device use).

First, the next section of this introduction (1.3 below) gives more details about the methodology that was used to collect data, as well as information about the target population and sample used in the survey.

The following chapter (chapter 1) discusses **what product factors consumers find important** and take into account when deciding which device to buy – separately for laptops, smartphones, tablets, smart TVs and gaming consoles. The analysis covers both factors related to the performance of the device as well as factors that are related to the sustainability and energy-efficiency of the device – in addition to more general factors such as the price of the device.

A second chapter (chapter 2) looks at the usage behaviour of consumers for each of the five devices in scope. It focusses specifically on **streaming usage behaviour**, analysing how often consumers engage in various streaming activities and how much time they spend on these activities. We also discuss consumer preferences when it comes to the connection type to use when streaming (ethernet/WiFi vs. a mobile connection), and the video quality of the content they stream (taking into account different connection types).

Finally, chapter 3 discusses consumers expectations and attitudes when it comes to the sustainability of their device and their usage behaviour. In particular, this chapter looks at when and why consumers would envisage to replace their device (and whether different attitudes towards device replacement result in different expected use lengths), and also discusses what consumers report to know about the environmental impact of their streaming behaviour – as well as whether this influences their actual streaming behaviour.

1.3 Methodology

1.3.1 Target population and sample representativity

The survey interviewed consumers who fitted the following definition:

*Any adult consumer who has access to one of the following devices in their household and uses it at least monthly, **or** finds it at least somewhat likely that they will buy in the next*

two years any of the following devices: computer (laptop or desktop), tablet, smartphone, smart TV, gaming console.

In order to achieve a final sample of consumers that was representative of the general population, quota were set on various key parameters:

- Age: consumers aged 18-34, 35-49 or 50+
- Gender: male or female⁴
- Education: consumers with a high, medium or low education level. Education levels were determined using local education levels, which were subsequently converted to ISCED categories to determine the high (ISCED 5 or over), middle (ISCED 3-4) or low (ISCED 2 or lower) education level.⁵
- Employment status: consumers who are in employment, unemployed or inactive (e.g. students or retirees).⁶ For the analysis of the results, unemployed and inactive consumers are grouped, since the size of the group of unemployed consumers is too small to allow a separate analysis in this survey.

Sample quota to ensure representativity were set separately per country, to account for differences in population structure between countries.

Finally, it should be emphasised that the sample is representative for the general population of adult consumers as a whole. There might be a slight discrepancy when it comes to the population of consumers as defined above – i.e., those who use one of the five devices in scope at least monthly or who find it likely to buy one of these devices in the near future. This is necessarily so, in absence of population statistics of exactly that target population. However, given that this definition is broad and that the group of consumers who fall outside of this definition (i.e.. those who do not own one of the five devices in scope and do not intend to buy one) is very small, it can be safely assumed that any deviations are very small and do not impact the representativity of the results of this study.

1.3.2 Selection of countries

The survey was conducted among consumers in seven European Member States: **Germany, France, Hungary, Italy, Poland, Spain and Sweden.**

Results are analysed and presented in this report at the overall level (i.e., not per country). In order to allow to draw more general conclusions about European consumers, it was therefore vitally important to make sure the selected countries together covered a diverse and representative selection of European consumers, taking into account the objectives of the survey. Specifically, the following elements have been taken into consideration when identifying the countries included in the survey:

⁴ Respondents were given the option to select an “other” gender. Respondents choosing this option were proportionally divided over the two genders used for analysis.

⁵[https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_Standard_Classification_of_Education_\(ISCED\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_Standard_Classification_of_Education_(ISCED))

⁶ Following Labour Force Survey definitions of these variables. Unemployed people are those that are not in paid work but are looking for a job, whereas inactive people are not in paid work and also not actively seeking work (including students and retirees).

- The **regional spread** of the countries. To ensure a good geographic spread, countries were selected from the North, South, East and West regions of the European Union.⁷
- The **population size of the countries**.⁸ The country selection includes larger as well as a number of smaller countries, while still ensuring that the combined population of the countries covers a large proportion of the total EU population.
- The **gross domestic product per capita** (at market prices), allowing to include countries with different economy sizes.⁹
- The profile of the country when it comes to **usage of ICT devices**. For this parameter, it is important to keep in mind that the survey targeted any ICT device users who either currently own or intend to buy in the near future one of the devices covered by the survey. This means that it included users regardless of whether they use these devices to stream/download multimedia. Therefore, it was deemed useful to already at country level aim for a diverse spread of countries with a high and low level of 'digitisation', so that the survey results are not skewed as a consequence of including countries that are at the high end of this range. Specifically, our selection was informed by several indicators from the European Commission's DESI index:¹⁰
 - **% of households with a broadband connection** – as an indicator of how many people have the capacity for heavy use of ICT devices for multimedia streaming/downloading.
 - **% of individuals who use the internet almost daily** – indicating the proportion of people for who the internet is generally important in their daily lives
 - **% of individuals who use the internet to play or download video games, images, films or music** – reflecting how many people effectively use the internet for multimedia purposes
 - **% of individuals who use their mobile phone to access the internet**. This can be seen as a proxy of how many people will watch multimedia via mobile networks (e.g., 4G).
 - **% of individuals with above basic level of digital skills**. This parameter is used as a proxy to indicate the proportion of people that is likely to be more aware of the technical specificities of ICT devices.

Together, the selected countries cover a large proportion of the population of the EU27 (71%), while at the same time representing a diverse range in terms or geography as well

⁷ While there is no official definition for supranational geographical regions in use by the European Commission or Eurostat, a commonly used categorisation is as follows: Western Europe (Austria, Belgium, France, Germany, Luxembourg, Netherlands), Northern Europe (Denmark, Estonia, Finland, Latvia, Lithuania, Sweden), Eastern Europe (Bulgaria, Croatia, Czechia, Hungary, Poland, Bulgaria, Romania, Slovakia, Slovenia), Southern Europe (Cyprus, Greece, Italy, Malta, Portugal, Spain).

⁸ https://ec.europa.eu/eurostat/databrowser/view/demo_pjan/default/table?lang=en

⁹ <https://ec.europa.eu/eurostat/databrowser/view/tec00001/default/table?lang=en>

¹⁰ <https://digital-strategy.ec.europa.eu/en/policies/desi>

as GDP, and the ICT-related indicators defined above. This is summarised in the table on the next page.

Table 0.1 Properties of countries included in the survey

Indicator	Germany	France	Hungary	Poland	Italy	Spain	Sweden	EU27
Region	West	West	East	East	South	South	North	n.a.
Population (2020)	83,005,244 (large)	66,993,125 (large)	9,770,910 (small)	37,967,368 (large)	60,345,090 (large)	46,925,379 (large)	10,228,118 (small)	71% of EU population
GDP/capita (2020)	40,120	33,690	13,940	13,640	27,500	23,690	45,610	29,660
Households with a broadband connection (2020)	94.8%	82.8% ¹¹	87.2%	98.6%	86.8%	95.3%	91.0%	89.4%
Almost daily use of internet (2020)	88.1%	77.3% ¹²	78.6%	72.3%	75.6%	83.1%	92.2%	79.7%
Use of internet to play or download video games, images, films or music (2020)	43.3%	19.9% ¹³	25.8%	24.5%	31.7%	55.1%	69.9%	34.9%
Use of mobile phone to access internet (2017)	65.1%	62.1%	64.9%	46.2%	41.9%	81.9%	76.5%	62.7%
Above average ICT skills (2020)	38.8%	30.9%	25.4%	21.3%	22.0%	36.1%	46,0%	31.1%

¹¹ 2019 data. At that point, the EU average was 87.5%

¹² 2019 data. At that point the EU average was 77.0%

¹³ 2019 data. At that point, the EU average was 23%.

1.3.3 Definition of the sample subgroup parameters

Results of the survey were analysed not only at the level of the overall sample (i.e.; the average consumer), but also by comparing different consumer subgroups, to see whether various sociodemographic and other parameters have an impact on consumers' behaviour when it comes to the purchase of ICT devices and the streaming of AV content via these devices.

In the first place, these analyses make use of the sociodemographic parameters defined in section 1.3.1 above: gender, age, employment status and education level. In addition to these four parameters, a diverse set of additional parameters will also be used to compare consumer subgroups by. These are defined here below, to facilitate interpretation of the analyses presented in the next chapters.

- **Financial situation.** This parameter is based on respondents' assessment on how difficult to find it to make ends meet with the current financial situation of their household.

Levels of analysis: easy vs. difficult

- **Digital competence.** This parameter measures respondents' level of digital competence by assessing whether they have recently engaged in a series of digital activities. Specifically, it uses the "problem-solving skills" indicator from DESI. This indicator is measured by asking whether, in the past three months (except for e-shopping, which is asked for the past 12 months), respondents have executed any of the following activities:
 - Transfer files between computers or other devices;
 - Install software and applications (apps);
 - Change settings of software or device operating systems
 - Selling goods or services online
 - Do an online course or use other online learning materials
 - Internet banking.
 - Purchase a product or service online

Activities one to three are defined as "problem-solving" activities, whereas activities four through seven are defined as "online services" activities. Respondents that have in the recent past conducted one or more activities from both groups are considered to have above basic skills. Respondents who have conducted one more activities from one of both groups only are defined as having basic skills. Those who have conducted none of the activities have below basic skills.

Levels of analysis: basic or below basic skills vs. above basic skills

- **Streaming intensity.** For several indicators in the study we compare consumers depending on how much they stream video content. This is based on the time that respondents reported to spend in an average week on various streaming activities (see section 2.1 for an overview of these activities), on each of the five devices in scope. The reported times per activity and device are totalled per respondent to come to the total time

spent on streaming per week. Using this, respondents are assigned to one of three groups: heavy streamers (the top 33,3% of streamers in terms of total time spent on streaming activities), moderate streamers (the middle 33,3%) and light streamers (the bottom 33,3%).

Levels of analysis: heavy vs. medium vs. light streamers

- **Environmental impact knowledge.** Finally, consumers are also compared with regards to their (self-reported) knowledge about the environmental impact of their streaming behaviour (as well as other data-consuming internet-activities)¹⁴.

Levels of analysis: respondents who know a bit or a lot about this vs. respondents who know very little or nothing about this.

¹⁴ For brevity, we will refer to this as “streaming behaviour” when reporting, but the survey question also included reference to other data-consuming activities.

1 Factors influencing ICT device purchase

1.1 Measuring the importance of purchase-influencing factors

The goal of this part of the study was to measure the **relative importance of a large set of product factors when it comes to their impact on consumers' purchase decisions**. Gauging the relative importance of factors can be challenging in the context of survey research as people sometimes find it cognitively difficult to rank multiple factors in a list – or simply lack the inclination to do so. Often they will pick factors placed towards the top of a list, ignoring those further down; or they may find it relatively easy to identify the most and least important factors but find discriminating between middling factors difficult.

It is also important to consider that for this particular context, where a range of (sometimes competing) factors are taken into account, ranking questions do not necessarily reflect accurately the real-life trade-offs that consumers often find themselves making. Certainly, in relation to the specific factors that are of interest for this study, it must be borne in mind that consumers will not consider factors relating to multimedia performance and factors relating to the sustainability of the device separately. Rather, they will tend to trade-off factors from across the two areas of factors.

Given these issues, we used a sophisticated form of stated importance analysis that both lowers the cognitive load on respondents and more accurately mimics the purchase decision-making process. Specifically, we recommend assessing the impact of multimedia performance, material efficiency and energy efficiency using **a MaxDiff (Maximum Difference Scaling) approach** – sometimes also referred to as "best-worst scaling".

In practice, respondents were repeatedly presented with smaller subsets of factors taken from a larger list, and asked to each time choose the most and least important factors in each subset. From the resulting data it is possible to derive an overall ranking of all the factors for the sample as a whole and to arrive at an importance score for each factor – which in turn means it is possible to identify exactly how important each factor is *seen in relation to the others*. This is quantified using a score, where the higher the score, the more important the factor.

Factors included in the survey

For each of the devices included in the study (laptop, smartphone, tablet, smart TV and gaming console), a unique list of product factors was developed that could potentially play a role in the decision process to purchase the device. These factors can be categorised in three distinct groups:

- Factors related to the **device performance** (generally and when it comes to streaming multimedia content), such as hardware performance and processing speed, internet connection, battery life etc.
- Factors related to the **sustainability** of the device, such as the expected lifetime, but also consumer care, energy efficiency, reparability of the device and take-back services.
- **Other factors** that do not fall into the two previous groups but can be reasonably expected to play a role in the consumer's decision, such as the price of the device.

The table on the next page shows which factors were included in the study from each of these groups, and for which device they were included in the survey.

Table 1.1 Product factors included in the study (per device)

Factors	Type			Device				
	Performance	Material/energy efficiency	Other	laptop	Smartphone	tablet	smart TV	gaming console
The resolution and quality of the screen (e.g. HD/UHD, 4K/5K)	X			X	X	X	X	
The size of the screen	X			X	X	X	X	
The possibility to install and use specific media platforms/applications (e.g. YouTube, Google Play, Amazon Prime, Netflix) on the console	X							X
The speed and quality of the internet connection of the device	X			X	X	X	X	X
Performance and features of the camera (e.g., resolution, picture quality)	X				X			
The energy label class (e.g. A, B, C), ecolabel or other labels that provide information on the device's environmental impact		X					X	
How easy it is to have the product repaired or to replace parts		X		X	X	X	X	X

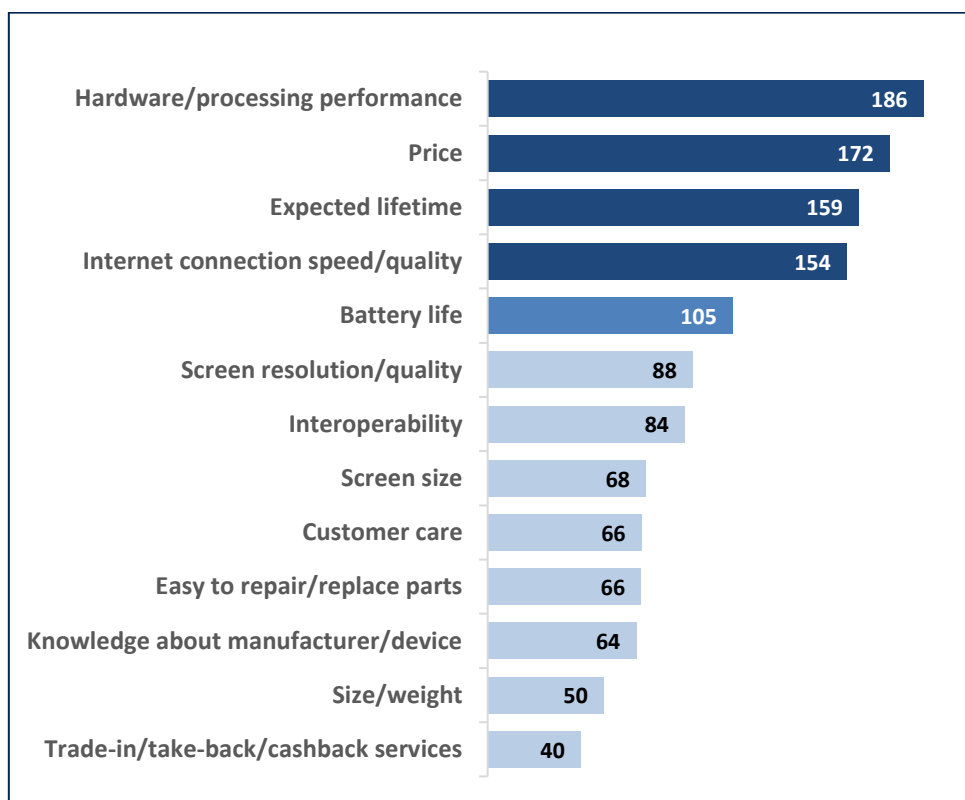
The expected lifetime of the product before there is significant performance or usability decrease (e.g. how long the battery will retain acceptable capacity or how long there will be software upgrades available)		X		X	X	X	X	X
The availability of trade-in, take-back or cashback services (i.e., that the manufacturer or the retailer will take back your device when you want to buy a new device, possibly paying you for the old device)		X		X	X	X	X	X
Your knowledge about the manufacturer or device (e.g., the reputation of the model/brand/manufacturer, personal past experiences, reviews or ratings of the device)			X	X	X	X	X	X
Whether and how you can use the device together with other devices (e.g., wireless or physical connectivity to other devices, software compatibility, data sharing, etc.)	X			X	X		X	
How long the battery lasts before it needs recharging	X			X	X	X		
The size and weight of the device			X	X	X	X		

The price of the device			X	X	X	X	X	X
Customer care offered by the manufacturer (e.g., repair services, help desk, warranty)		X		X	X	X	X	X
Processing speed and hardware performance	X			X	X	X		X
Storage space on the device	X				X			

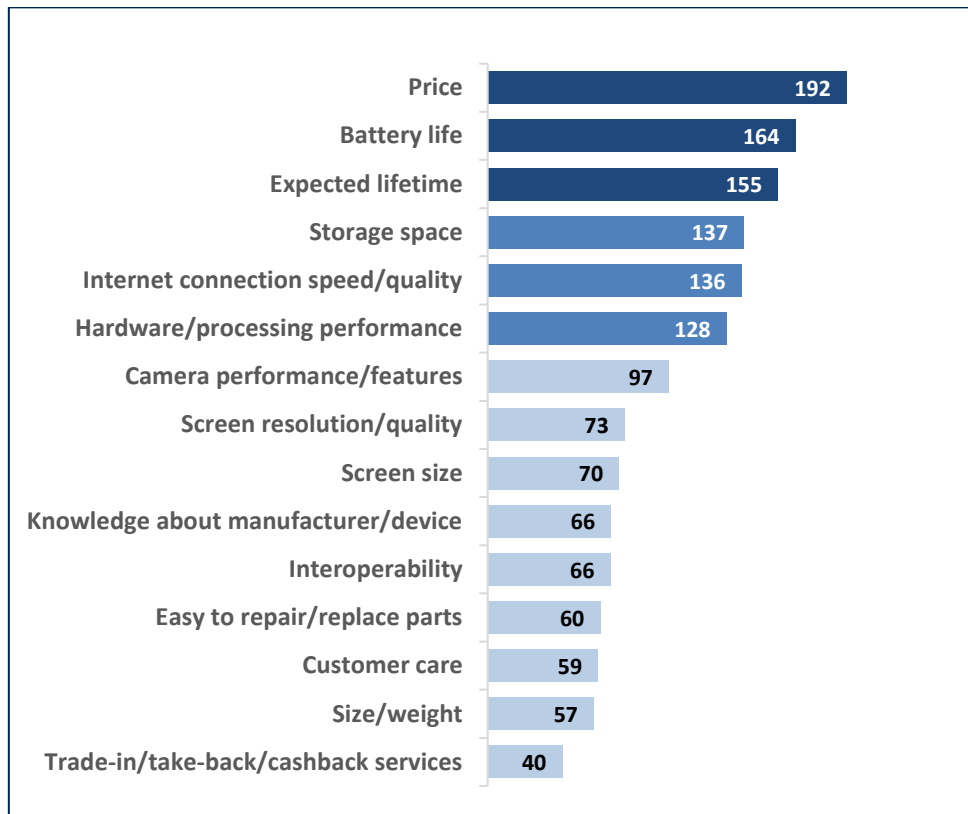
1.2 Relative importance of factors

The figures below and on the next pages show, for each device, the relative importance of different factors that could have an influence on the purchase choice of consumers, each time ranked from high to low. As explained in the previous section, the numbers for each factor represent the relative importance score. The difference between any two scores indicates how much more important that factor is found, on average, compared to the other factor (e.g., 100 is twice as important as 50), and a score of 100 in itself indicates that that factor is exactly as likely to be found more as well as less important than other factors (i.e., the closer this score is to 100, the more “average” the importance is compared to other factors).

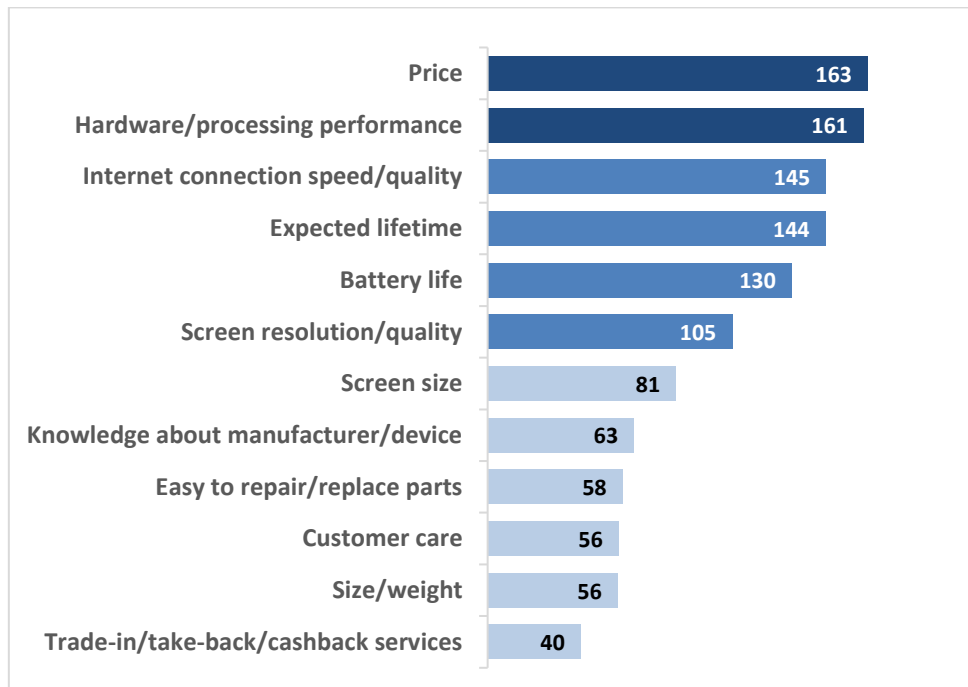
1.2.1 Relative importance of factors when buying a LAPTOP



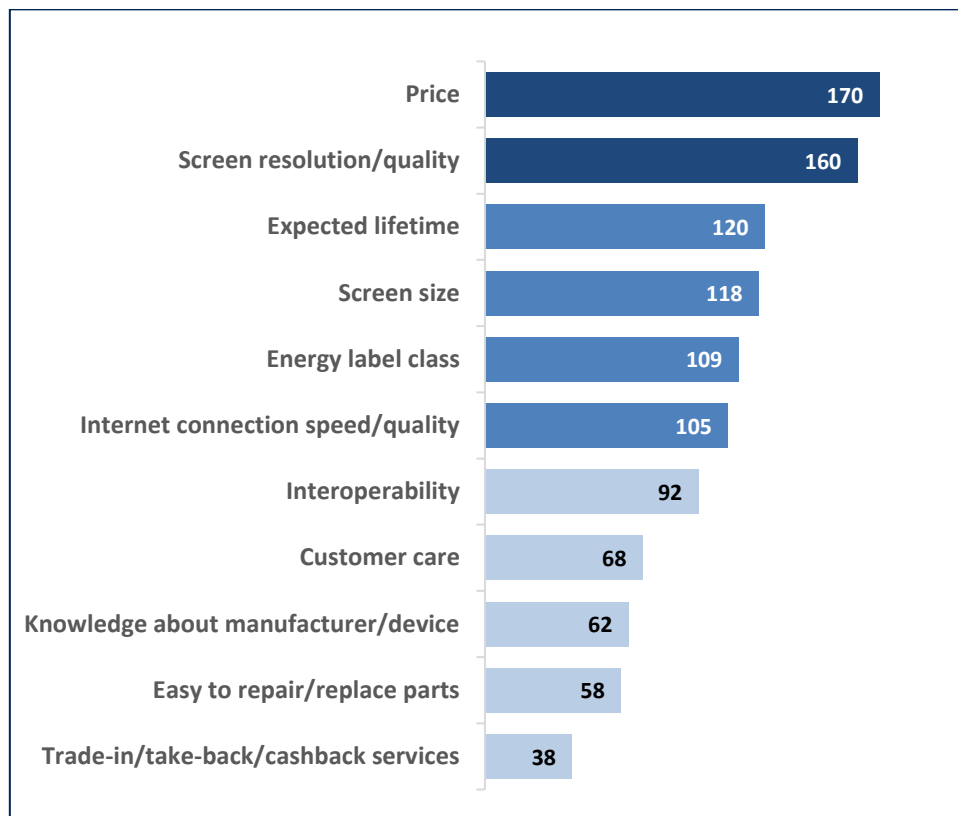
1.2.2 Relative importance of factors when buying a SMARTPHONE



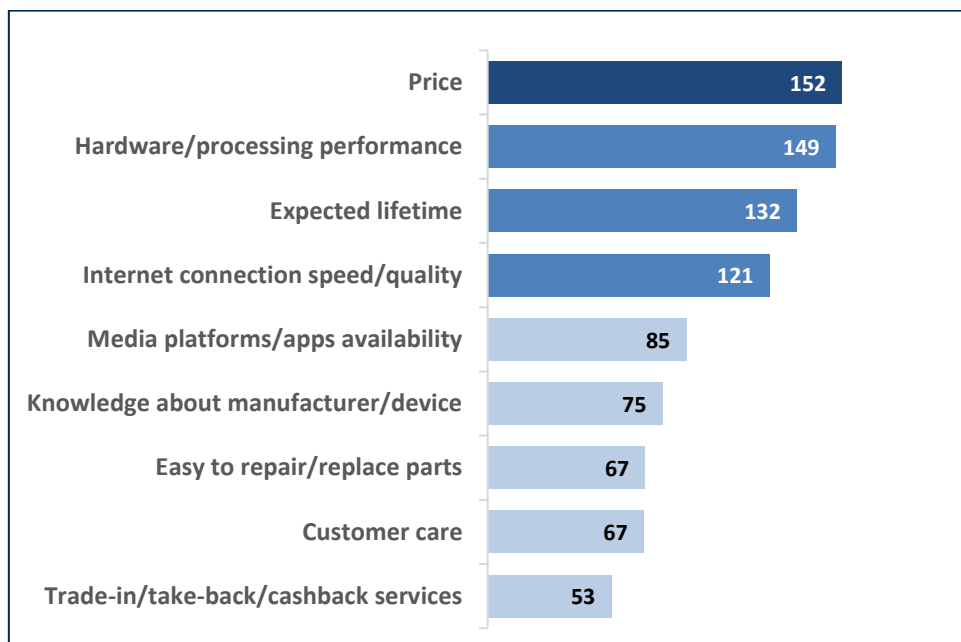
1.2.3 Relative importance of factors when buying a TABLET



1.2.4 Relative importance of factors when buying a SMART TV



1.2.5 Relative importance of factors when buying a GAMING CONSOLE



Overall trends

From the rankings presented on the previous pages, it becomes clear that there **are considerable consistencies across devices** when it comes to the relative importance of various product factors when buying a new device – more so than there are differences between devices.

First, **price** is clearly the most important factor for consumers when choosing a device, ranking first for four out of five devices. Only for laptops is hardware performance and processing speed more important.

Second, **performance-related factors are overall found much more important when buying a device than factors related to sustainability**. This is highly consistent across devices. Hardware performance/processing speed, internet connection quality/speed and battery life are generally among the top factors. Factors that have to do with sustainability almost always rank with very low importance compared to other factors. One major exception to this general trend is the factor „expected lifetime“, which ranks in the top three for almost all devices.

Performance-related factors

Table 1.1 below shows the ranking of each factor that relates to the performance of the device (e.g., „hardware performance/processing speed“ ranks first for laptops, and sixth for smartphones). The ranking place among other factors for that device is each time given, and it is indicated whether the relative importance score for that factor, pertaining to that device, is above average (green) or below average (red).

Table 1.2 Ranking of performance-related factors per device

factor	Laptop	Smartphone	Tablet	Smart TV	Gaming console
Hardware performance/processing speed	1	6	2		2
Battery life	5	2	5		
Storage space		4			
Internet connection quality/speed	4	5	3	6	4
Media platform/apps availability					5
Screen resolution	6	8	6	2	
Screen size	8	9	7	4	
Camera		7			
interoperability	7	11		7	
Total number of factors measured	13	15	12	11	9

This shows that **hardware performance and processing speed** is generally the most important performance-related factor, and indeed typically among the most important factors overall for most of the devices. It does rank lower than price for all devices except laptops (and was not asked for smart TVs). Smartphones are an exception in this regard. There, hardware performance and processing speed rank sixth. This is due to the higher importance that is given, on average, to

battery life and storage space when it comes to smartphones. **Battery life** is typically found less important for laptops and tablets, but still consistently has an above average importance score for these devices as well. Finally, also **internet connection quality and speed** has an above average importance for each of the devices. It is found especially important for tablets, where it ranks third, the highest ranking of all devices and the only device where this factor is on average found more important than the expected lifetime of the device.

Other performance-related factors are on average seen as less important compared to other factors, particularly **camera features and quality** (only asked for smartphones) and **interoperability**. **Screen size and screen resolution** rank below average typically as well, although these factors are somewhat more important for tablets, and particularly for smart TVs. For the latter device, screen resolution and size in fact rank among the top factors overall, ahead of device's internet connection quality and speed. Still, for this group of factors as well, it can be noted that they still generally rank higher than most of the factors that are related to sustainability.

Sustainability-related factors

Table 1.2 below shows the same ranking information for factors that are related to environmental sustainability and energy efficiency.

Table 1.3 Ranking of sustainability-related factors per device

factor	Laptop	Smartphone	Tablet	Smart TV	Gaming console
expected lifetime	3	3	4	3	3
Energy label class				5	
easy to repair / replace parts	10	12	9	10	7
customer care	9	14	10	8	8
Trade-in/take-back/cashback	13	15	12	11	9
Total number of factors measured	13	15	12	11	9

This table shows that most often, factors that relate to the product's sustainability are assigned only little importance, on average, compared to other factors. This is specifically the case for the after-sales factors, who are all found less important than average for each of the devices. The **availability of trade-in, take-back or cashback services** ranks consistently as least important relative to all other factors for each of the devices. For most devices the availability of **customer care** ranks closely above that. The **ease with which a device can be repaired or that parts can be replaced** is also assigned below average importance for all devices, although it is found most important than the former two factors. Only for laptops and Smart TVs is customer care found somewhat more important relative to ease of repairability/replacement.

The big exception to this is **the expected lifetime of the device**. This factor is found highly important for all devices relative to other factors, ranking among the top three factors overall for each device, with the exception of tablets, where, as mentioned above, internet connection quality and speed is found more important.

Apart from the expected lifetime of the device, the only other sustainability factor with an above average importance score is the **energy label class** of the device. It should be kept in mind that this factor was only surveyed for smart TVs, since this is the only device among those included in the study for which energy labels exist. For smart TVs, it is assigned higher than average

importance compared to other factors, and is also found more important than the quality and speed of the internet connection of the device.

Sociodemographic trends

The above described trends do not only hold largely across devices, but there is also a strong consistency between different sociodemographic subgroups. This means that regardless of consumers' sociodemographic background, price is almost always the most important factor to take into account when buying a new device, closely followed by hardware performance / processing speed and other performance factors, while in turn such factors are consistently found more important than factors related to sustainability, with the exception of the expected lifetime of the device.

There are some minor differences between subgroups that can be noted, keeping in mind that those do not change this general ranking. These difference in themselves are also highly consistent between devices, which is why we describe them here together, rather than per device. Where observations differ between devices, this is however also mentioned.

- **Age:** Across devices, price is a more important factor for older consumers than for younger consumers, with the exception of gaming consoles, where price is more important for younger consumers. Older consumers also attach somewhat more importance to internet connection quality and speed, except for laptops where no such difference can be observed. There are no real differences when it comes to the importance of sustainability factors. While younger people on average attach a slightly higher importance to trade-in/take-back/cashback services, this factor remains the least important for all age groups among all devices.
- **Education level:** differences between levels of education are overall very small. For laptops and smartphones, consumers with a low/medium level of education find internet connection quality and speed somewhat more important, but this is not observed for other devices.
- **Financial situation:** in general, price is more important for consumers who find it difficult to make ends meet. Moreover, they attach slightly more importance to sustainability-related factors. However, this does not pertain to the expected lifetime of devices, which is not particularly more important (or even slightly less important in the case of laptops and smartphones) for consumers with a difficult financial situation compared to those who are in an easy financial situation.
- **Digital competence:** consumers with a basic or below basic digital competence level find hardware performance and processing speed less important than those with an above basic competence level, although it remains one of the most important factors for this group as well. Consumers with a basic or below basic digital competence level attach slightly more importance to sustainability factors compared to those with an above basic level of digital competence. The exception is the expected lifetime, which the former group finds slightly less important compared to the latter group across devices (except for smart TVs,, where no such difference is observed). Here too, however, both groups follow the general trend, meaning that expected lifetime is an important factor for both groups, while other sustainability factors score much lower.

Looking at differences between groups with a different use behaviour profile (expected use length before replacement, the intensity/volume of streaming and the knowledge about the environmental impact of streaming), the same conclusion can be drawn that differences are small, and there are

no subgroups that differ from the overall trend described above. Some interesting subgroup differences are the following:

- **Expected use length:** as can be expected, consumers who envisage to use their device for up to three years before replacing it attach less importance to the expected lifetime of the device compared to those who envisage to use the device longer. In addition, the longer consumers envisage to use the device, the more important they also find the price of the device – although this does remain also one of the top factors for those who intend to use the device only up to three years. Notably, consumers who intend to use their device longer find other sustainability factors not more important than those who intend to use it up to three years. Minor exceptions are smart TVs and consoles, where the former group attaches slightly more importance to repairability, cashback/take-back services and customer care. But for those devices as well, these factors remain among the least important factors compared to other, mostly performance-related factors.
- **Streaming intensity:** how much people use devices for streaming has no strong impact on what factors they find important when buying a device. Heavy streamers attach somewhat more importance to hardware performance and processing speed than moderate or light streamers. They find the expected lifetime also slightly more important when it comes to laptops, smartphones and tablets, but other sustainability factors slightly less important when it comes to these devices.
- **Knowledge of environmental impact of streaming:** consumers who report to have some or a lot of knowledge about the impact on the environment of streaming find price considerably less important than those who report to have only a little or no knowledge about this, although it does remain one of the most important factors for both groups. For laptops, the former group also finds internet connection quality and speed somewhat less important than the latter group, but this difference is not seen for other devices. Consistently across devices, the consumers who report to have some or a lot of knowledge about the impact on the environment of streaming find their existing knowledge about the device manufacturer or the device itself more important than those who have only a little or no knowledge about that impact – but this does not influence the overall low position of this factor on the importance ranking.

Country differences

Overall, consumers from different countries are largely similar when it comes to what factors they find important when deciding to purchase a device. The set of factors that are most likely to be more important than others are typically the same across countries, and this goes for all devices. If there are differences, these generally concern relatively small switches in ranking within the set of most important factors. This also means that the overall observation - performance-related factors are consistently found more important than sustainability-related factors, with the general exception of expected lifetime. Still, one factor where we do see two countries – Poland and Sweden – deviating from the common trend - in opposite directions, is **the expected lifetime of the product**.

First, in **Poland**, expected lifetime often ranks *lower* in relative importance against other factors, compared to other countries. As discussed above, across all countries the expected lifetime ranks often among the top three or top four (in the case of tablets) of most important product factors. In Poland however, it typically ranks lower. This is in particular the case for:

- **Smartphones**, where expected lifetime ranks sixth (with the average across countries being third), behind not only price and battery life, but also storage space, processing speed & hardware performance, and the speed/quality of the internet connection.
- **Smart TVs**, where expected lifetime ranks seventh (with the average across countries being third), behind all of the performance-related factors. Notably, energy label class is the single sustainability factor that ranks high for smart TVs in Poland, ranking third. This makes Poland, together with Italy, the country where the energy label class is found most important compared to other countries.

For the other devices as well, the expected lifetime ranks lower in Poland than the average across countries, but less significantly so.

Vice versa, in **Sweden**, the expected lifetime ranks almost always higher than in other countries. For laptops and tablets, the expected lifetime ranks first, and for smartphones and gaming consoles still second. Only for smart TVs, the expected lifetime is only the fourth most important factor in Sweden, after screen quality/resolution, price and screen size.

1.2.1 Segmentation analysis

A MaxDiff analysis allows not only to identify across the whole consumer sample what factors are most important when buying a new device. It also allows to identify distinct consumer **segments**. Specifically, we can distinguish subgroups of consumers that behave differently in terms of what product factors they find important. This can, for instance, concern subgroups that attach particularly more importance to sustainability factors, or less to price. In addition, each segment can also be further in terms of their sociodemographic and device usage profiles, highlighting whether there is any link between these characteristics and differences in purchase preferences.

In the following sections, we present for each device the results of the segmentation analysis. Each time, we present the importance scores of the different product factors, per segment, indicating differences in what factors our found most important. In the same table, we list relevant sociodemographic and usage characteristics in which the segments differ considerably from each other.

A summary discussion of each segment is always included. The focus in these discussions is always on how each segment distinguishes itself from the other segments and from the average (overall) consumer behaviour as presented in the preceding section. Particular attention goes to segments where there is a deviation from the overall results, in terms of:

- Higher importance given to sustainability factors
- Lower importance given to price, performance factors and expected lifetime
- The extent to which the sociodemographic and usage profile conforms to the expected trends as seen in the overall sample (for instance, does a better financial situation also come with a lower interest in the product's price?)

1.2.1.1 Laptops

	Segment 1	Segment 2	Segment 3
MaxDiff factors			
Processing speed and hardware performance	158	201	202
The price of the device	75	227	217
The expected lifetime of the product	149	128	199
The speed and quality of the internet connection	136	154	171
How long the battery lasts before it needs recharging	94	119	102
The resolution and quality of the screen	97	104	62
Whether and how you can use the device	116	58	77

together with other devices			
The size of the screen	64	117	24
Customer care offered by the manufacturer	95	26	75
How easy it is to have the product repaired or to replace parts	79	30	86
Your knowledge about the manufacturer or device (110	42	37
The size and weight of the device	56	83	11
The availability of trade-in, take-back or cashback services	72	12	35
TOP 4 FACTORS			
	Processing speed and hardware performance	The price of the device	The price of the device
	The expected lifetime of the product	Processing speed and hardware performance	Processing speed and hardware performance
	The speed and quality of the internet connection	The speed and quality of the internet connection	The expected lifetime of the product
	Whether and how you can use the device together with other devices	The expected lifetime of the product	The speed and quality of the internet connection
Sociodemo factors			
Age	29% below 34	21% below 34	19% below 34
Education level	29% high	35% high	26% high
Digital competence	43% basic/below basic	32% basic/below basic	40% basic/below basic
Financial situation	53% easy	57% easy	46% easy
Employment status	56% employed	54% employed	46% employed
ICT usage factors			
Streaming intensity (general)	29% heavy streamers	32% heavy streamers	30% heavy streamers
Streaming on device (% no)	9% no	17% no	12% no
Streaming intensity on device	228 min/week	266min/week	237 min/week

Segment 1

This segment does not place a lot of importance on price. Interestingly however, they do rate sustainability factors higher in importance than the other two segments, and in particularly higher than segment 2. While performance-related factors still typically rank higher than sustainability factors, the difference is smaller than the discrepancy observed in segment 2. This relatively lower interest in performance-related factors and somewhat

higher interest in sustainability-related factors could be associated with the fact that this segment contains the highest share of consumers with a basic or below basic digital competence level, and that consumers in this segment who use their laptop for streaming spend the least time on this per week compared to the other two segments. At the same time, the fact that price is not very important for this segment shows that the interest in sustainability-related factors cannot be immediately linked to.

Segment 2

This segment finds price most important, but other than that performance-related factors rank clearly higher than sustainability factors, with the exception of the expected lifetime of the product. Other sustainability factors rank at the very bottom of the factor list, considerably lower than what is observed in the other two segments.

Linking this to sociodemographic background parameters, there is clear consistency with the overall trend, in that this segment on average spends the most time on streaming, has the highest level of digital competence and the highest average education level, which we know are associated with stronger focus on performance-related factors and less on sustainability-related factors.

Segment 3

Segment 3 finds itself between segment 1 and segment 2. Consumers on the one hand attach a high importance to price (as with segment 2 and in contrast to segment 1), while on the other hand they attach more importance to the expected lifetime of the product compared to both segment 1 and 2, and they find other sustainability slightly more important than consumers in segment 2 (similar but somewhat less than segment 1).

1.2.1.2 Smartphones

	Segment 1	Segment 2	Segment 3
MaxDiff factors			
The price of the device	246	68	264
How long the battery lasts before it needs recharging	181	135	178
The expected lifetime of the product	121	161	190
Storage space on the device	157	140	111
The speed and quality of the internet connection of the device	130	156	120
Processing speed and hardware performance	123	158	101

Performance and features of the camera	119	117	49
The resolution and quality of the screen	85	95	36
The size of the screen	114	52	39
Your knowledge about the manufacturer or device	43	86	70
Whether and how you can use the device together with other devices	36	111	51
How easy it is to have the product repaired or to replace parts	24	60	103
Customer care offered by the manufacturer	22	68	92
The size and weight of the device	89	40	38
The availability of trade-in, take-back or cashback services	11	54	59
TOP 4 FACTORS			
	Price of the device	The expected lifetime of the product	Price of the device
	How long the battery lasts before it needs recharging	Processing speed and hardware performance	The expected lifetime of the product
	Storage space on the device	The speed and quality of the internet connection of the device	How long the battery lasts before it needs recharging
	The speed and quality of the internet connection of the device	Storage space on the device	The speed and quality of the internet connection of the device
Sociodemo factors			
Age	20% below 34	24% below 34	17% below 34
Education level	31% high	27% high	26% high
Digital competence	35% basic/below basic	40% basic/below basic	45% basic/below basic
Financial situation	52% easy	50% easy	42% easy
Employment status	53% employed	53% employed	43% employed
ICT usage factors			

Streaming intensity (general)	29% heavy streamers	30% heavy streamers	21% heavy streamers
Streaming on device (% no)	25% no	14% no	23% no
Streaming intensity on device	171 min/week	144 min/week	128 min/week

Segment 1

This segment has a strong preference over performance-related factors over sustainability factors. While they rank the importance of expected lifetime as above average compared to other factors, it ranks outside of the top five for this segment, and scores lower than in the other two segments. The three other sustainability factors (repairability, customer care and trade-in services) rank as the three lowest-scoring factors for this segment.

In line with the overall findings, this strong focus on performance at the cost of sustainability factors can be linked to the fact that this segment has, compared to the other two segments, more highly educated consumers, more consumers with a high digital competence level, and more consumers who find it easy to make ends meet financially. While this segment contains the largest group of non-streamers, it is also the segment where those who do use their smartphone for streaming do so for the largest amount of time per week.

Segment 2

This segment is quite similar to segment 1, with the main difference being that price is not important for this segment. In its place, the expected lifetime is the most important purchase factor, but at the same time other sustainability factors rank only low in importance - though with higher importance scores than we see in segment 1. Similar to segment 1, this segment is very much focused on performance-related factors, with the exception that quality/resolution of the screen and screen size are ranked with below-average importance compared to other factors. On average, this segment's consumers are quite intensive streamers, though less so than in segment 1.

Segment 3

Price is by far the most important factor, followed by the expected lifetime of the product, battery life and internet connection quality/speed. Notably, repairability is also found quite important, scoring above average compared to other factors, and higher than key performance-related factors such as processing speed/hardware performance, performance and features of the camera and the resolution/quality of the camera (the latter is ranked lowest of all factors in this segment). Similarly, but less prominently, other sustainability factors are also found more important compared to the other two segments, customer care and trade-in services also score higher than in the other two segments. These results thus indicate a higher interest in sustainability aspects of the device over some key performance factors.

This can be linked to the fact that this segment has the highest group of consumers with a basic or below basic level of digital competence, as well as the lowest level of consumers who find it easy to make ends meet. It is also the group in which consumers who use their device for streaming do so the least amount of time per week.

1.2.1.3 Tablets

	Segment 1	Segment 2	Segment 3
MaxDiff factors			
The price of the device	240	63	177
Processing speed and hardware performance	151	231	116
The speed and quality of the internet connection	134	191	118
The expected lifetime of the product	91	174	164
How long the battery lasts before it needs recharging	142	146	109
The resolution and quality of the screen	115	143	68
The size of the screen	133	62	54
Your knowledge about the manufacturer or device	38	56	87
How easy it is to have the product repaired or to replace parts	25	39	98
Customer care offered by the manufacturer	23	41	93
The size and weight of the device	97	35	39
The availability of trade-in, take-back or cashback services	12	19	77
TOP 4 FACTORS			
	Price of the device	Processing speed and hardware performance	Price of the device
	Processing speed and hardware performance	The speed and quality of the internet connection	The expected lifetime of the product
	How long the battery lasts	The expected lifetime of the product	The speed and quality of the internet of the device

	Speed and quality of internet connection	How long the battery lasts	Processing speed and hardware performance
Sociodemo factors			
Age	20% below 34	20% below 34	27% below 34
Education level	32% high	34% high	26% high
Digital competence	33% basic/below basic	23% basic/below basic	40% basic/below basic
Financial situation	53% easy	61% easy	46% easy
ICT usage factors			
Streaming intensity (general)	34%	40%	29%
Streaming on device (% no)	28% no	22% no	19% no
Streaming intensity on device	134 min/week	136 min/week	136 min/week
Usage frequency of device	42% daily	46% daily	46% daily

Segment 1

Consumers in this segment find price the most important when purchasing a device, but at the same time they are heavily focussed on performance factors - not only hardware performance and processing speed, but also screen quality and screen size. The expected lifetime scores below average, and the other sustainability factors (repairability, customer care and trade-in services) have very low importance scores, indicating that consumers' interest in sustainability in this segment is low.

Looking at consumers' characteristics, this segment contains a fairly high proportion of digitally competent consumers, though less so than in segment 3. This segment does contain at the same time the highest proportion of consumers who do not use their tablet for streaming, and they also slightly less often use their tablet daily. This goes somewhat against the overall trend that a lower engagement with streaming typically comes with a higher interest in sustainability factors.

Segment 2

Segment 2 is to some extent similar to segment 1, particularly regarding a high focus on performance factors and a low focus on sustainability factors, in line with the overall trend we see across devices. The main difference is that consumers in this segment assign only little importance to price (considerably below average). This lower importance of price results in a higher importance for performance factors, but even more so in a stronger focus on expected lifetime - suggesting that consumers in this segment are willing to pay more for a device that performs better but also lasts better. Other sustainability factors, however, still remain unimportant.

The high interest in performance factors and the low importance of price coincide, in line with the overall trend, with the fact that consumers in this segment have the highest digital competence level, and are most likely to find it easy to make ends meet.

Segment 3

The third segment contains consumers who assign somewhat less importance to performance factors, and more to sustainability factors. In particular, the expected product lifetime is the second-most important factor for them, behind price. Repairability and customer care, while found less important than internet speed/quality and hardware performance, score much higher than in segments 1 and 2, and are notably found more important by consumers in this segment than screen quality and screen size - these latter two factors are among the least important factors in this segment.

These findings are also in line with sociodemographic characteristics as we expect them based on the overall trends: consumers in this segment are more likely to have a basic or below basic digital competence compared to the other two segments (which correlates with a higher interest in sustainability factors and somewhat lower interest in performance factors), and they are most likely to find it difficult to make ends meet (which correlates with a higher importance of price as well as the product's expected lifetime).

1.2.1.4 Smart TVs

	Segment 1	Segment 2	Segment 3
MaxDiff factors			
The price of the device	56	250	181
The resolution and quality of the screen	196	206	81
The size of the screen	97	191	57
The speed and quality of the internet connection	140	97	83
The expected lifetime of the product	126	87	151
The energy label class	130	78	124
Whether and how you can use the device together with other devices	145	70	70
Your knowledge about the manufacturer or device	73	42	73
Customer care	57	34	113
How easy it is to have the product repaired or to replace parts	44	31	100
The availability of trade-in, take-back or cashback services	35	13	65
TOP 4 FACTORS			

	The resolution and quality of the screen	The price of the device	The price of the device
	Interoperability	The resolution and quality of the screen	The expected lifetime
	The speed and quality of the internet connection	The size of the screen	The energy label class
	The energy label class	The speed and quality of the internet connection	Customer care
Sociodemo factors			
Financial situation	39% difficult	41% difficult	52% difficult
Employment status	41% not employed	42% employed	48% not employed
Digital competence	31% basic/below basic	30% basic/below basic	41% basic/below basic
ICT usage factors			
Streaming intensity (general)	38% heavy streamers	33% heavy streamers	30% heavy streamers
Streaming on device (% no)	7% no	11% no	14% no
Streaming intensity on device	307 min/week	318 min/week	248 min/week
Usage frequency of device	85% daily	86% daily	81% daily

Segment 1

This segment attaches very little importance to price compared to other segments. While in other segments price ranks first, in this segment it ranks at the bottom of the factors list, only above repairability and trade-in services. This low importance of price comes with a much higher than average importance given to performance-related factors, in particular the resolution and quality of the screen, interoperability and the speed/quality of the internet connection. In terms of sustainability-related factors, it is notable that they find the energy label class quite important (ranking as the fourth-most important factor), as well as the expected lifetime, but that other sustainability factors (customer care, repairability and trade-in services) are found not important.

The absence of a focus on price is consistent with the fact that this segment contains the least consumers who find it difficult to make ends meet. On the other hand, the focus on performance factors is consistent with the fact that this segment has, on average, the highest digital competence, and that consumers in this segments are most engaged with streaming.

Segment 2

This segment is in several ways similar to segment 1: consumers in this segment are also, on average, heavy streamers, and they have a high level of digital competence. They attach a very high importance to price, while at the same time they also find performance-related factors very important, much more so than sustainability-factors. Different from segment 1, this also goes for the expected lifetime of the product and energy label class. In other words, while in segment 1 these two factors are still found important,

sustainability ranks even lower for segment 2, at the advantage of performance-related factors.

Segment 3

Segment 3 behaves very different from the other two segments in the sense that three sustainability-related factors rank in the top four, only preceded by price. Moreover, reparability ranks fifth. In other words, in addition to the price of the device, this segment pays more attention to sustainability of the device than it does to its technical performance. That is not to say that this segment does not contain consumers who use their device for streaming. In fact, a clear majority does so, and the average streaming time among those who do is still high. However, it is also clearly lower than in segments 1 and 2. Moreover, consistent with the relative importance of performance factors in this segment, this segment has the highest proportion of consumers with a basic or below basic digital competence. Finally, the high importance attached to price as well as for almost all tested sustainability factors is also consistent with the fact that this segment contains the most consumers who find it difficult to make ends meet, as well as the highest proportion of non-employed consumers. This suggests that the segment's focus on price and sustainability might be informed by cost-saving concerns.

1.2.1.5 Gaming consoles

	Segment 1	Segment 2	Segment 3
MaxDiff factors			
The price of the device	212	69	210
Processing speed and hardware performance	154	131	170
The expected lifetime of the product	173	125	96
The speed and quality of the internet connection	97	115	157
The possibility to install and use specific media platforms/applications	17	111	123
Your knowledge about the manufacturer or device	73	90	52
How easy it is to have the product repaired or to replace parts	74	84	34
Customer care offered by the manufacturer	65	90	32

The availability of trade-in, take-back or cashback services	34	84	26
TOP 4 FACTORS			
	Price of the device	Processing speed and hardware performance	Price of the device
	The expected lifetime of the product	The expected lifetime of the product	Processing speed and hardware performance
	Processing speed and hardware performance	The speed and quality of the internet connection	The speed and quality of the internet connection
	The speed and quality of the internet connection	The possibility to install and use specific media platforms/applications	The possibility to install and use specific media platforms/applications
Sociodemo factors			
Age	29% below 34	37% below 34	37% below 34
Education level	35% high	30% high	31% high
Digital competence	22% basic/below basic	33% basic/below basic	25% basic/below basic
ICT usage factors			
Streaming intensity (general)	41%	39%	39%
Streaming on device (% no)	69% no	36% no	59% no
Streaming intensity on device	76 min/week	142 min/week	92 min/week
Usage frequency of device	13% daily	28% daily	18% daily

Segment 1

This segment is first of all characterised by the fact that price is the least important factor for consumers in this segment. While other than this, the segment mostly follows the overall tendency to find performance-related factors more important than sustainability-factors (with the exception of expected lifetime), it is notable that the difference between the different factors in terms of relative importance is relatively small. While other than expected lifetime all other sustainability factors are more likely than not found less important than more important than other factors, they remain close to average importance (i.e., with a score close to 100). This is interesting because this is the only segment in which the majority of consumers uses their console for streaming, and does so much more frequently than the other two segments as well. So for gaming consoles there is a consumer segment that combines a high-intensive streaming behaviour with a relatively high interest in sustainability factors related to the device.

Segment 2

This segment can be characterised as the most traditional gaming console user segment. A clear majority of consumers in this segment does not use their console for streaming, and those who do, do so the least frequently. They also use their console the least often on a daily basis.

Consumers in this segment attach most importance to price, but other than that the only two factors with an above average relative importance are expected lifetime and the hardware performance and processing speed of the device. With considerable margin they also find the possibility to install media apps on their console the least important product factor. This further indicates that their focus lies mainly with traditional function of gaming consoles rather than with multimedia streaming. Notably, this observation does not correlate with a lower level of digital competence. On the contrary, this segment contains the lowest proportion of consumers with a basic or below basic digital competence.

Segment 3

In several respects, this segment finds itself in between the first two segments. This segment attaches most importance to the price of the device, and in addition to that to performance-related factors. Contrary to segment 2, consumers in this segment do find the possibility to install specific media apps highly important, as well as internet connection speed and quality. This is consistent with the fact that they use their device more often for streaming - although less so than segment 1. All sustainability factors, including also the expected lifetime, have a below average importance score.

Notably, between these three segments there is no difference in terms of financial situation, indicating that a difference in how important they find price and/or certain sustainability factors is not directly correlated with this parameter.

2 Usage behaviour

2.1 Usage frequency

In this section, we discuss how often consumers engage in a range of streaming activities via different devices. We focus on five distinct types of streaming activities:

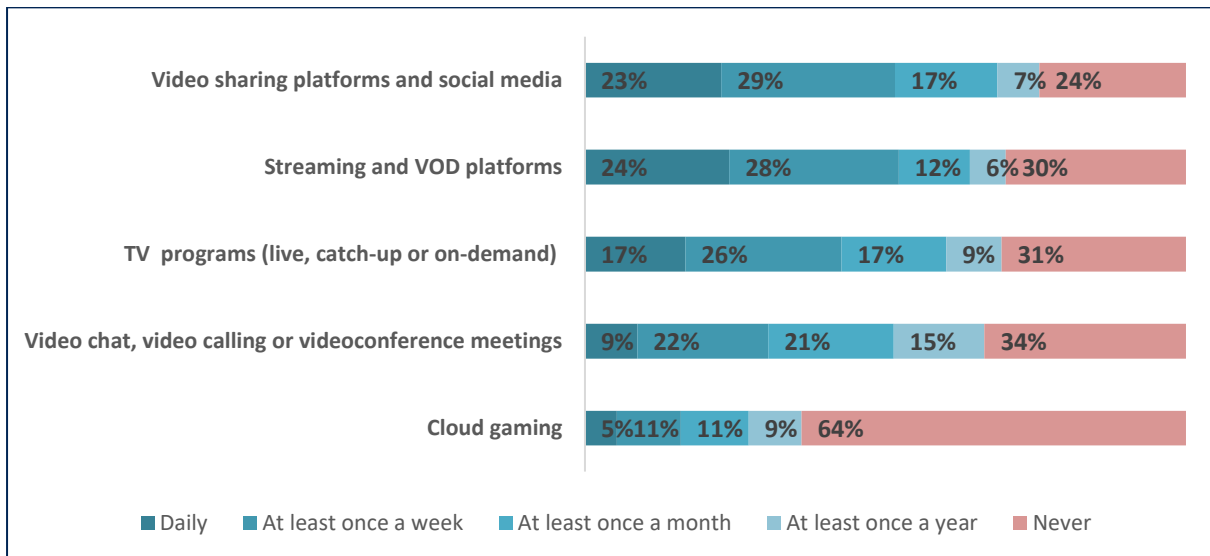
- Streaming of content from **video sharing platforms** (such as YouTube, Vimeo, Dailymotion etc.) **and social media** (such as Facebook, Instagram, TikTok)
- Streaming via commercial **SVOD/TVOD platforms** such as Netflix, Google Play, Amazon Prime, etc.
- Streaming of **TV programs** from a website or dedicated app (either live, catch-up or on demand)
- Participating in **video calls/chats or videoconference meetings**, including online learning activities
- **Cloud gaming** (i.e., playing games via streaming without (fully) downloading them, e.g. via platforms such as PS Now, Xbox Gamepass, Steam Remote Play, etc.)

We will first look at the **frequency** of these activities (how often do consumers engage in them, across devices), followed by a discussion of the **intensity** (how much time do consumers spend on these activities on different devices).

2.1.1 Frequency of streaming activities

Across all devices, the most frequent streaming activities is the streaming of content from video sharing platforms and social media, and streaming from VOD platforms. For both, just above half (52%) of consumers reports to do this at least once a week, and just under one in four on a daily basis. This is followed by streaming of TV programs (43% at least once a week) and video calling/conferencing (31%). The least frequently practiced streaming activity is cloud gaming. Sixteen percent of consumers does this at least weekly. Cloud gaming is the only streaming activity that the majority of consumers reports not to have ever engaged in (64%).

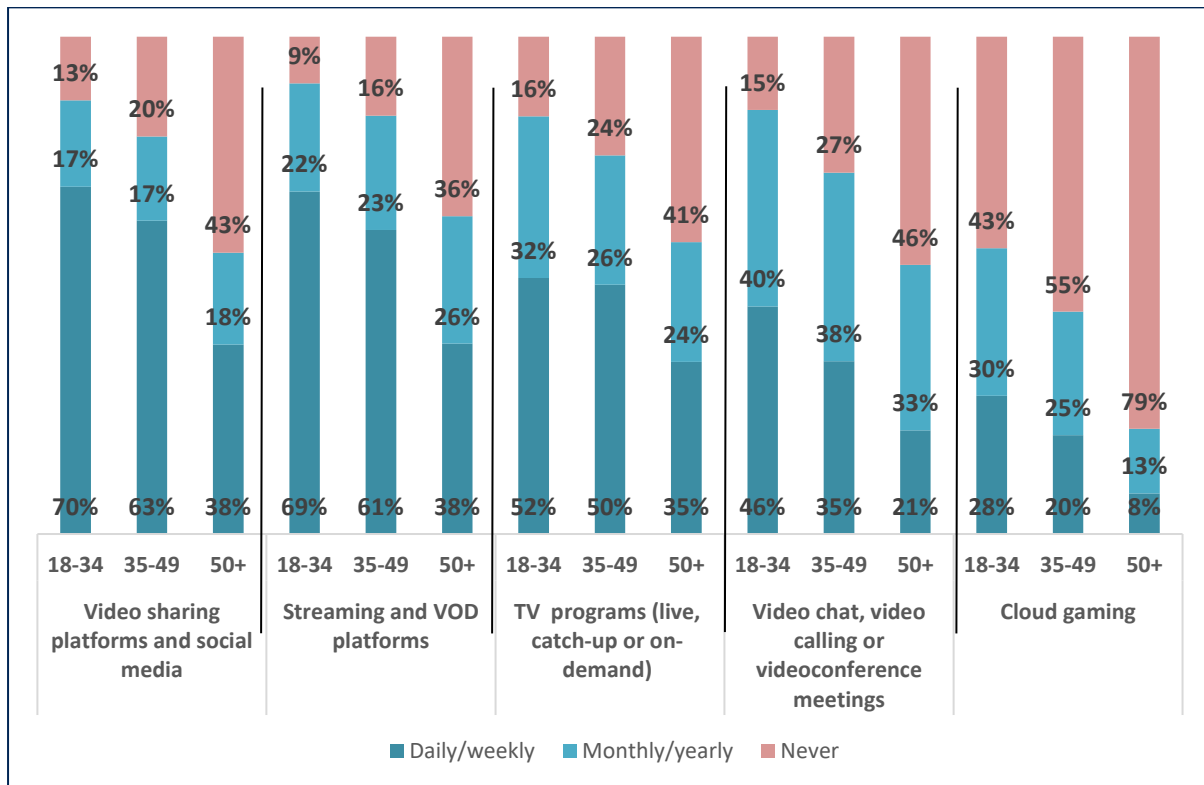
Figure 2.1.1 Frequency of streaming activities (overall)



This relative frequency of activities generally holds across various sociodemographic subgroups (i.e., streaming via video sharing platforms and social media is typically the most popular form of streaming among all subgroups, and cloud gaming always the least frequent form). There are, however, clear differences between subgroups when it comes to how frequent streaming is done.

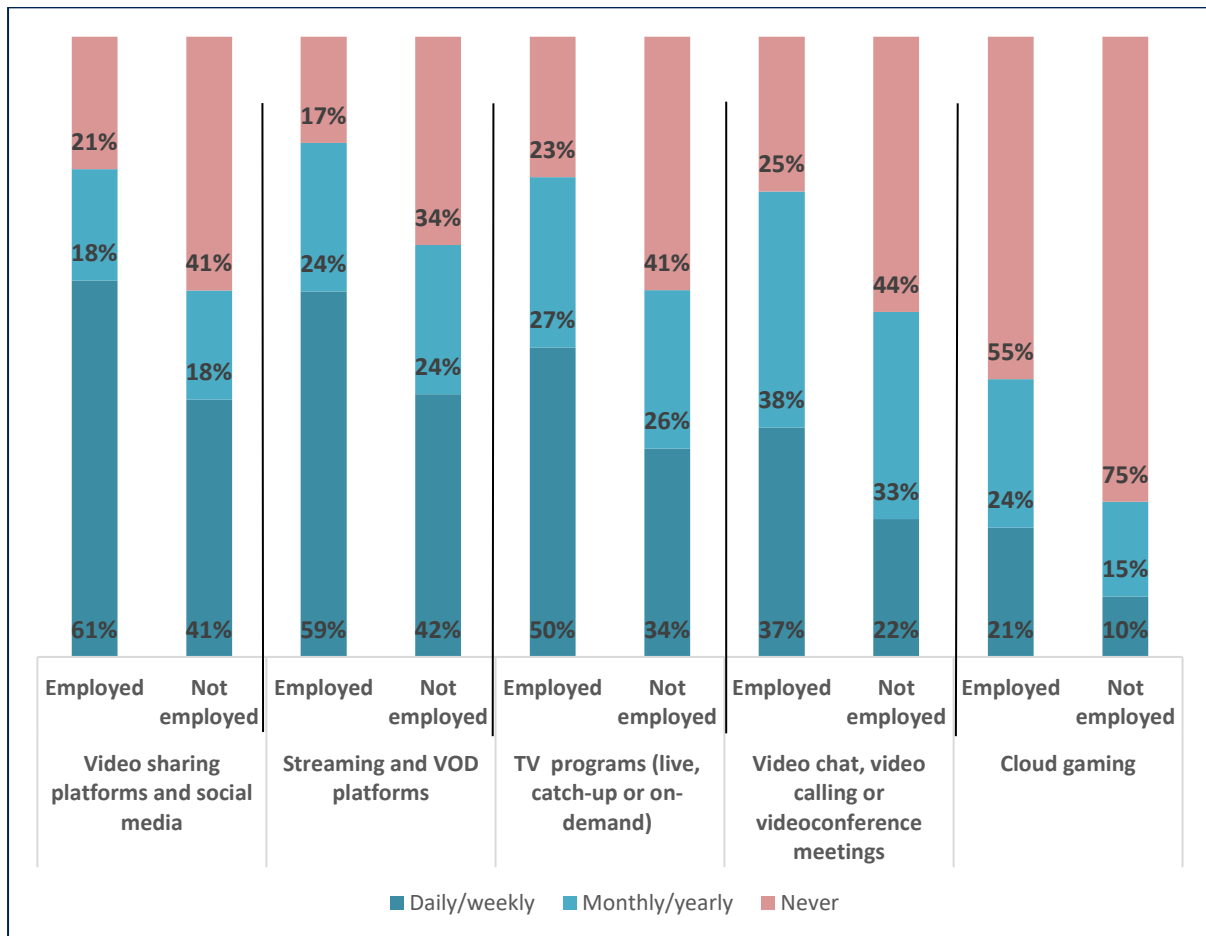
Streaming is consistently more frequent among younger consumers than among older ones, and this is the case for each of the studied streaming activities. Around seven in ten of consumers aged 18-34 stream at least weekly via video sharing platforms or social media (70%) or via VOD platforms (69%), and only a small minority in this group does never do this (13% and 9%, respectively). Among consumers aged 50 or over, less than four in ten stream at least weekly via video sharing platforms or social media, or via VOD platforms (38% for both).

Figure 2.1.2 Frequency of streaming activities (age groups)



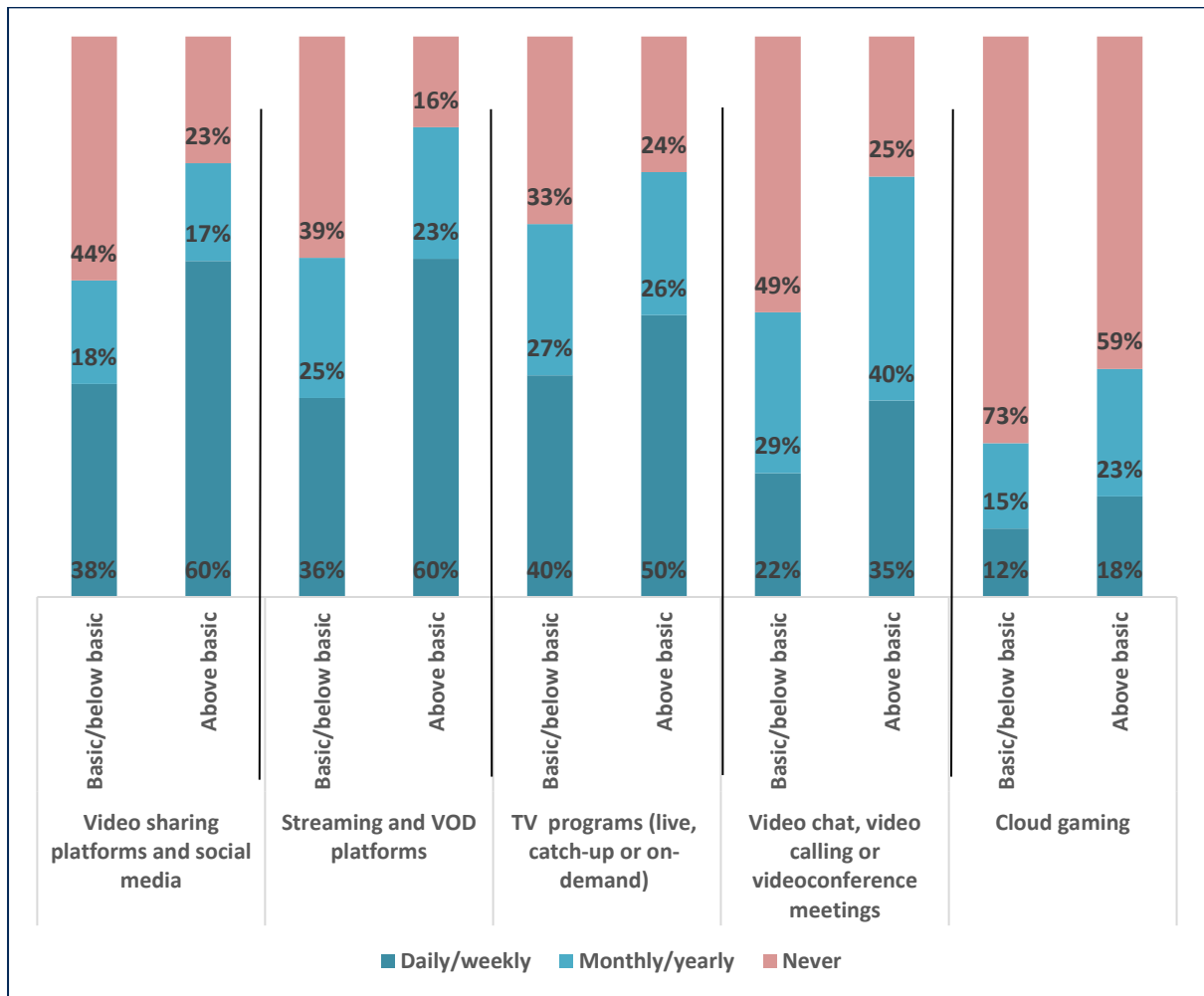
Streaming is also closely associated with employment status. Across all studied activities, consumers who are in employment stream more frequently than those who are not. Among non-employed consumers, the most practiced streaming activity is streaming via VOD platforms, which 66% in this group have ever done. Among employed consumers, the most practiced activity is streaming from video sharing platforms and social media, which 79% in this group have ever done.

Figure 2.1.3 Frequency of streaming activities (employment status)



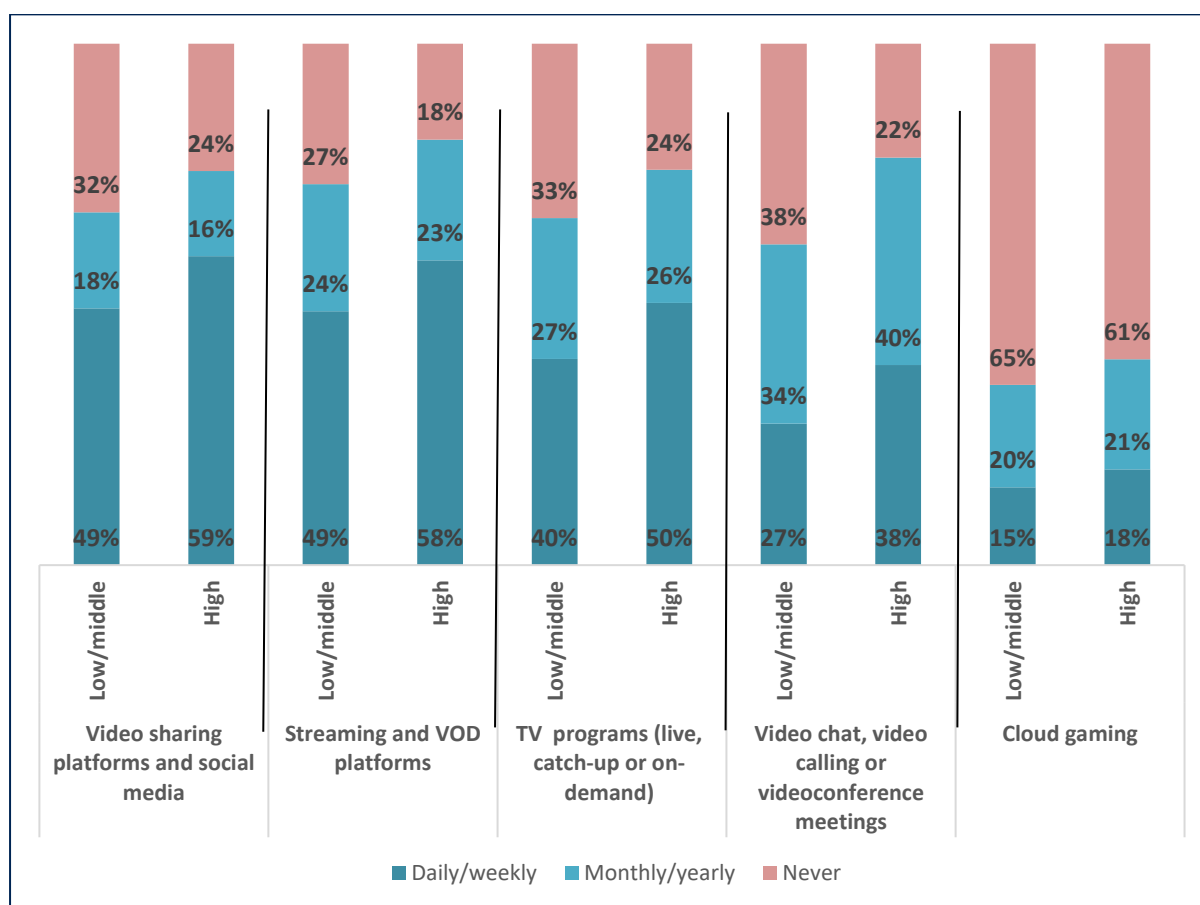
Consumers' level of digital competence is also positively correlated with the frequency of streaming activity. For all streaming activities, streaming is done more frequently by consumers with an above basic level of digital competence. Among those with a basic or below basic level of digital competence, the most common streaming activity is the streaming of TV-programs, which 67% have ever done. For those with an above basic level of digital competence, the most common streaming activity is streaming from VOD platforms, ever done so by 83%.

2.1.4 Frequency of streaming activities (digital competence level)



Finally, there is some association of streaming frequency with education level. Consumers with a low/medium level of education stream slightly less frequently than those with a high level of education. This difference is the largest for video calls/chats and videoconferencing, which almost four in ten (38%) of consumers with a low/medium level of education never do, compared to 22% of consumers with a high education level.

Figure 2.1.5 Frequency of streaming activities (education level)



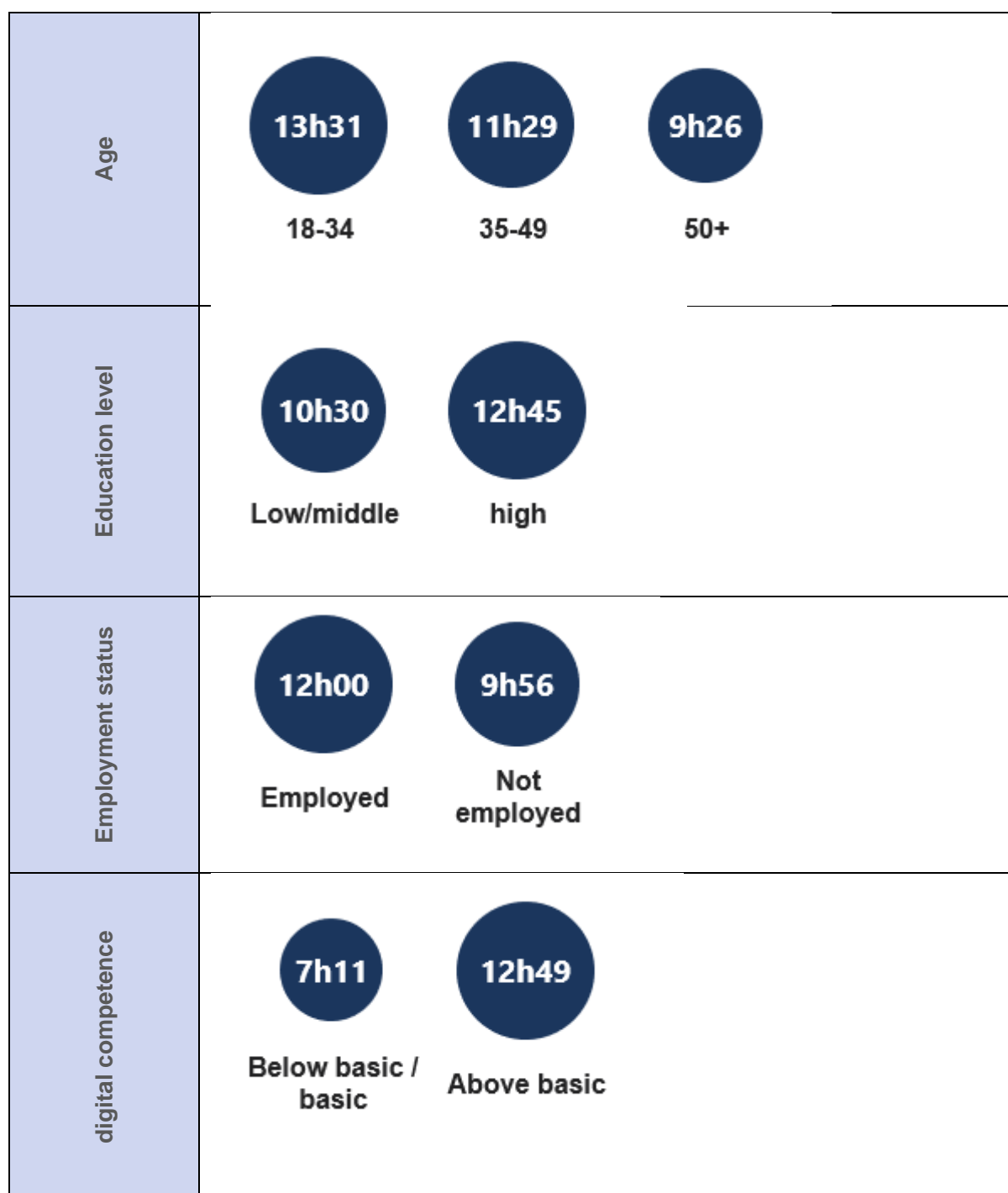
2.1.2 Streaming time

Overall

Consumers who stream video content do so on average for **11 hours and 14 minutes per week**, across all devices and streaming activities studied in this survey.¹⁵ Streaming time is highest among consumers who are younger, highly educated, in employment and with an above basic level of digital competence, as is shown in the figures here below:

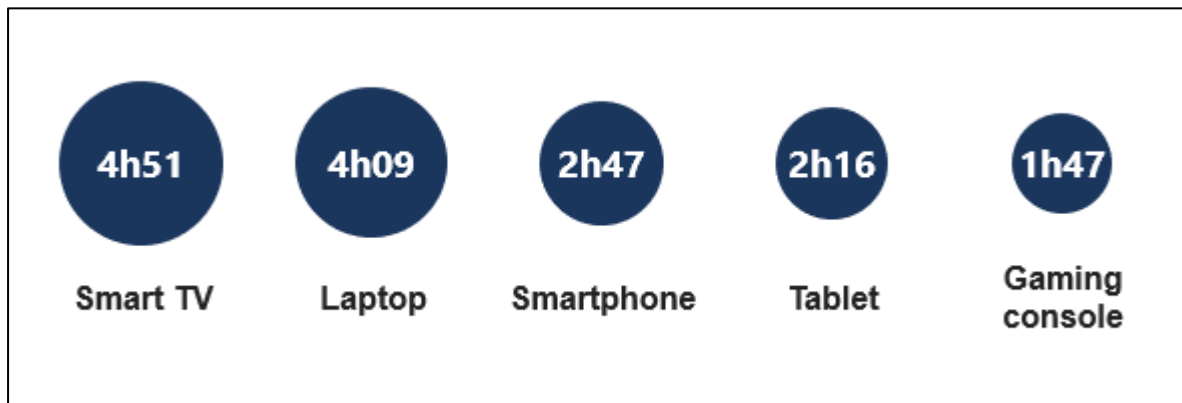
¹⁵ This was asked separately per device and per streaming activity, each time to respondents who indicated to use the device at least once per month. The average is calculated by summing the streaming time per activity and per device, for everyone who indicated at least one minute of streaming time for the respective activity and device, and taking the average.

Figure 2.1.6 Streaming time (across devices)



The device most used for streaming is a **smart TV**. On average, consumers who stream via this device (and use it at least once a month) stream for **four hours and 51 minutes per week** via their smart TV. This is followed by laptops (4h09), smartphones (2h47), tablets (2h16) and gaming consoles (1h47).

Figure 2.1.7 Streaming time (per device)



This is mostly consistent across different subgroups of consumers, with the following exceptions worth noting:

- The ranking of most popular devices for streaming differs slightly depending on age. First, among younger people (18-34) the laptop is the most popular streaming device (5h05 per week), followed by the smart TV (4h48). Overall, consumers aged 18-34 stream more on all devices than older people, with the exception of Smart TVs, which are used slightly less often by 18-34 year olds compared to those aged 35 or over (4h53).

Second, consumers aged 50 or over spend slightly more time on streaming via their tablet (2h05) than via their smartphone (2h17), while in the younger age groups more streaming time is spent on a smartphone than on a tablet.

The times spent on streaming per device are shown per age group here below.

Figure 2.1.8 Streaming time per device (age group 18-34)

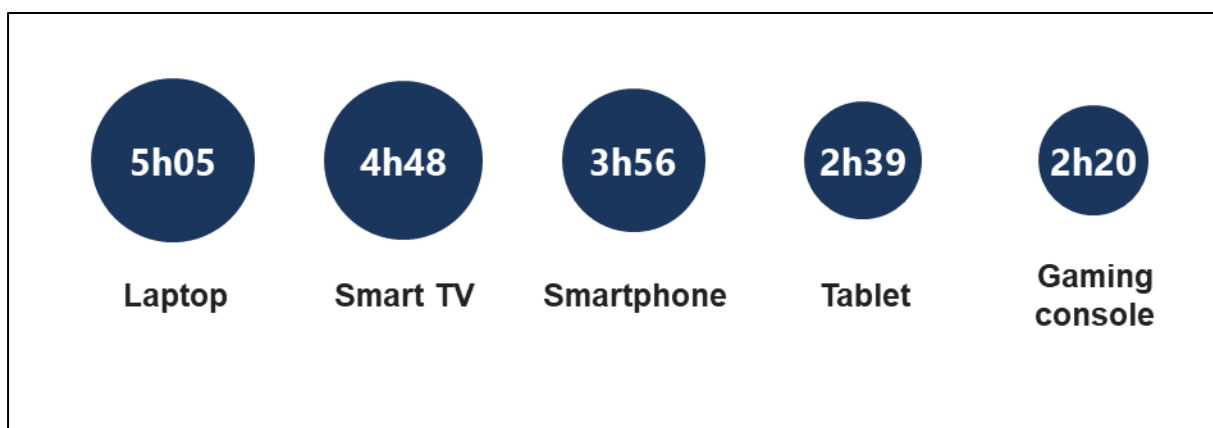


Figure 2.1.9 Streaming time per device (age group 35-49)

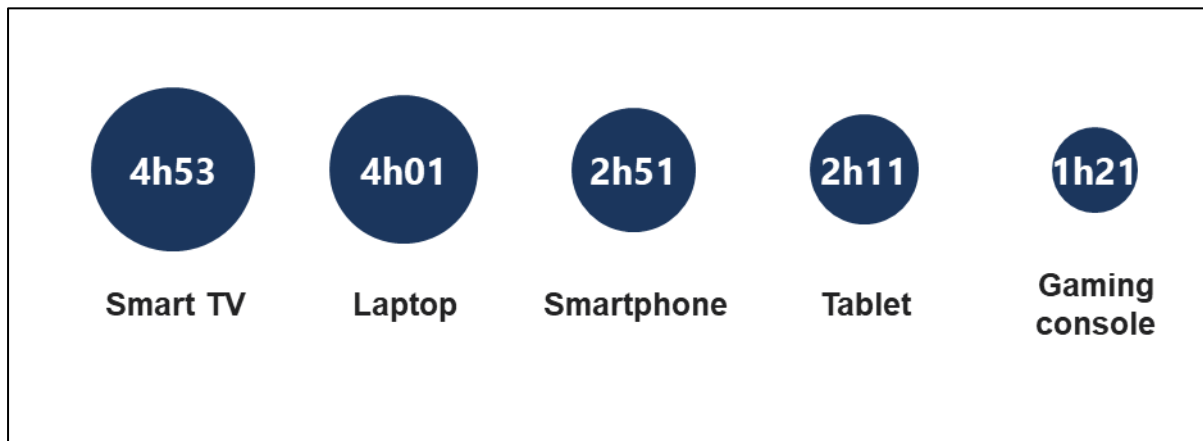
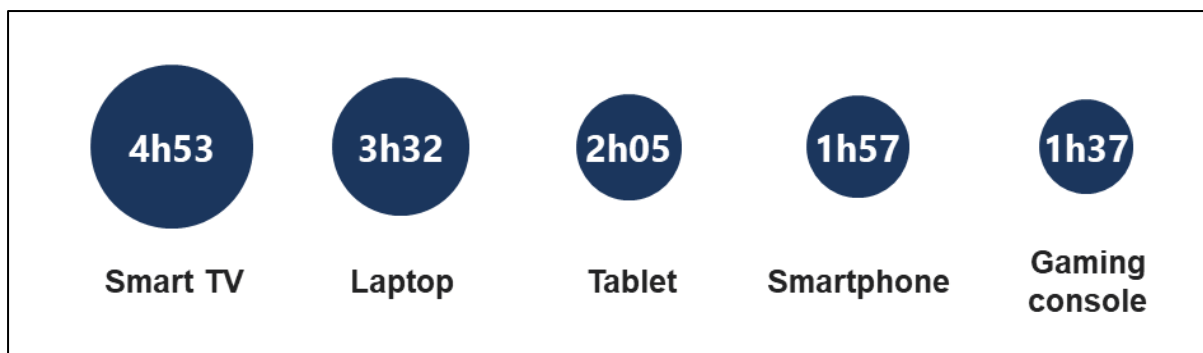


Figure 2.1.10 Streaming time per device (age group 50+)



- Consumers with a low/medium education level, and consumers who find it difficult to make ends meet, generally stream less often across devices than those with a high education level and those who find it easy to make ends meet. The exception to this are smartphones, which are used for streaming slightly more often by these first two groups (2h52) compared to consumers with a high education level (2h39) and those who find it easy to make ends meet (2h42).
- Consumers who state that they know at least a bit about the impact of streaming on the environment do not stream less than those who know only a little or nothing about this, and in fact stream slightly more (though not significantly so). This is most apparent for gaming consoles (2h24 vs. 1h10), tablets (2h34 vs. 2h02) and laptops (4h23 vs. 3h58).

Laptops

Consumers who use their laptop for streaming most often do so for the streaming of content from streaming/VOD platforms (1h51 per week), and least often to stream TV programs (1h11).¹⁶

Figure 2.1.11 Average weekly streaming time on **laptops** (per activity)



Differences among subgroups are generally small and overall follow this pattern. The most notable differences are as follows:¹⁷

- Older consumers (aged 50 or over) who use their laptop for cloud gaming spend more time on this than those aged 18-34 (1h51 vs. 1h00). Moreover, the average streaming time spent on cloud gaming among older consumers is higher than for any other activities for that group.
- Consumers with a high education level who use their laptop for video calling/videoconferencing spend more time on this than those with a medium or low education level (1h53 vs. 1h20). For cloud gaming, the streaming time spent is higher among consumers with a low/medium education level compared to those with a high education level (1h27 vs 1h06).
- People who have a basic or below basic level of digital competence generally spend less time on different streaming activities on a laptop compared to those whose digital competence level is above basic, in particular when it comes to VOD streaming (1h17 vs. 2h01), and streaming from video sharing sites and social media (1h11 vs. 1h42). They do spend slightly more time on cloud gaming, but this result is not statistically significant (1h35 vs. 1h14).

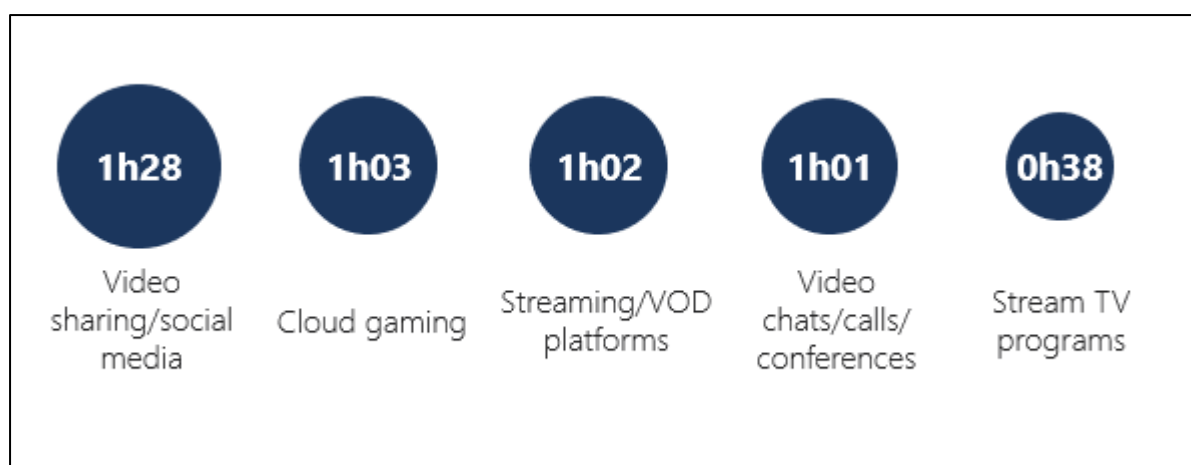
¹⁶ Figures per activity for separate devices reflect the average weekly streaming time among consumers *who use the device for that activity*. For that reason, the sum of average streaming times per activity for a given device differs from the total streaming time per device as shown in figure 2.6. The latter figure is based on the total streaming time per respondent on that device. But since a consumer might not engage in all five types of streaming activities, the sum of average streaming times per activity for a device will be higher than the total average streaming time for a device.

¹⁷ it is important to keep in mind when interpreting these figures that, as said in footnote 2, this reflects the streaming time spent *among consumers who engage in this activity to begin with*. In other words, a higher weekly streaming time for a subgroup does not mean that that activity is more popular among that subgroup compared to other groups. The incidence/frequency of the activity among that group can still be very low, as discussed in the preceding section 2.1.1.

Smartphones

Consumers who use their smartphone for streaming do so mostly for the streaming of content from video sharing platforms or social media (1h28 per week), and least often to stream TV programs (0h38).

Figure 2.1.12 Average weekly streaming time on **smartphones** (per activity)



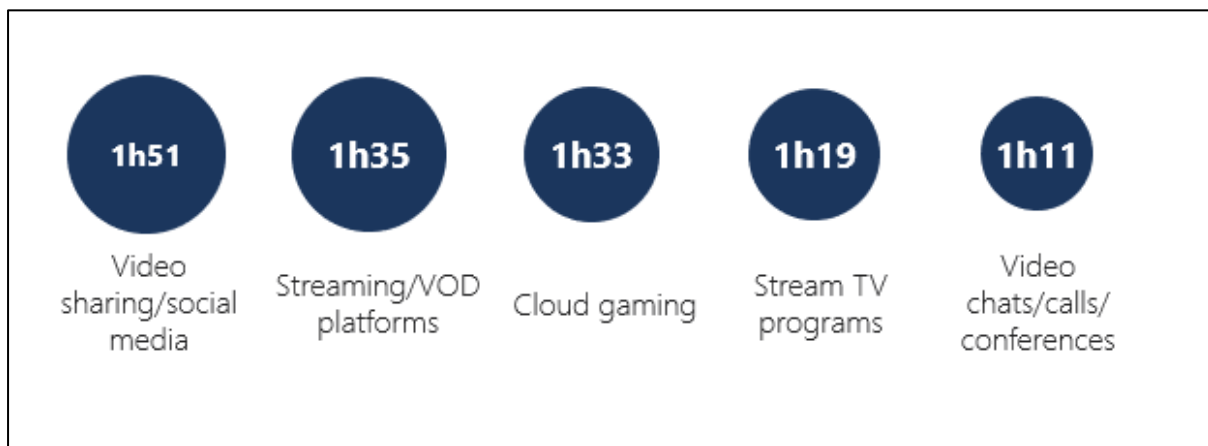
The most significant differences between consumer subgroups are:

- Younger consumers (aged 18-34) who use their smartphone spend overall more time on the different streaming activities compared to older consumers aged 50 or over, in particular when it comes to streaming from VOD platforms (1h23 vs 0h46) and streaming from video sharing platforms and social media (1h56 vs 1h04).
- Consumers with basic or below basic digital competence spend less time on streaming for several activities compared to those with a high digital competence, most notably so when it comes to streaming from VOD platforms (0h49 vs 1h07), streaming from video sharing platforms and social media (1h09 vs 1h33) and video calling (0h40 vs 1h08).
- Consumers who state that they know at least a bit about the impact of streaming on the environment and who use their smartphone for cloud gaming do significantly less so than those who know only a little or nothing (0h48 vs 1h32). This is also the case for other streaming activities, but there the difference is smaller and not significant.

Tablets

Consumers who stream content on tablets do so mostly from video sharing platforms and social media (1h51). The least time is spent on video calls/conferencing (1h11). Given the overall relatively small figures when it comes to streaming on tablets, no notable difference between consumer subgroups can be detected.

Figure 2.1.13 Average weekly streaming time on **tablets** (per activity)



Smart TVs

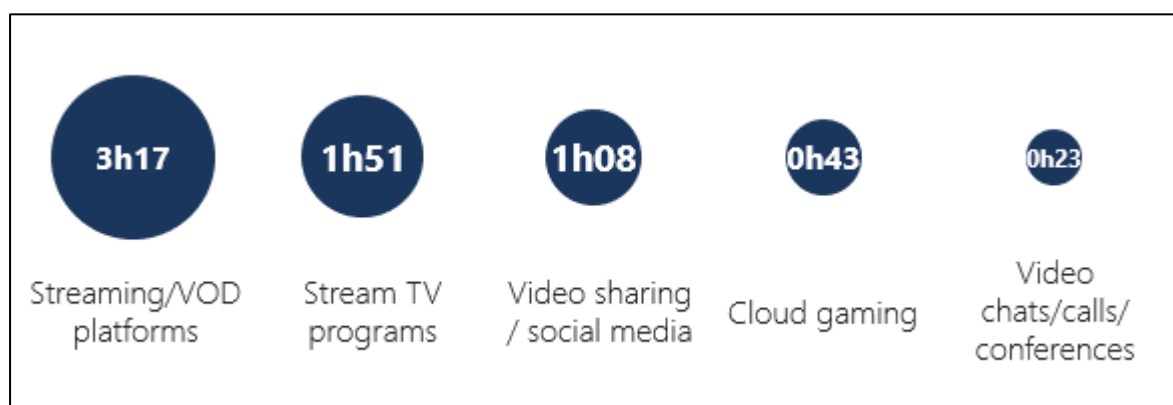
Consumers who use their Smart TV for streaming activities do so with considerable margin most often to stream from VOD platforms – on average 3h17 per week. The streaming of TV programs comes only second, with 1h51 per week. It should be kept in mind however that this only concerns *streaming* of TV programs, via a dedicated streaming platform, app or website that is accessed from the TV, and thus excluding cable TV watching as well as any streaming done from peripheral devices connected to the smart TV. The streaming activity spent the least time on smart TVs is video calling/conferencing, with 23 minutes per week among those who conduct this activity on their smart TV.

Digital competence accounts for the biggest differences between consumer subgroups. Consumers with an above basic level of digital competence who stream via smart TV also generally spend more time on different streaming activities compared to those who have a basic or below basic level of digital competence, with the biggest differences observed regarding VOD streaming (3h32 vs 2h27) and cloud gaming (0h51 vs 0h21).

When it comes to age differences, it is worth noting that smart TVs are the only device on which consumers older than 50 spend generally more time during an average week compared to those aged 18-34, although only when it comes to streaming TV programs is this difference is significant (2h25 vs 1h19).

Finally, consumers who state that they know at least a bit about the impact of streaming on the environment and who use their smart TV for VOD streaming do so significantly less than those who know little or nothing about this (2h41 vs 3h47)

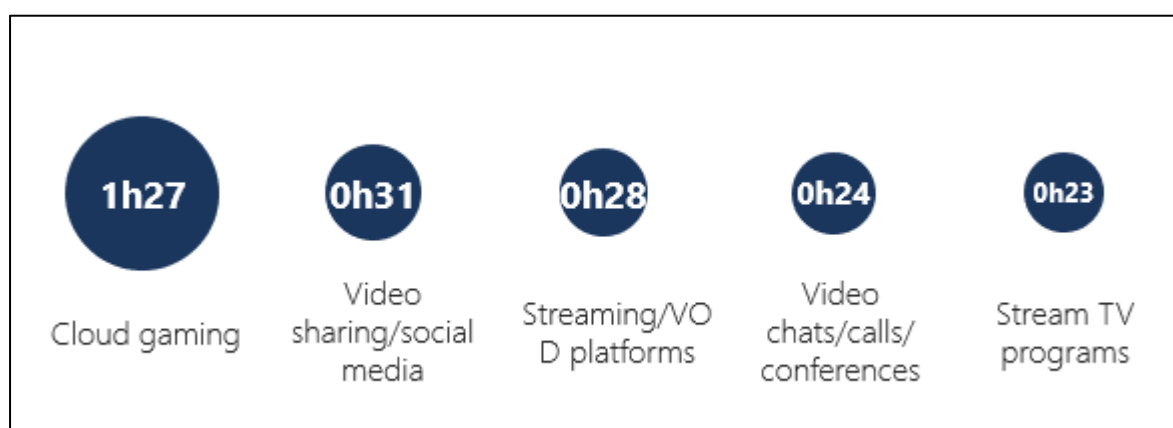
Figure 2.1.14 Average weekly streaming time on **smart TVs** (per activity)



Gaming consoles

On gaming consoles, the streaming activity spent most time on is cloud gaming, far ahead of any other activity. Other activities are only done on average less than half an hour per week by those who conduct them on a gaming console. As with tablets, the streaming time per activity on gaming consoles is overall too low to identify meaningful differences between consumer subgroups.

Figure 2.1.15 Average weekly streaming time on **gaming consoles** (per activity)



2.2 Usage preferences

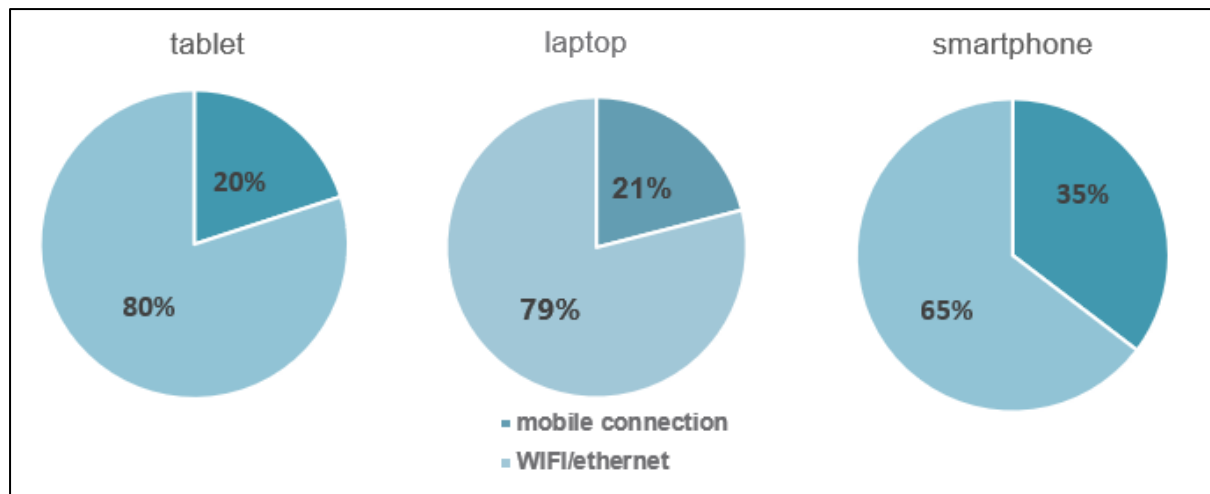
This section discusses consumers' usage preferences when it comes to streaming video content. In particular, we look at:

- What type of connection (WIFI/ethernet connection vs. a mobile connection) consumers prefer when streaming on different devices.
- To what extent consumers adjust the quality settings of the content they stream, depending on the type of connection they use for streaming.

2.2.1 Connection preferences

When streaming video content, consumers use an ethernet or WIFI connection much more often than a mobile connection (such as 4G). This is the case for all three devices for which this was surveyed. Ethernet/WIFI connection is most often used for streaming on **tablets and laptops**. On those devices, the average consumer uses that connection type 80% and 79% of the time when streaming. On **smartphones**, streaming via a mobile connection is more common (35%) than on tablets and laptops, but there too consumers stream via an ethernet/WIFI connection most of the time (65%).

Figure 2.2.1 Connection types used for streaming

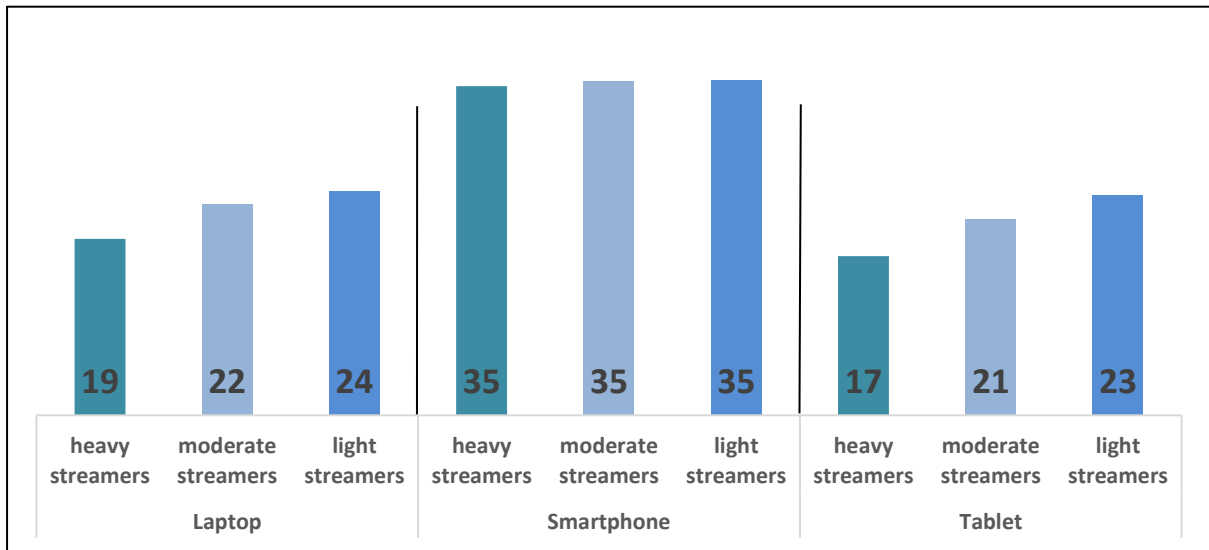


This preference for streaming via WIFI/ethernet over streaming via a mobile connection holds for all consumer subgroups, and across all groups mobile connection streaming is also always more frequent on a smartphone compared to laptops and tablets. Some trends can be noted between subgroups, but these are overall small, within a margin of one to five percentage points, and thus often not significant:

- Younger consumers use a mobile connection more often than older consumers.
- Consumers with a medium/low education level use a mobile connection more often than those with a high education level.
- Consumers who find it difficult to make ends meet use a mobile connection more often than those who find this easy.
- Consumers with a basic or below basic level of digital competence use a mobile connection more often than those with an above basic digital competence level.

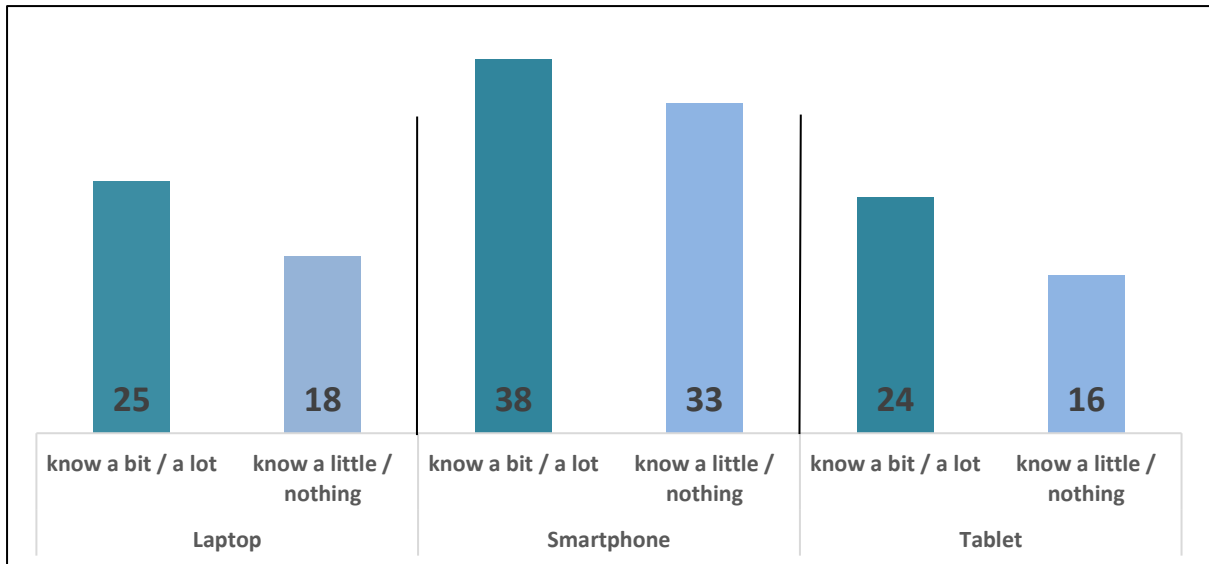
The amount of streaming also does not have a strong impact on the preferred connection type, but it is notable that heavy streamers use a mobile connection slightly less often than medium and light streamers, at least when it comes to laptops and tablets, as shown in figure 2.14 below. No such difference is observed for smartphones.

Figure 2.2.2 Mobile connection used for streaming (per amount of streaming)



Finally, a slightly stronger, but still fairly small association exists between how often a mobile connection is used and the self-reported knowledge about the impact of streaming on the environment. Consumers who report to know at least a bit about this use a mobile connection more often than those who know only a little or nothing about the environmental impact of their streaming behaviour – see figure 2.15 below.

Figure 2.2.3 Mobile connection used for streaming (per streaming impact knowledge)

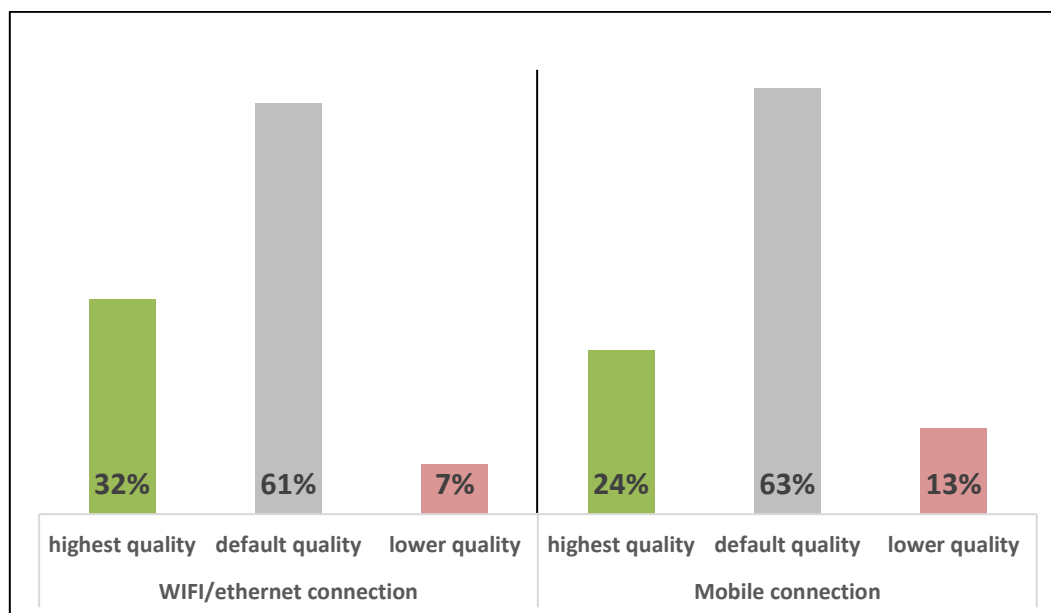


2.2.2 Quality preferences

A majority of consumers does not change the quality settings of the video content when they stream, and instead opts to use the default streaming quality. This is the case for streaming via a WIFI/ethernet connection (61% of consumers does not change the settings) as well as streaming

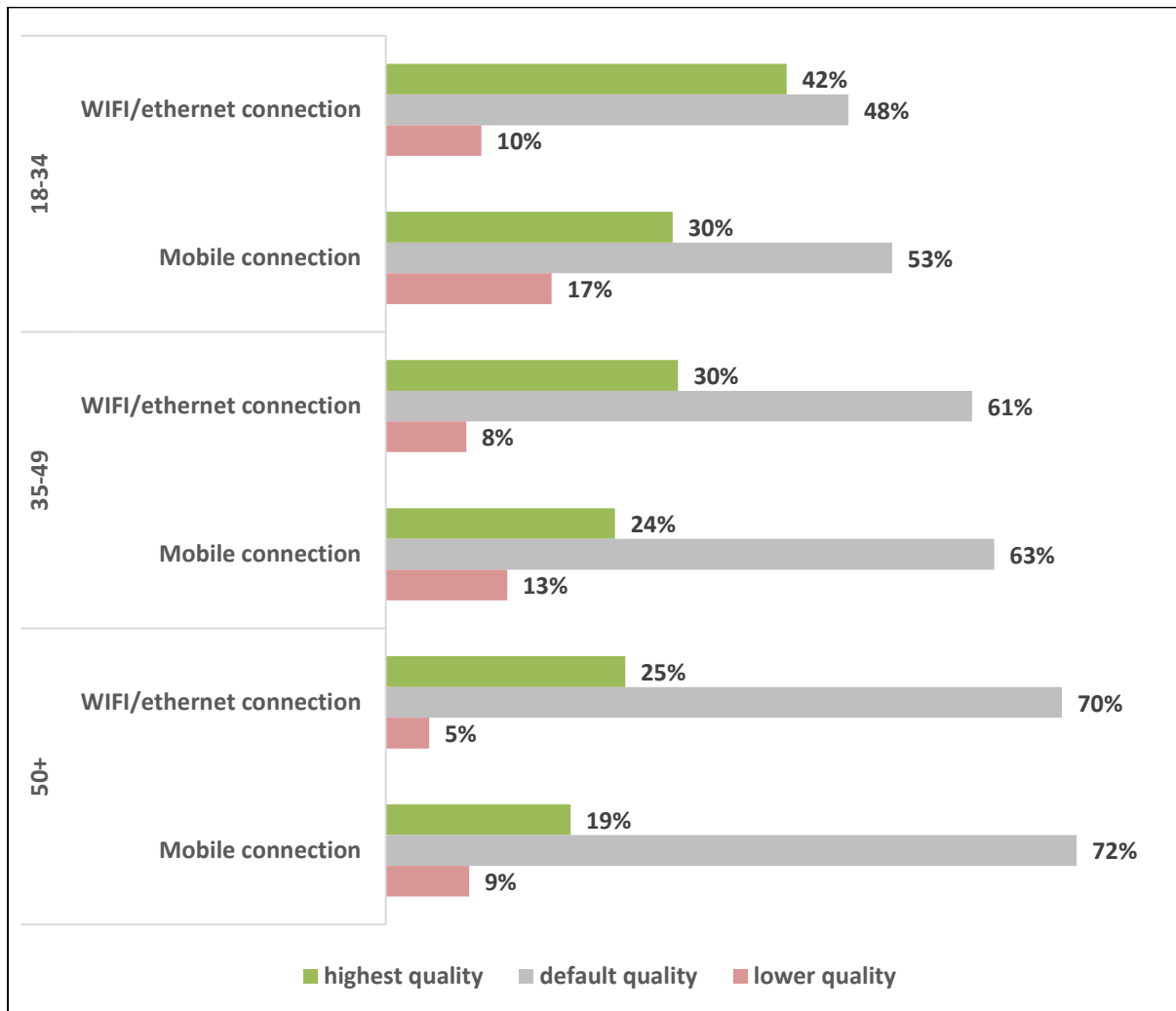
via a mobile connection (63%). Consumers do *lower* the quality settings when streaming via a mobile connection somewhat more often compared to when streaming via a WIFI/ethernet connection: 13% vs. 7%. Mirroring this, they *increase* the quality settings to the maximum possible somewhat less often when streaming on a mobile connection (24%) compared to when streaming on a WIFI/ethernet connection (32%).

Figure 2.2.4 Preferred video quality settings when streaming (per connection type)



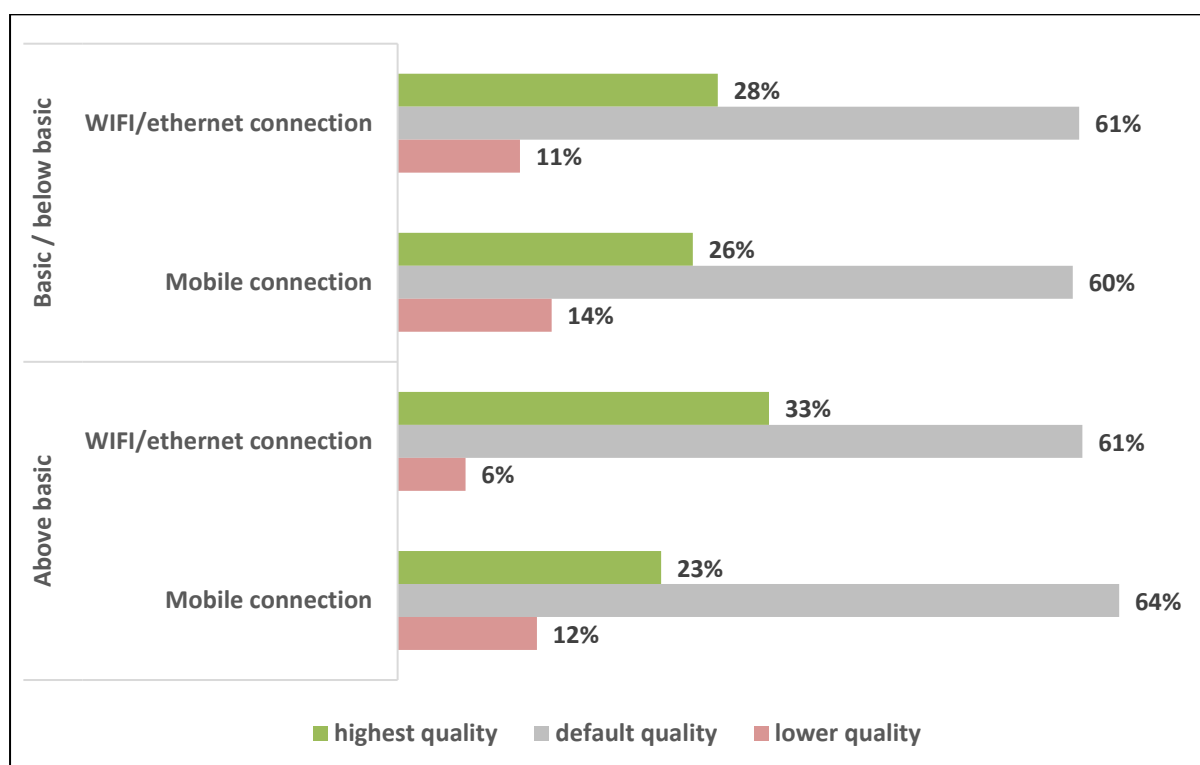
This general trend, with an overall preference to use the default quality settings regardless of the connection type, can be seen across consumer subgroups, though there are some notable differences. In particular, **age** has the strongest impact on consumer behaviour in this regard. Younger consumers (aged 18-34) have a clearly higher tendency to adjust the quality settings of the content they stream. Overall only about half in this age group (48% on a WIFI/ethernet connection, 53% on a mobile connection) prefers the default quality settings, while this is around seven in ten (70% and 72%, respectively) among consumers aged 50 or over. Indeed, younger consumers are much more inclined to maximise video quality settings compared to older consumers, and the percentage of young consumers that prefers to maximise video settings when streaming on a WIFI/ethernet connection is not much smaller than the percentage of those who prefer default settings (42% vs. 48%). That said, among younger consumers too, as with other age groups, there is a higher tendency to lower video quality settings when streaming via a mobile connection compared to streaming via a WIFI/ethernet connection.

Figure 2.2.5 Preferred video quality settings when streaming (per connection type and age group)



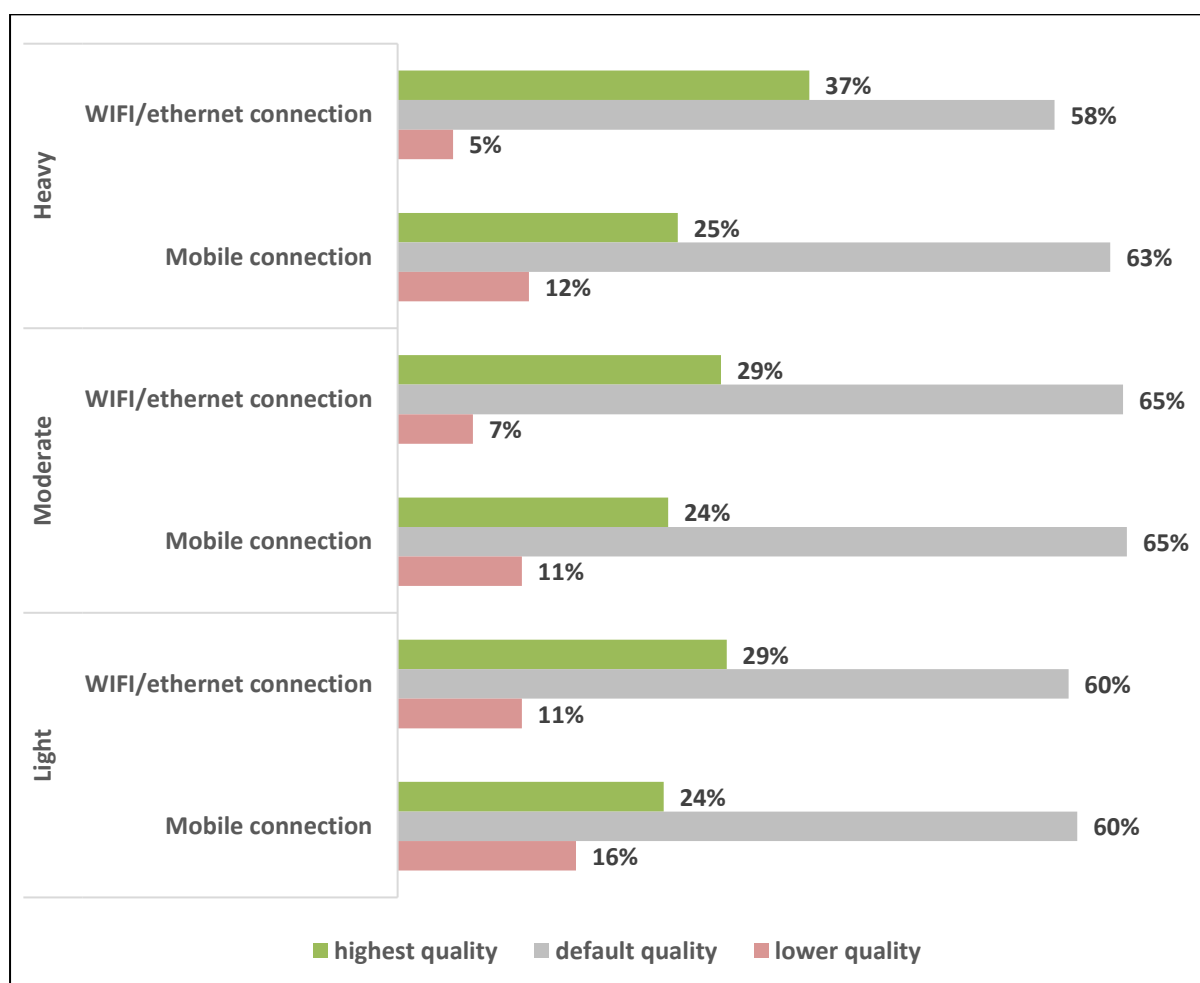
Consumers with an above basic level of **digital competence** are also slightly more likely to increase video quality settings when streaming compared to those with a basic or below basic competence level. This goes for both WIFI/ethernet connection streaming (33% vs. 28%) as well as mobile connection streaming (26% vs. 23%). Vice versa, for both connection types they are also slightly less likely to decrease the quality settings. Here too, however, the level of digital competence has no impact on the tendency that consumers decrease their video quality settings slightly more often when streaming via a mobile connection compared to a WIFI/ethernet connection.

Figure 2.2.6 Preferred video quality settings when streaming (per connection type and digital competence level)



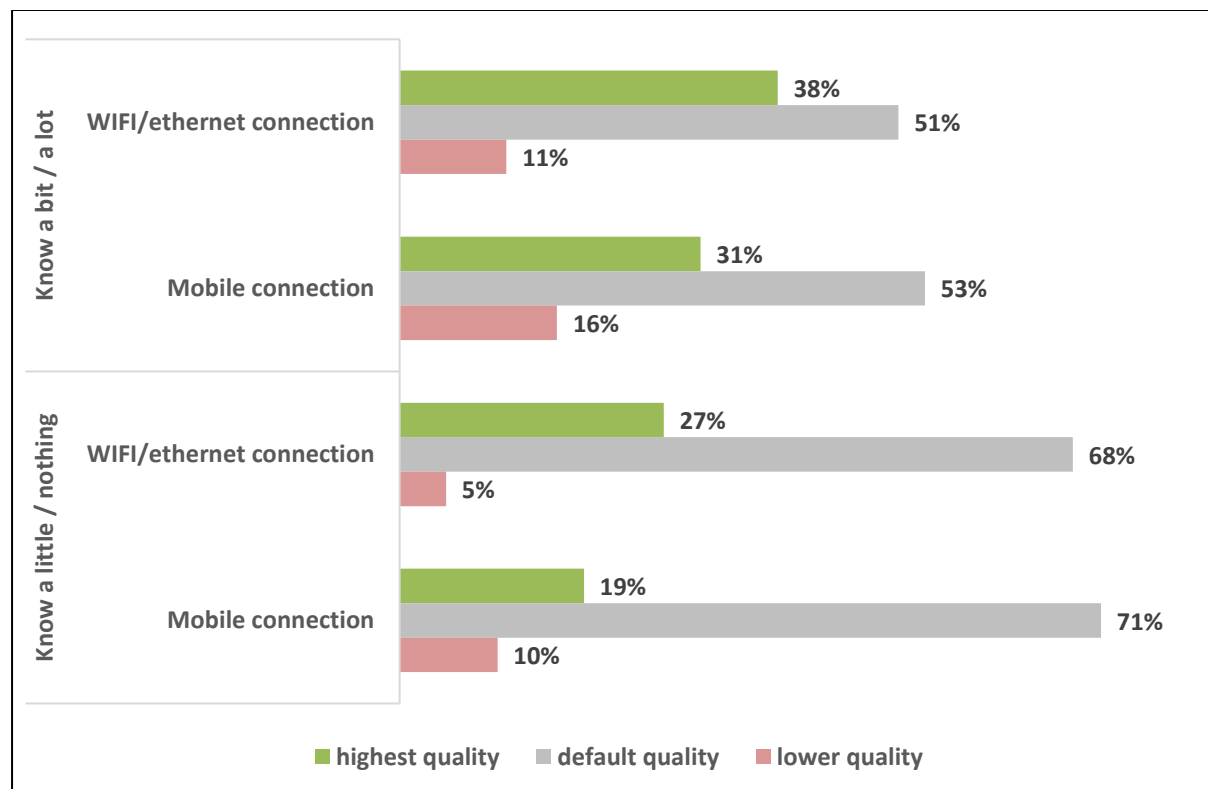
The **amount of streaming** also impacts consumer behaviour when it comes to streaming quality settings. Overall, the more people stream, the more likely they are to prefer maximising the quality of the video content, and the least likely they are to decrease the quality. When it comes to streaming via a mobile connection, differences are however small, and heavy streamers are only somewhat less likely to decrease quality settings (16%) compared to light streamers (12%).

Figure 2.2.7 Preferred video quality settings when streaming (per connection type and digital competence level)



Finally, there is a clear connection between consumers' (self-reported) knowledge about the impact on streaming on the environment and preferred video quality settings. Consumers who claim to know at least a bit about this impact are much less inclined to use the default quality settings – 51% on a WIFI/ethernet connection and 53% on a mobile connection – compared to those who know only little or nothing about this (where the figures are 68% and 71%, respectively). The tendency to less often accept the default quality settings goes two ways – consumers with a higher knowledge of streaming impact will more often increase as well as decrease quality settings, although the preference is clearly for the maximisation of quality settings rather than lowering them. That said, both those with a high or low knowledge about streaming impact on the environment are slightly more likely to decrease quality settings on a mobile connection compared to a WIFI/ethernet connection, and the impact is about the same in both groups.

Figure 2.2.8 Preferred video quality settings when streaming (per connection type and streaming impact knowledge)



3 Usage and sustainability attitudes

3.1 Replacing a device: reasons and timing

In the following sections we look at consumer behaviour when it comes to the replacement of their device. This is discussed from two complementary angles. First, section 3.1.1 analyses what consumers consider as **valid reasons to replace a device before it fully breaks down**, and specifically also to what extent consumers are likely to keep using. Subsequently, sections 3.1.2 and 3.1.3 look at **how long consumers expect to keep using their devices before replacing it**, and **how this relates to the reasons for replacing a device**.

3.1.1 Device replacement

Survey respondents were asked to indicate, from a list of possible reasons, what would be important reasons for them to buy a new device or replace their current one, considering that their old device would still be functioning. They were presented with the following possible reasons:

- Device is **no longer performing as well** as it used to (e.g., battery life had decreased, device is slowing down)
- There is a **new device on the market** that has better or newer features than the one owned now
- Current device can **no longer run recent software or apps**
- Device is **no longer updated or supported** by the manufacturer and/or software providers
- There are **cosmetic damages** to the device, such as scratches

Alternatively, respondents could indicate that they would intend to keep using their device until it breaks down – i.e., that there would be no other valid reason to replace a device if it still works.

The figures on the next pages show the ranking of reasons that consumers indicate as important reasons to replace that device. Across devices, the results are highly consistent. For **laptops, smartphones and tablets**, the three most important reasons to replace a device are always related to device usability and performance: **general performance decrease, ending of support/updates, and the fact that recent software or apps can no longer run**. For **smart TVs**, the trend is largely the same, with the slight difference that the **availability of a new device on the market** ranks third for this device, tied with the lack of updates.

Only **gaming consoles** form a real exception, as the only device where the **availability of a new device on the market is the most important reason to replace a device**, ahead of reasons related to the performance of the device. This is in all likelihood related to the specificity of the gaming console market. The rate at which new devices come onto the market is much slower than for the other devices included in this study, in generational cycles of several years. In addition, partially precisely because the small number of gaming consoles on the market and the slow generational switch, software and applications are tailored to the capacities of the consoles throughout their generational lifecycles, meaning that performance issues play a smaller role. As a consequence, there is a higher tendency, compared to other devices, to replace gaming consoles at the start of a new generation rather than because of performance issues.

Aside from these differences, it can finally also be noted that **cosmetic damages** are seen as an important reason to replace a device for only a very small percentage of consumers, tallying around 10% for all devices.

For all devices, **only a minority of consumers indicates that they will continue using the device until it breaks down**, before replacing it with a new one. There are, however, differences between devices in this regard. For laptops, this figure is the lowest, at 25%, followed closely by smartphones (28%), tablets (29%) and gaming consoles (32%). For smart TVs, the figure is notably higher, with 42% of consumers saying that they would use this device until it no longer functions.

Figure 3.1.1 Important reasons to replace a device - LAPTOPS

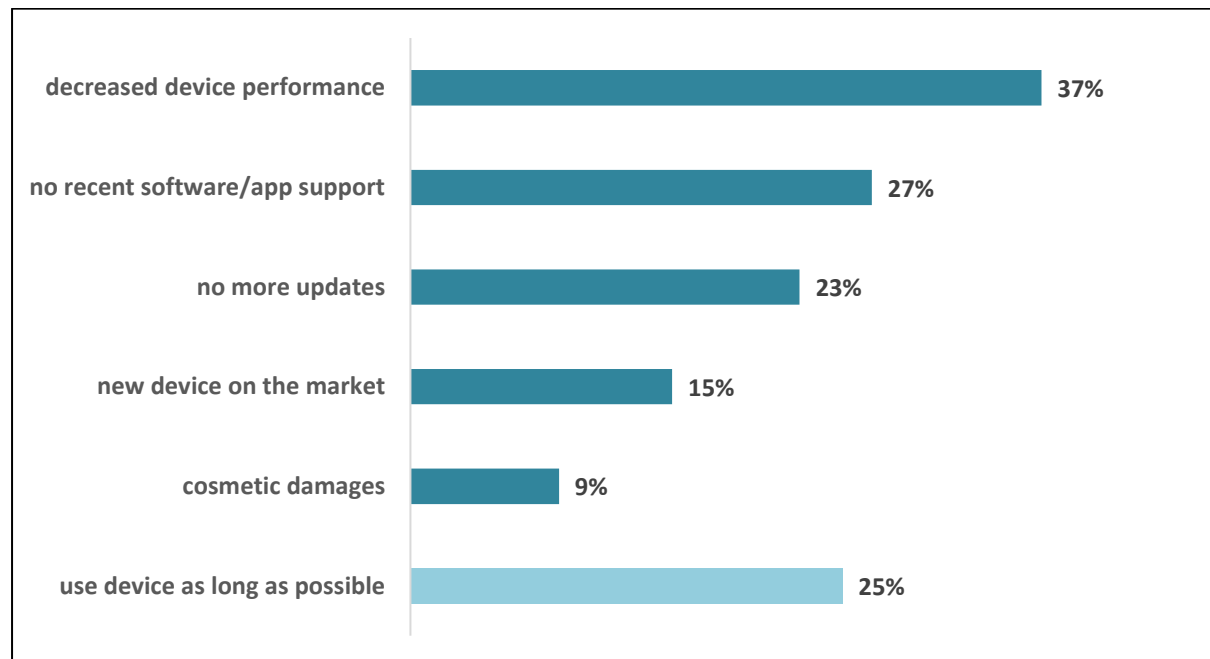


Figure 3.1.2 Important reasons to replace a device - **SMARTPHONES**

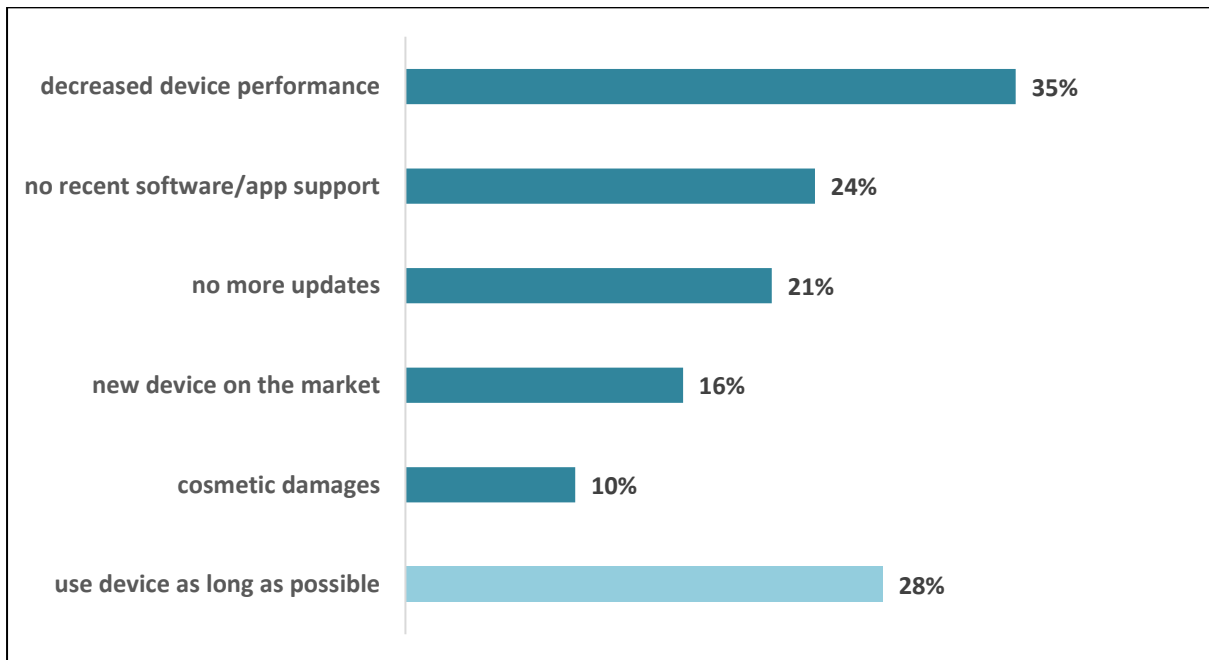


Figure 3.1.3 Important reasons to replace a device - **TABLETS**

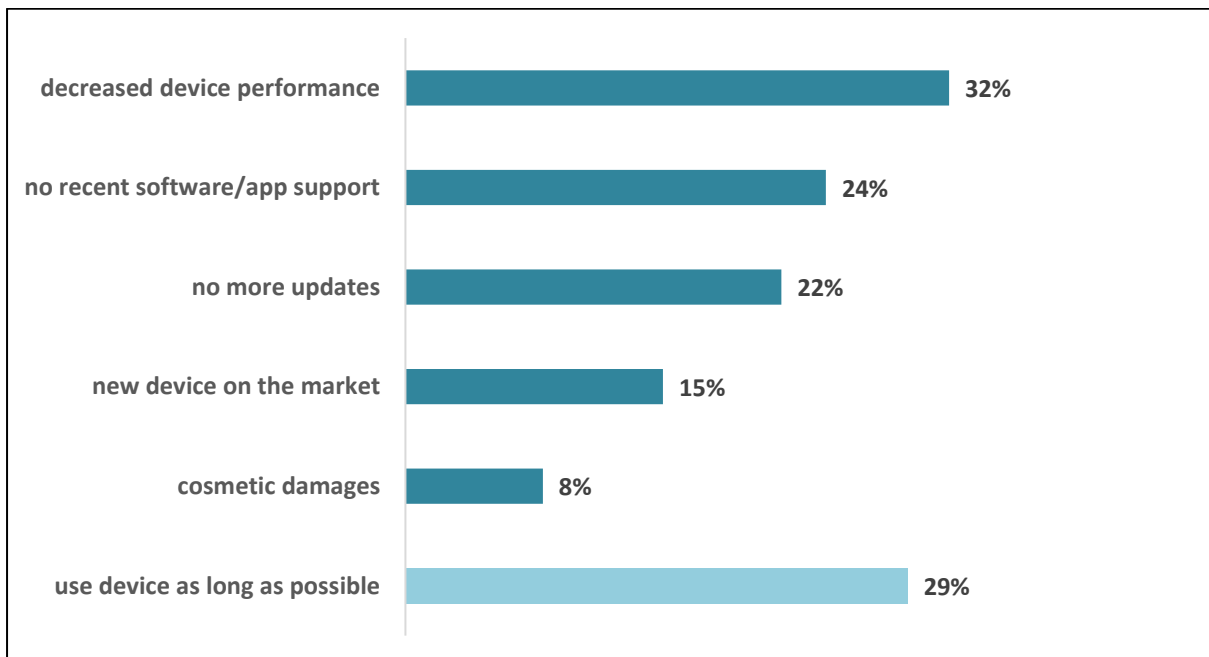


Figure 3.1.4 Important reasons to replace a device – **SMART TVs**

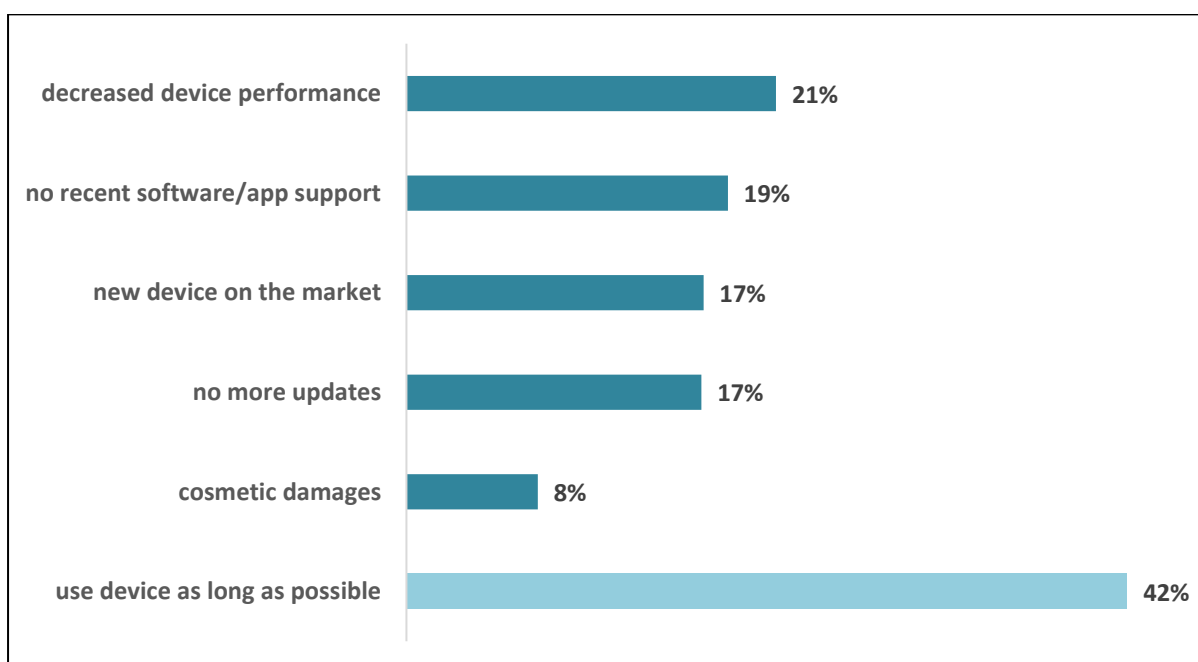
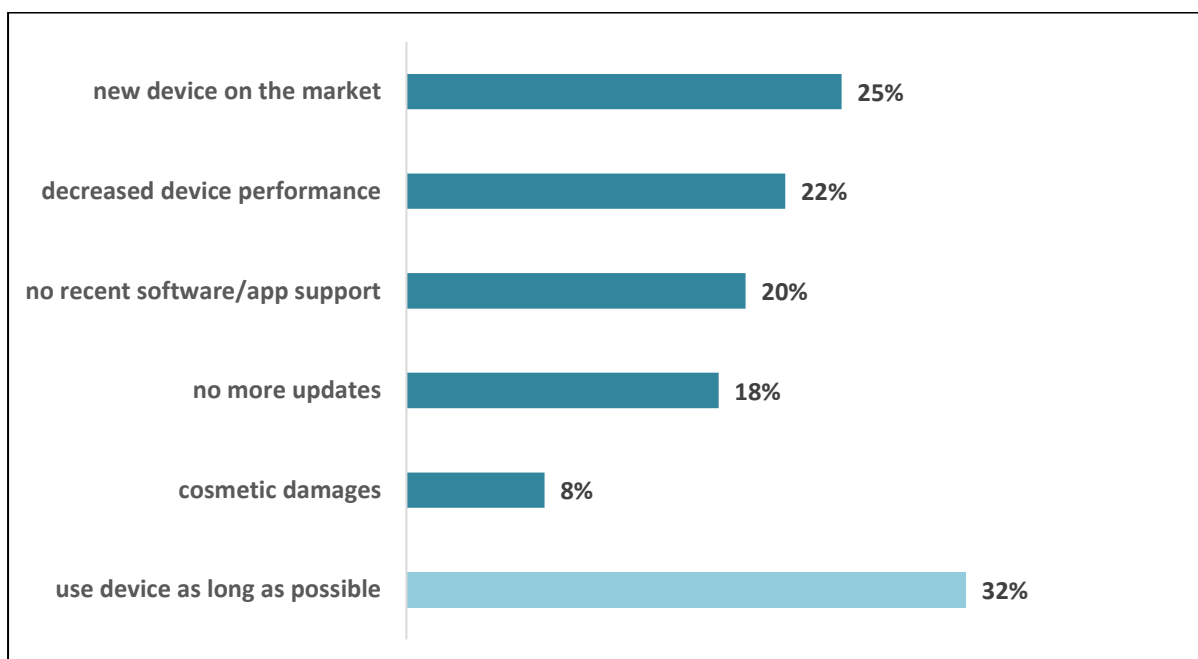


Figure 3.1.5 Important reasons to replace a device – **GAMING CONSOLES**

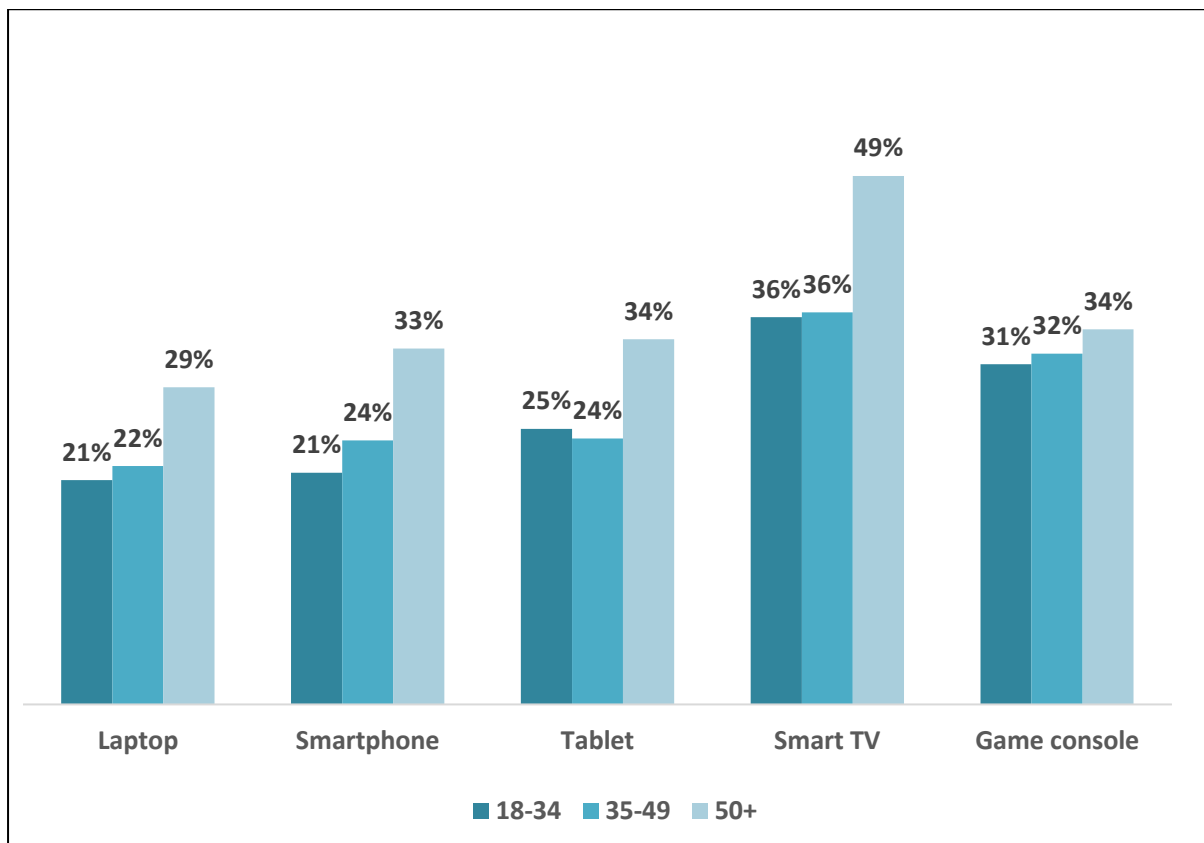


Using a device as long as possible (consumer subgroup differences)

Overall, the ranking of reasons to replace a device as described above holds across consumer subgroups, with no notable differences to report. There are, however, differences when it comes to the intention to use a device as long as possible, until it no longer functions.

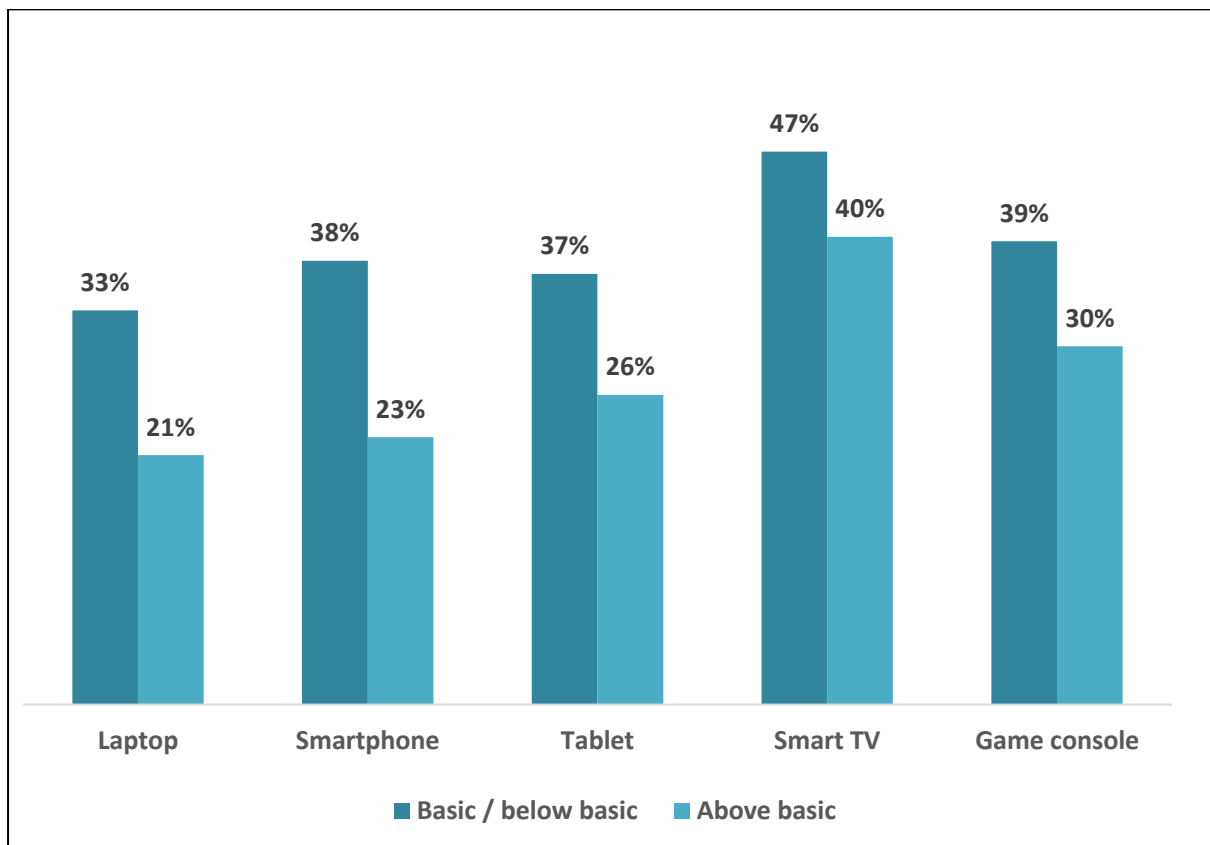
First, consumers aged 50 or over are much more likely to continue using a device until it no longer functions compared to consumers aged under 50. For all age groups, the overall observation holds that smart TVs are considerably more likely to be kept until they no longer function.

Figure 3.1.6 Using device as long as possible (per age group)

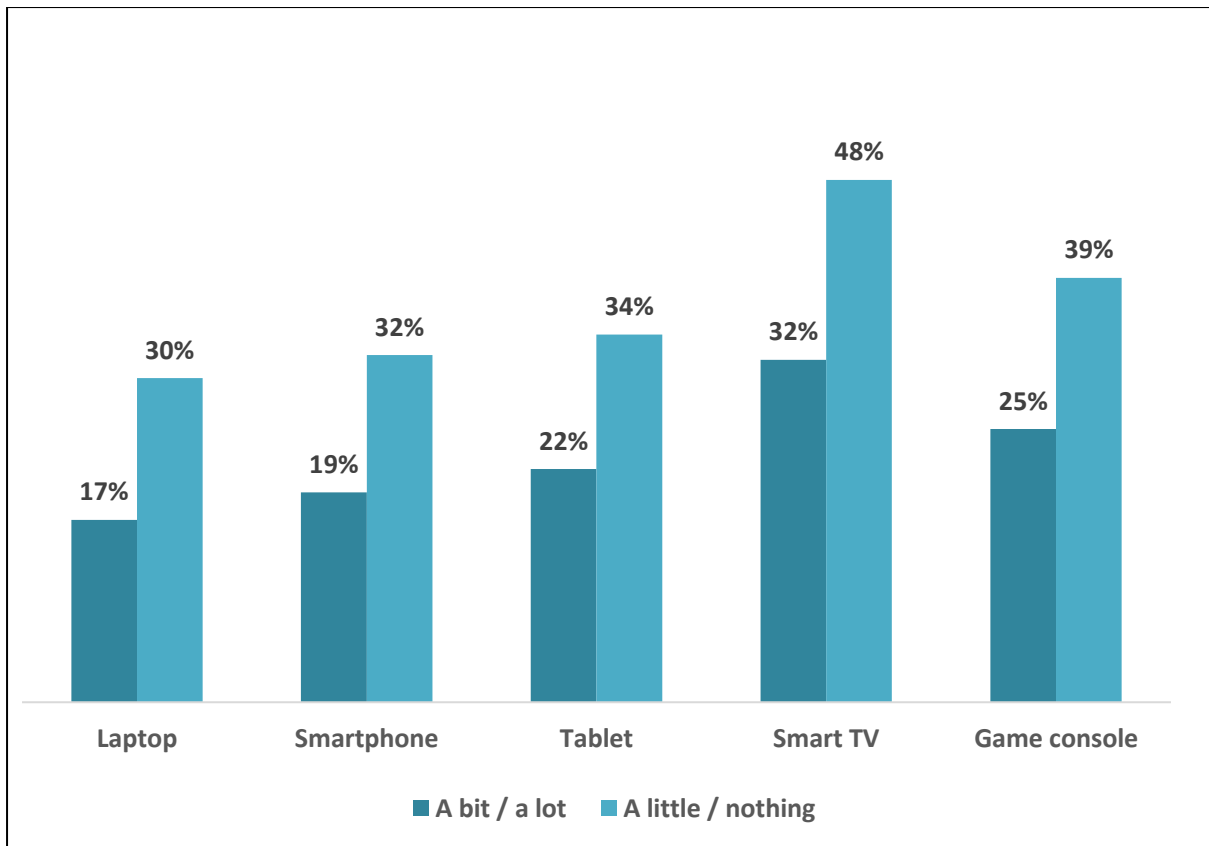


Consumers' **digital competence** also strongly impacts how likely they are to intend to use a device until it no longer functions. For all devices, consumers with an above basic digital competence level are less likely to do so compared to those with a basic or below basic digital competence level. This is particularly the case for laptops (21% vs. 33%, respectively) and smartphones (23% vs. 38%, respectively). For smart TVs, the difference is the smallest (40% vs 47%).

Figure 3.1.7 Using device as long as possible (per digital competence level)

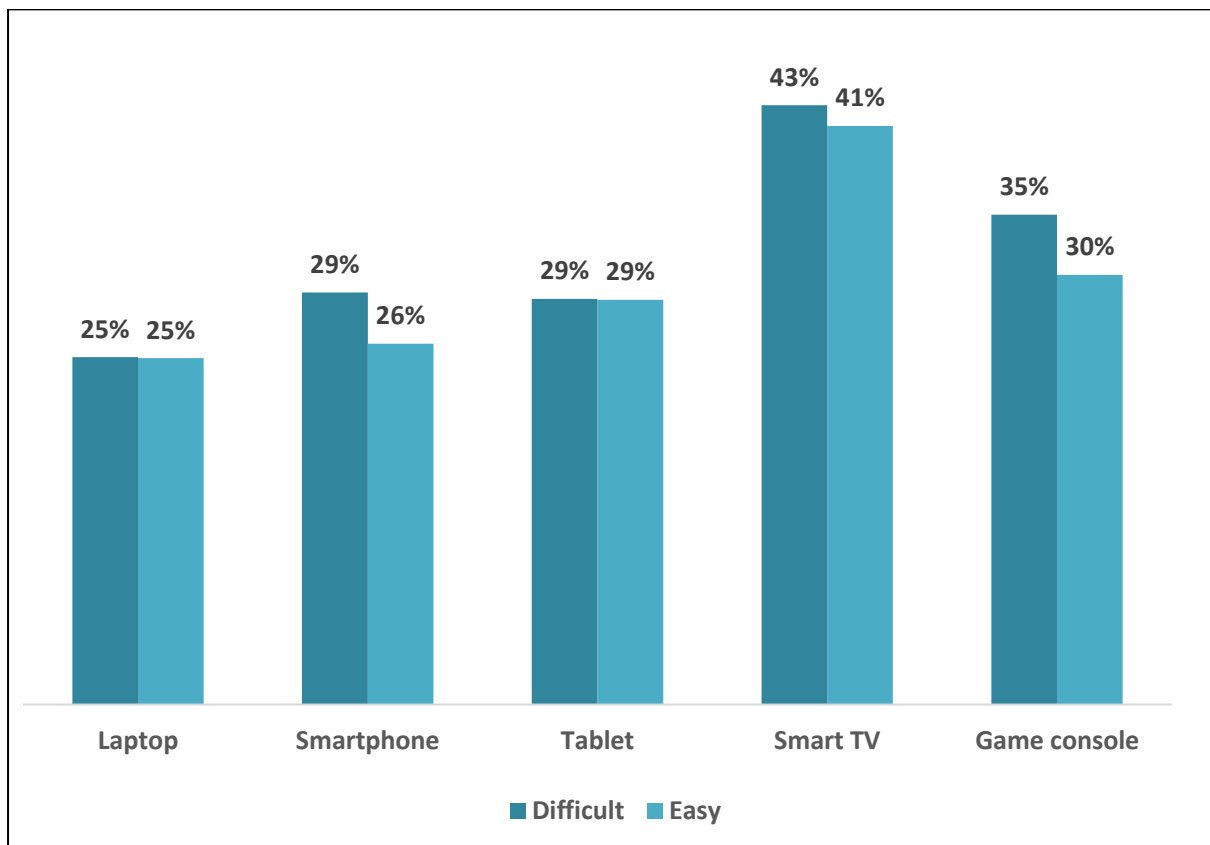


Similarly to this, there is also a clear association with consumers' self-reported **knowledge about the impact of streaming on the environment**. Consumers who know at least a bit about it are considerably less likely to keep using their device as long as possible, and this goes for all devices.



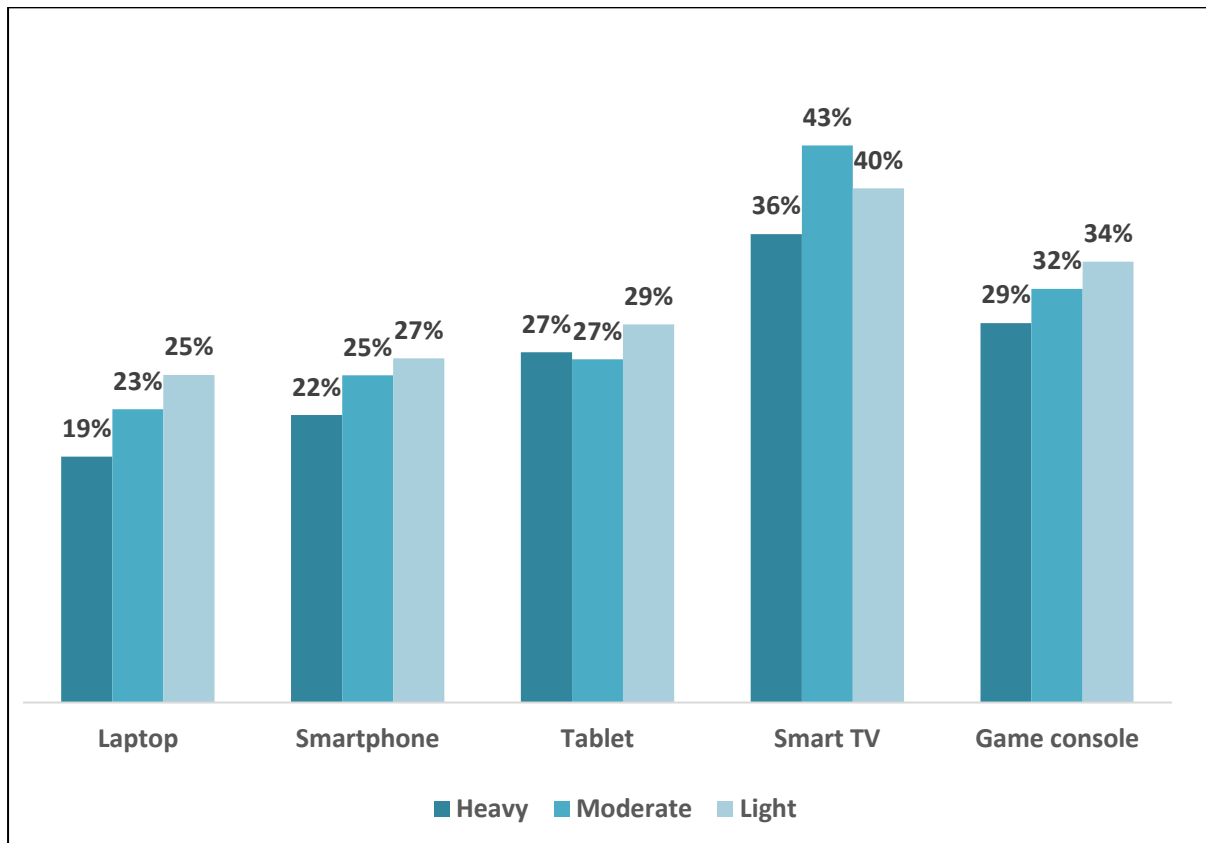
Interestingly, the tendency to keep using a device until it no longer functions is not strongly associated with the **financial situation** of a consumer. For most devices, the percentage of consumers that intends to do so is around the same, regardless of whether the financial situation is difficult or easy. Only for gaming consoles can a notable difference be observed. For that device, 35% of consumers who say it is difficult to make ends meet say they would use the device as long as possible, whereas this is 30% for those who say it is easy to make ends meet.

Figure 3.1.8 Using device as long as possible (financial situation)



Similarly, the amount of time people spend on streaming is also only slightly associated with the tendency to use a device as long as possible. In general, heavy streamers are somewhat less likely to use their device until it no longer functions compared to moderate and light streamers, but the difference is never larger than six percentage points (for laptops).

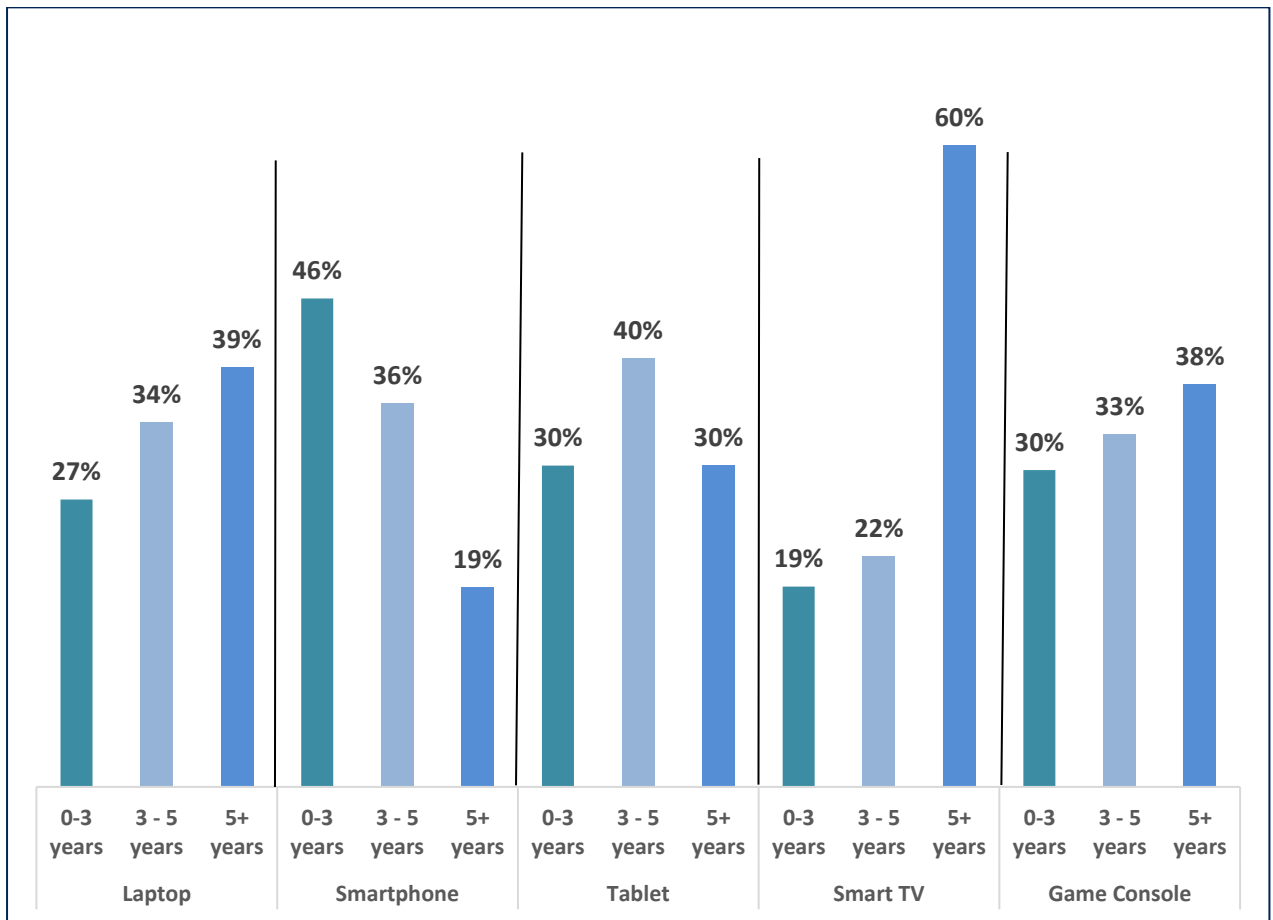
Figure 3.1.9 Using device as long as possible (streaming intensity)



3.1.2 Expected use length

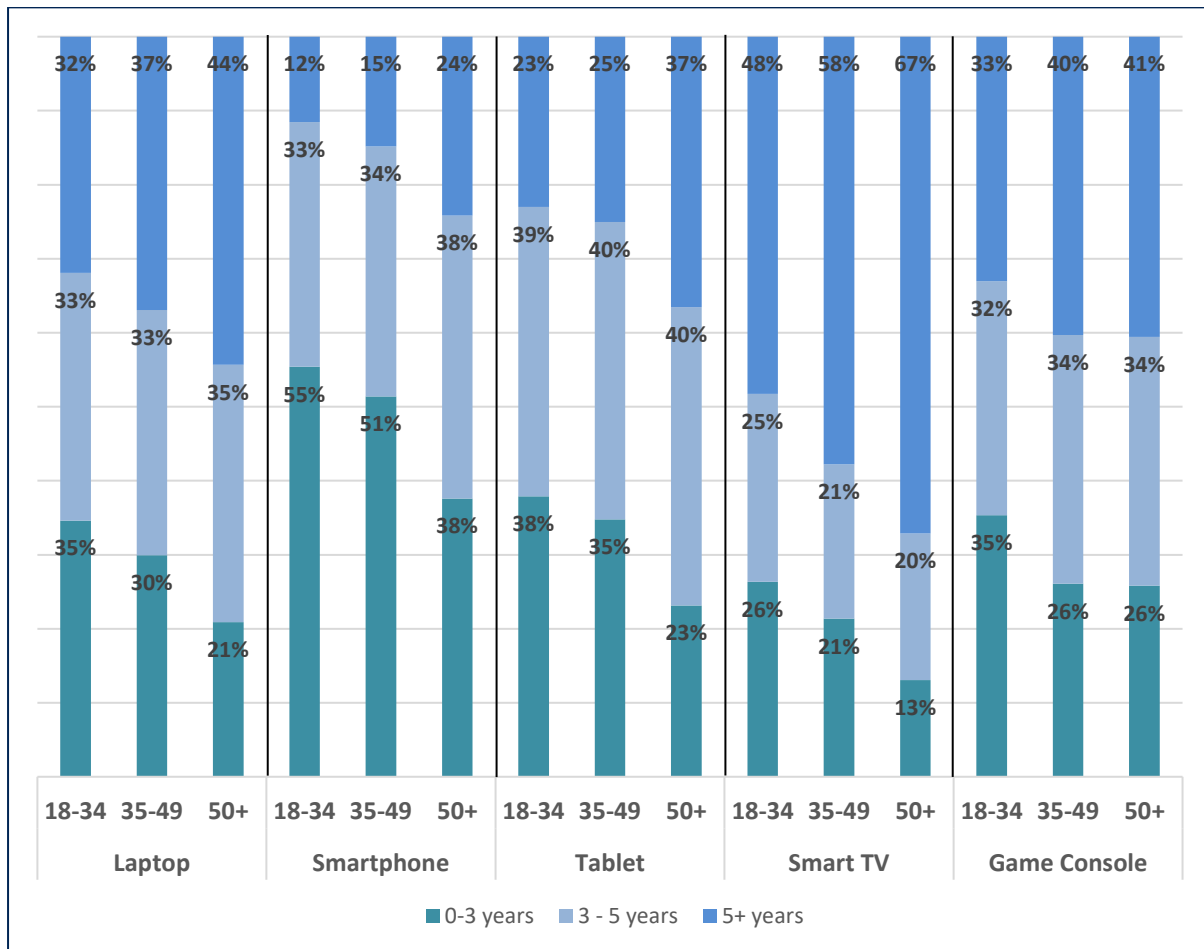
How long consumers expect to use a device before replacing it with a new one differs between devices. For all devices, a majority of consumers expects to use their device for at least 3 years from the moment they buy it. The expected use length for smartphones is the shortest. For this device, 46% of consumers expect to use it less than three years before replacing it, a group that is considerably larger compared to other devices. Smart TVs have the longest expected use length. Sixty percent of consumers expects that they will use this device at least 5 years before replacing it. For laptops and gaming consoles as well, a plurality of consumers thinks they will use the device for at least five years (39% and 38%, respectively). For tablets, a plurality of consumers (40%) thinks they will use that device between three and five years before replacement.

3.1.10 Expected use length of devices



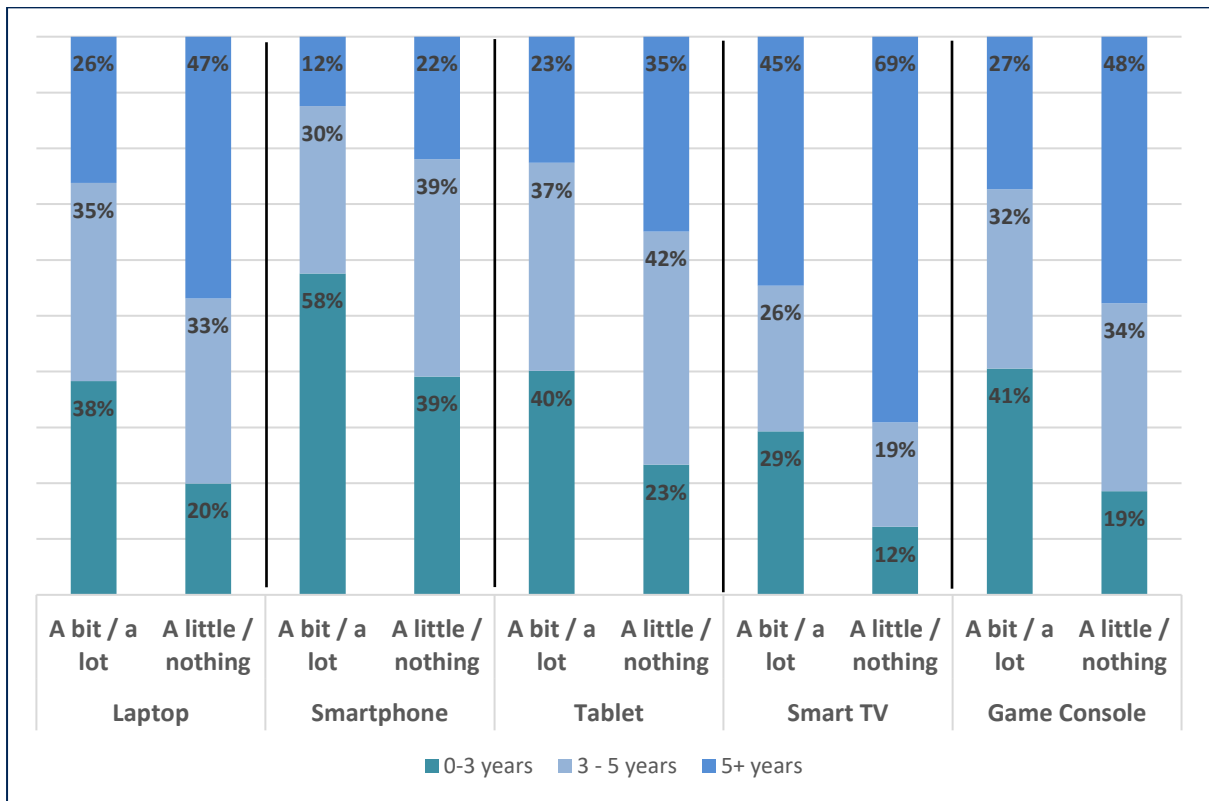
The older consumers are, the longer they envisage to use a device before replacing it. This trend can be seen for all devices, but is most notable for smartphones. Fifty-five percent of consumers aged 18-34 thinks they will use their smartphone for not more than three years, compared to 38% of consumers aged 50 or over.

3.1.11 Expected use length of devices (per age group)



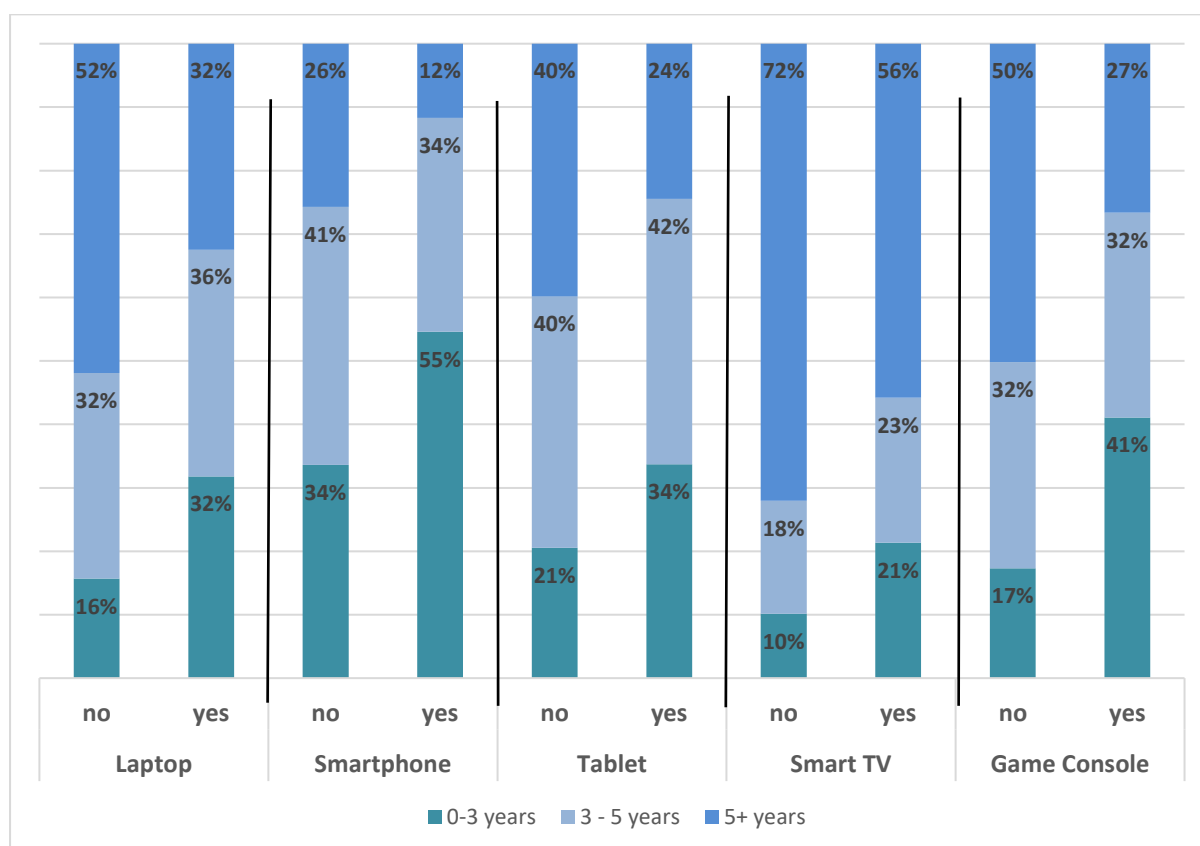
The knowledge consumers have about the impact of streaming on the environment is also clearly associated with how long they expect to use devices. Consumers who report to know at least a bit about this on average expect to use devices for less long before replacing it compared to those who know only a little or nothing about this, and this is the case for all devices. Among consumers with a higher reported knowledge about this, around six in ten (58%) expect to use their smartphone for a maximum of three years. For gaming consoles, tablets and laptops this is around four in ten (41%, 40% and 38%, respectively), and for Smart TVs still around three in ten (29%). Among consumers with little or no knowledge about the environmental impact of streaming, the device with the shortest expected use length is also the smartphone, which 39% expects to use for not more than three years. For tablets, laptops and gaming consoles, this goes for only around two in ten (23%, 20% and 19%, respectively), and only for 12% when it comes to smart TVs.

3.1.12 Expected use length of devices (per streaming impact knowledge)

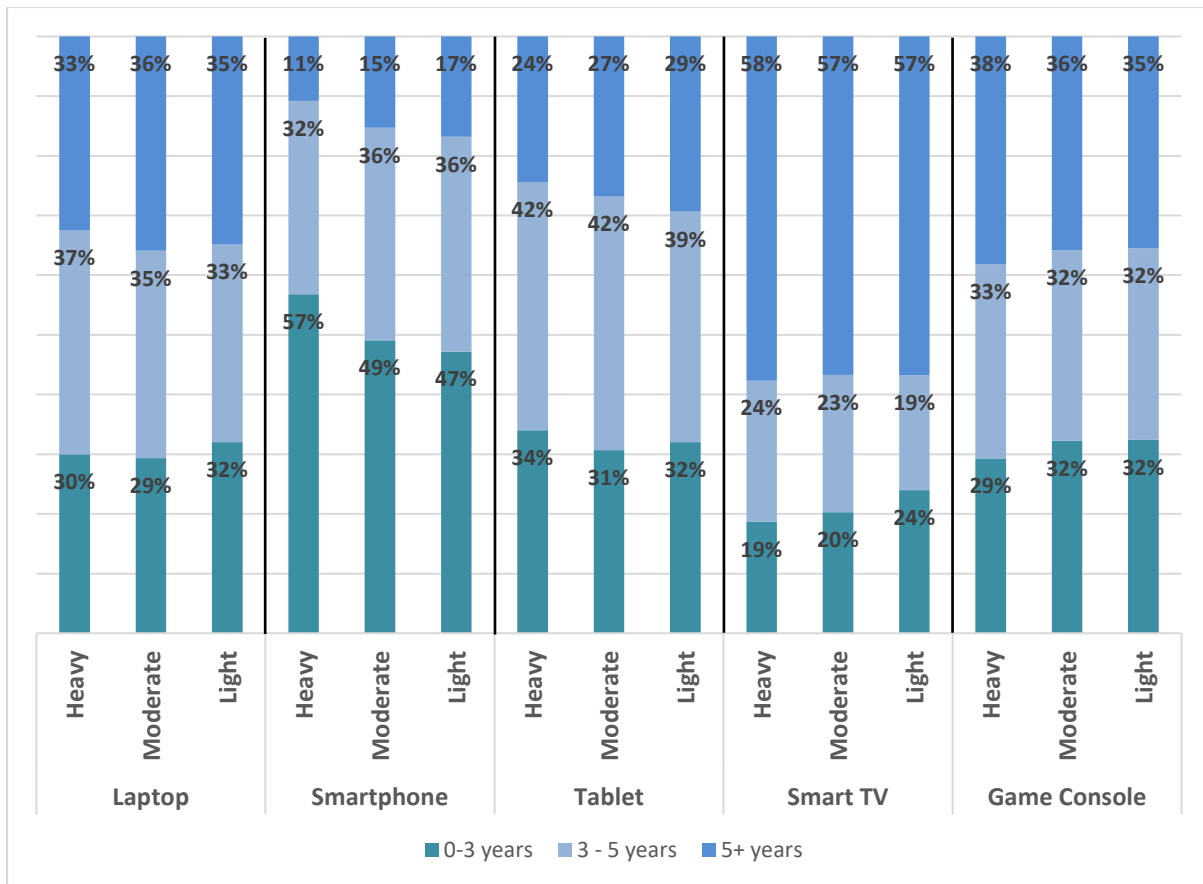


Whether consumers use the device for streaming or not also has a strong impact on the expected use length of devices. Consumers who do not use the device for streaming overall expect to use devices longer than those who do use the device for streaming. This holds for all devices, but is most notable for gaming consoles and smartphones, as shown in the figure below.

3.1.13 Expected use length of devices (device used for streaming)



At the same time, among consumers who do use their devices for streaming, the intensity of streaming has only limited impact on the expected use length of a device. People who stream more are not necessarily inclined to use their device for a shorter period of time before replacing it than those who stream less. For smartphones, this seems to be the case the most: 57% of heavy streamers expect to replace their device after three years, more than moderate (49%) and light streamers (47%). For other devices, the link with streaming intensity is less clear, or even reversed (albeit only slightly). The latter is most notably the case for smart TVs, which light streamers somewhat more often expect to use for a maximum of three years compared to heavy streamers (24% and 19%, respectively).



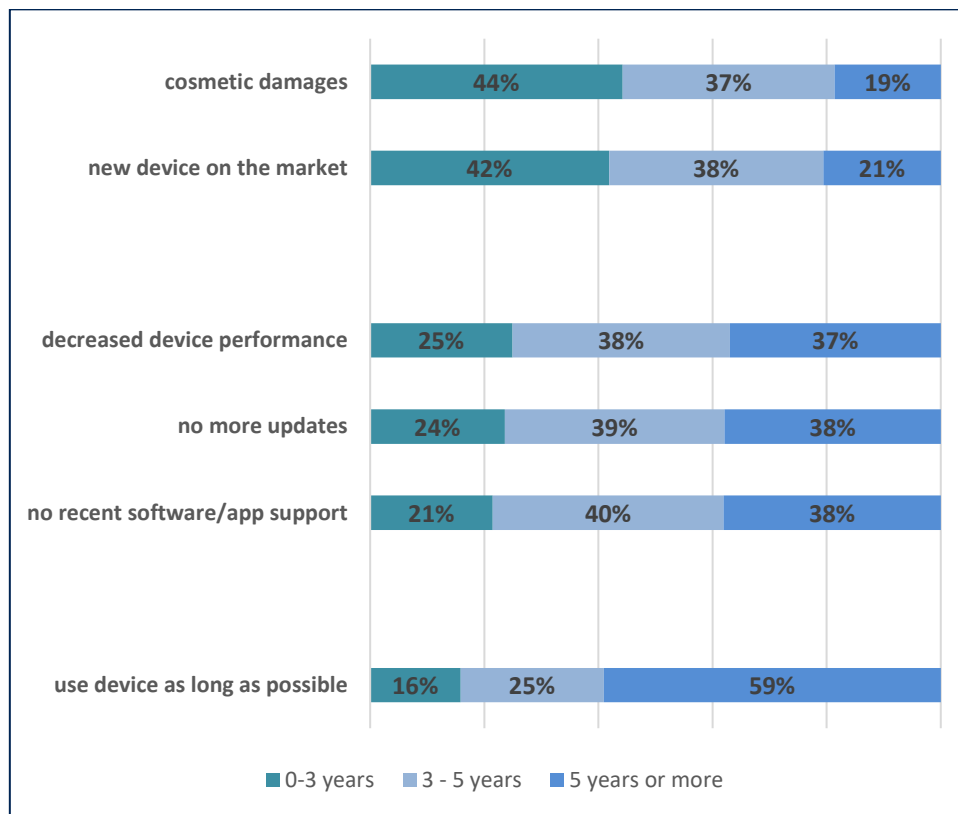
Finally, the financial situation of consumers has no notable impact on the expected use length before replacements. Expected use lengths for all devices are about the same regardless of whether the financial situation of the consumer is easy or difficult, with differences always within a range of four percentage points.

3.1.3 Use length and replacement reasons

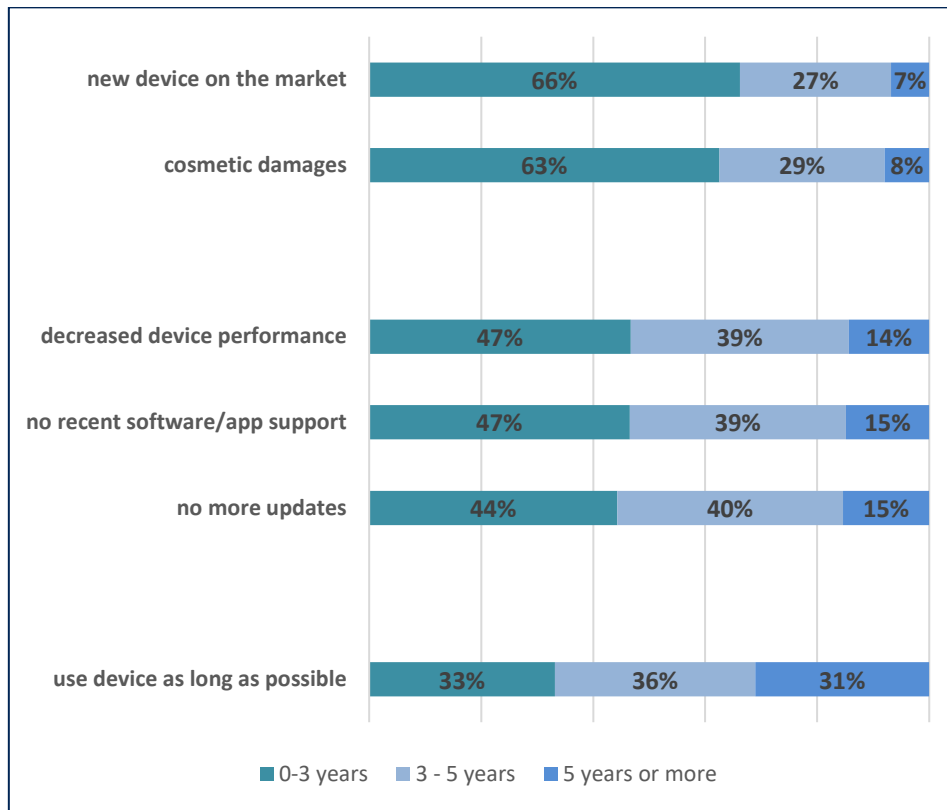
How long consumers expect to use a device depends on the reasons they see as important to replace that device. Much like there are only small differences between devices when it comes to the importance of different reasons to replace a device, this is also the case for the correlation with expected use length. For all devices, consumers who think cosmetic damages and the availability of a new device on the market is an important reason to replace a device are more likely to replace their device after up to three years. Those who think performance-related reasons are important, the likelihood to replace a device after up to three years is notably lower. As can be expected, consumers who intend to use a device until it no longer functions intend to use their device the longest. Among this group, the longest expected use length is for smart TVs: 72% of consumers who intend to use their Smart TV until it breaks down intend to use it for at least five years. At the other side of the spectrum, only 31% of consumers who intends to use their smartphone as long as it keeps working expects that they will use it for more than five years, compared to 33% in this group who thinks they will replace their smartphone within three years.

Detailed results per device are shown in the figures on the next pages.

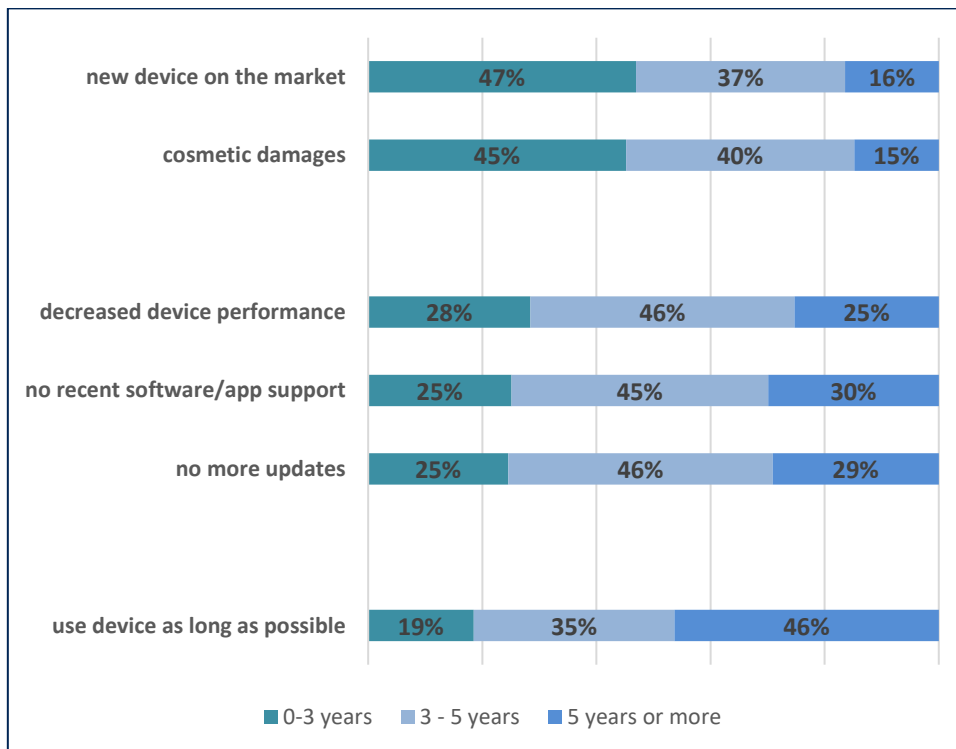
3.1.14 Expected use length per reason for replacement - **LAPTOP**



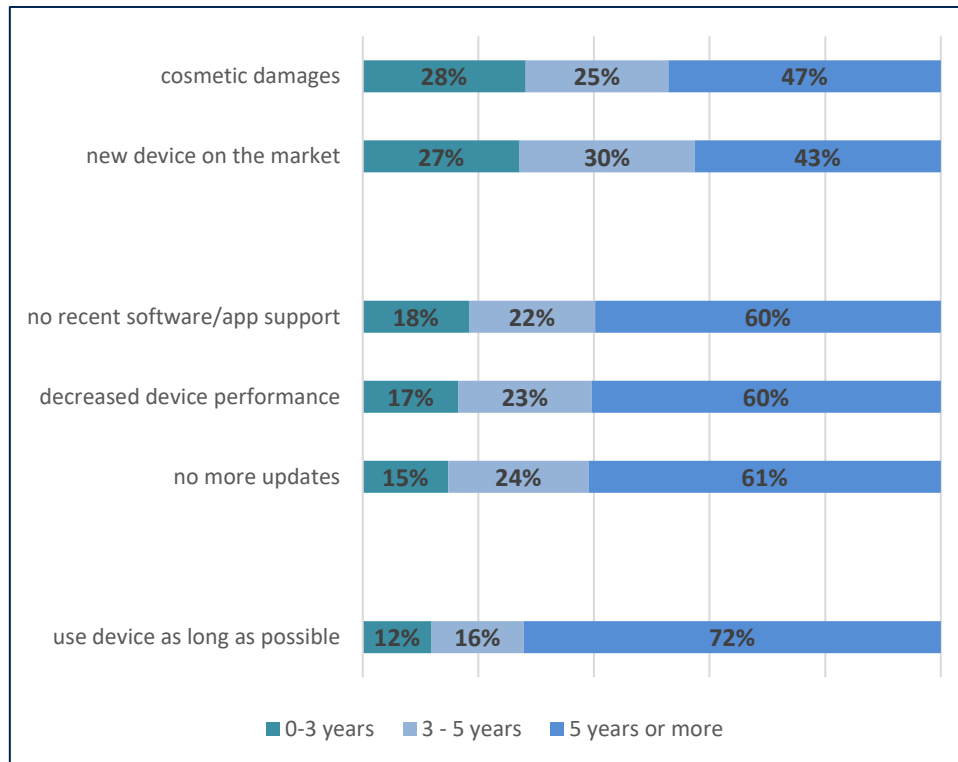
3.1.15 Expected use length per reason for replacement - **SMARTPHONE**



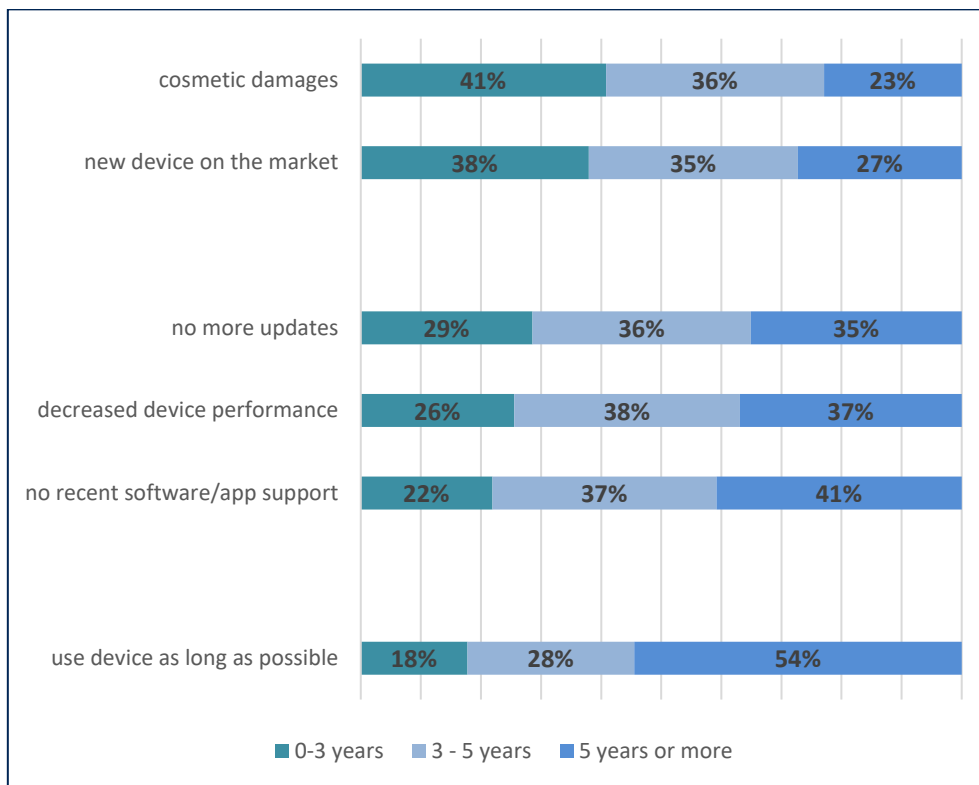
3.1.16 Expected use length per reason for replacement - **TABLET**



3.1.17 Expected use length per reason for replacement – SMART TV



3.1.18 Expected use length per reason for replacement – GAMING CONSOLE

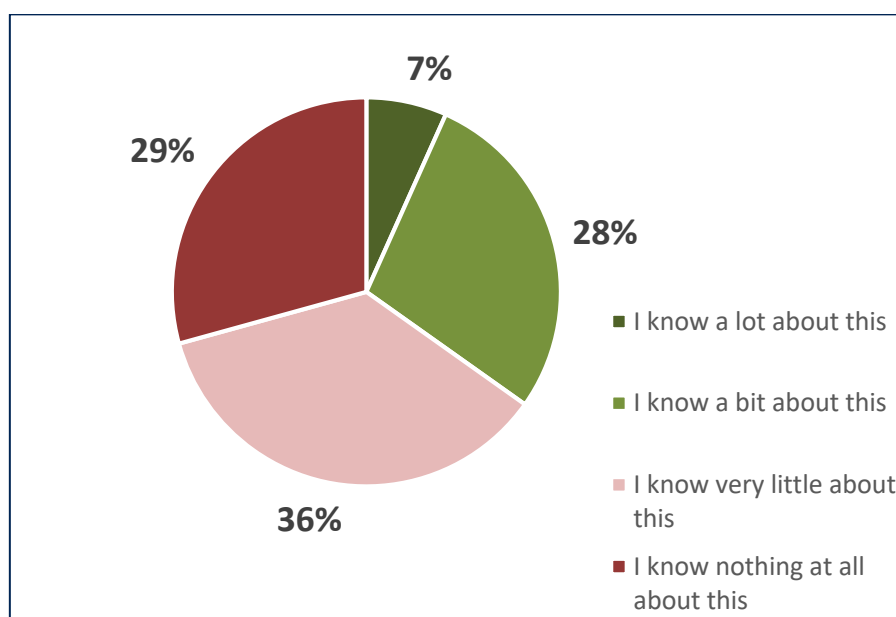


3.2 Environmental impact awareness

Reported awareness of the environmental impact of streaming

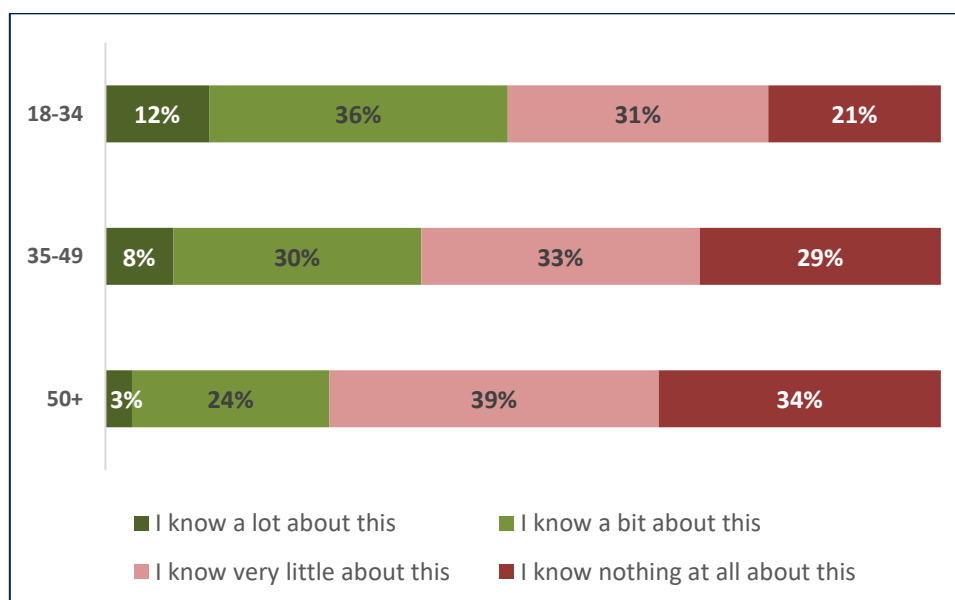
Only just over one in three consumers who stream video content report to know a bit (28%) or a lot (7%) about the environmental impact of streaming and other data-consuming internet activities. Thirty six percent say they know only very little about this, and a further 29% know nothing at all about this.

3.2.1 Knowledge about the environmental impact of streaming



Knowledge about the environmental impact of streaming is mostly associated with age. Younger consumers report a higher knowledge about the environmental impact of their streaming behaviour than older consumers. Among consumers aged 18-34, around four in ten (38%) say to know at least a bit about this, compared to 27% among those aged 50 or over.

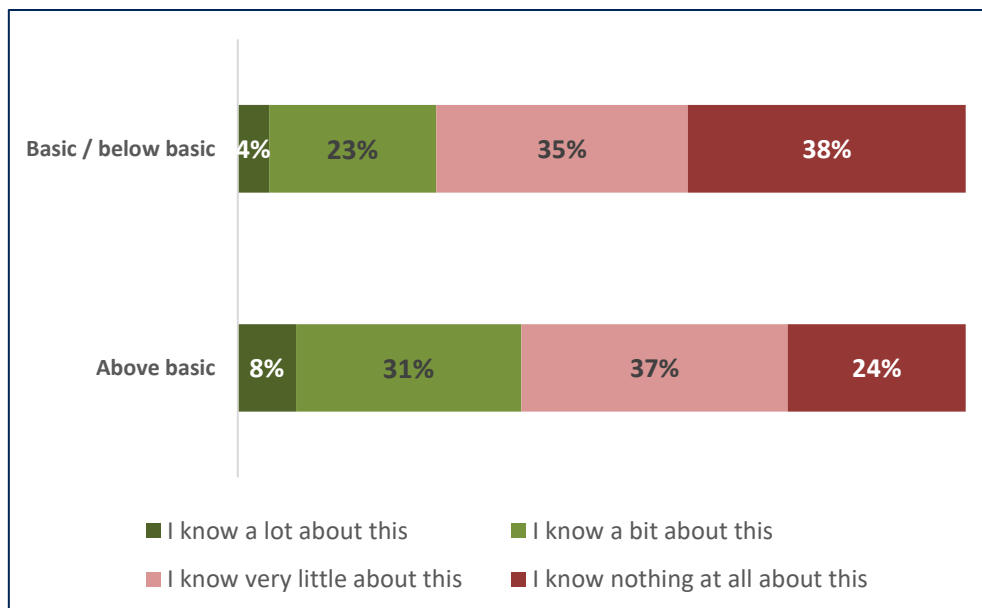
3.2.2 Streaming impact awareness (per age group)



The **level of digital competence** also impacts how much consumers claim to know about the environmental impact of streaming. Those with an above basic level of digital competence are

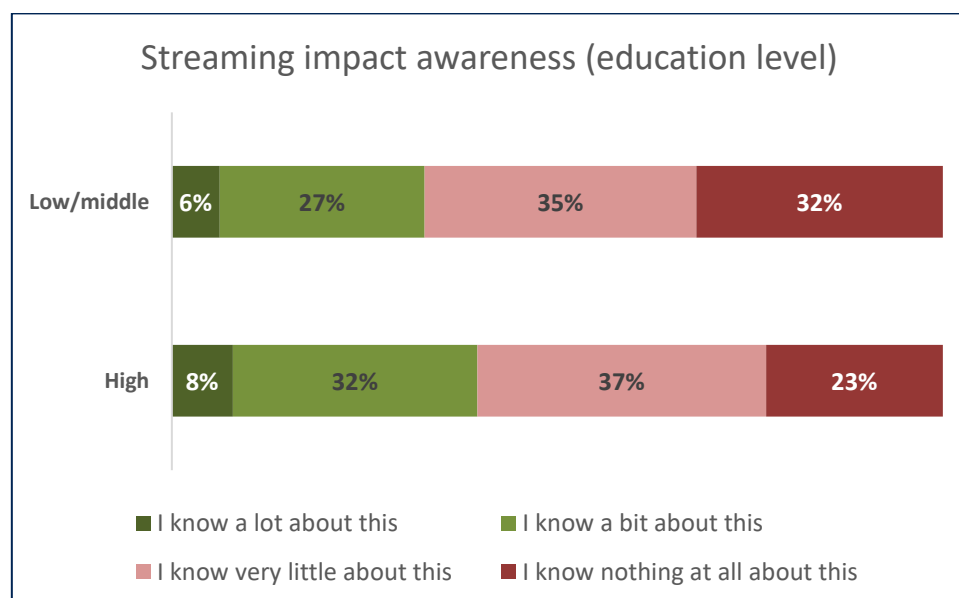
more likely to know at least a bit about this (39%) compared to those with a basic or below basic digital competence level (27%).

3.2.3 Streaming impact awareness (per digital competence level)



The **general level of education** of consumers has a smaller impact, although consumers with a high education level are somewhat more likely to report that they know at least a bit about the environmental impact of their streaming behaviour compared to those with a medium/low education level (40% vs. 33%).

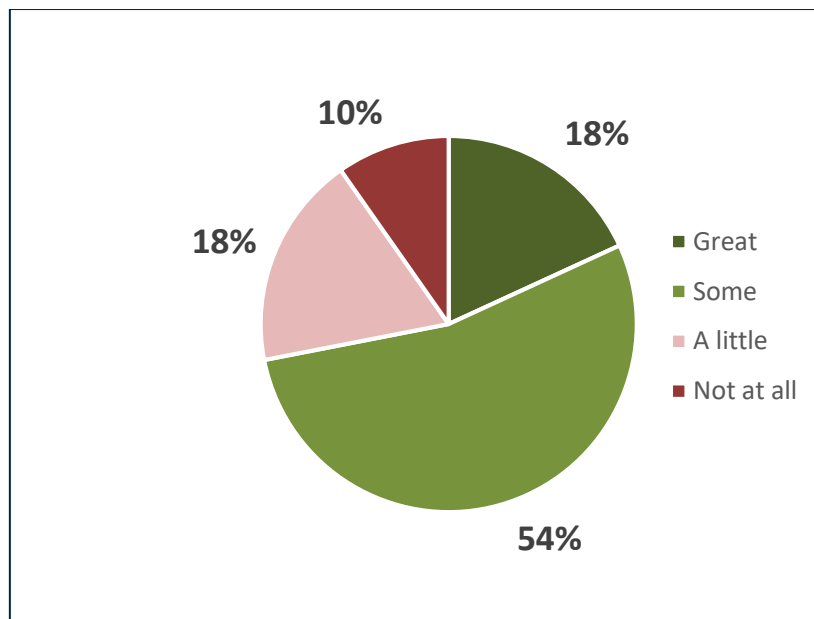
Figure 3.2.4 Streaming impact awareness (per digital education level)



Influence of environmental impact knowledge

Among consumers who report to know at least a bit about the environmental impact of streaming, more than seven in ten say that it impacts at least to some extent their streaming behaviour – 18% to a great extent and a further 54% to some extent.

3.2.5 Reported influence of environmental impact knowledge on streaming behaviour

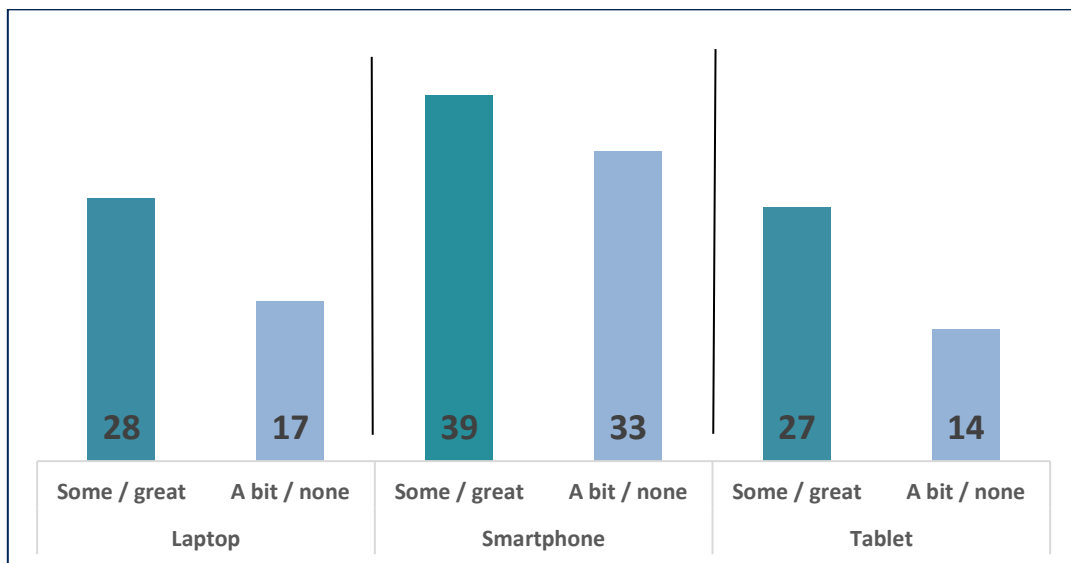


This self-reported influence should be interpreted with caution, however. It would be in line with expectations that this influence would result in some form of streaming behaviour that decreases (or could be expected to decrease) the impact on the environment. This, however, is not straightforward from the survey results.

First, looking at **overall streaming time**, there is no difference between those who claim at least some influence on their streaming behaviour compared to those who report little or no influence. For both groups, the average streaming time per week is 12h26. Looking per device, we see on the one hand that, for laptops, those who report at least some influence do stream less than those who report a little or no influence (4h07 vs. 5h08). But on the other hand, the trend is reversed for gaming consoles, on which those who report at least some influence stream considerably more than those who report little or no influence (2h45 vs. 1h16). For other devices there is no significant correlation in either direction.

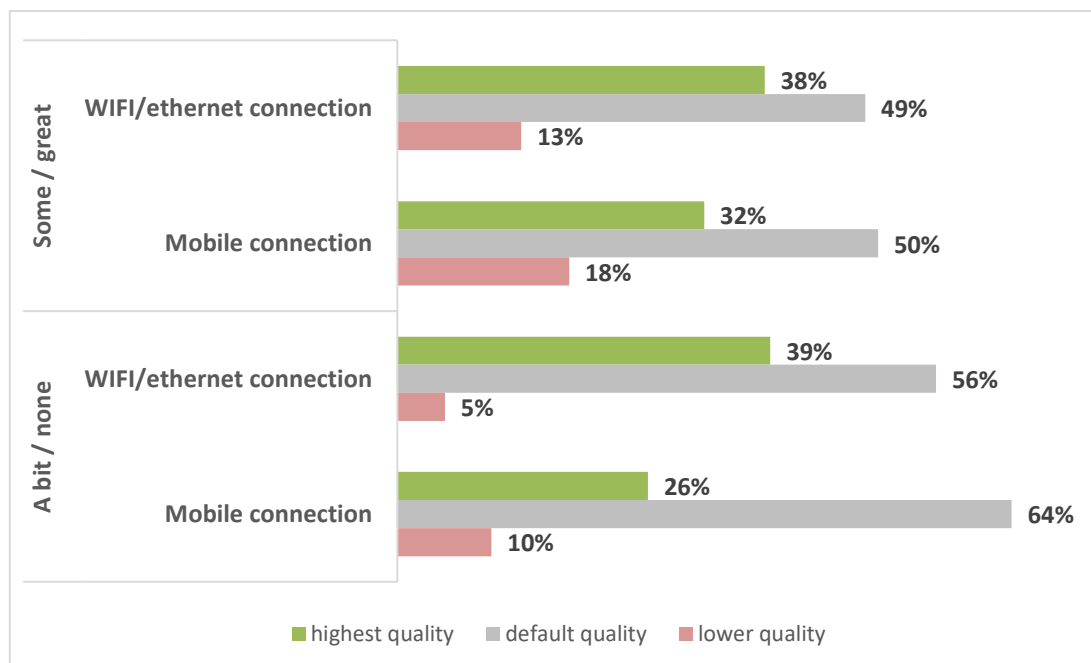
Looking at **usage preferences**, consumers who report at least some influence more often use a mobile connection than those who report little or no influence. This is in particular the case for laptops, where the former group reports to use a mobile connection 28% of the time for streaming, while this is 17% in the latter group, and tablets (27% vs. 14%).

3.2.6 Use of mobile connection for streaming (influence of impact knowledge)



When it comes to quality preferences, results are more ambiguous. Consumers who claim that their streaming behaviour is influenced to some or a great extent by their knowledge of the environmental impact of streaming are less likely to use the default video settings. However with regards to streaming on a mobile connection, they are both more likely to increase as well as to decrease those quality settings compared to those who report that this influences their behaviour only a bit or not.

3.2.7 Streaming quality preferences (influence of impact knowledge)



These results, indicating that consumers who claim that their streaming behaviour is guided by an awareness of the environmental impact of streaming, seem counter-intuitive, as they imply that those who claim that they are more guided by this awareness in fact show *less* environmentally friendly behaviour. Some considerations are important when interpreting this. First, the results could be impacted by a difficulty of part of the respondents to estimate their own behaviour. In particular, they might be convinced that their streaming behaviour is in some way steered by what they (think they) know about the impact of streaming on the environment, while this is in fact not the case. Moreover, respondents were not directly asked to report *what* that influence precisely is (for instance, they were not asked directly whether, because of that knowledge, they stream less), so it is possible that they have some other influence in mind besides the aspects of streaming behaviour measured in the survey.

With this in mind, this indicator could maybe be more accurately be interpreted not as reflecting an actual influence of environmental impact knowledge, but as a proxy for a wider technological knowledge and closer engagement with or interest in streaming (keeping in mind that this is not necessarily reflective of *actual* higher knowledge of the environmental impact of streaming. In that sense, the results are consistent with the fact that overall, younger consumers, consumers with a higher digital competence, a higher general education level and a higher self-reported knowledge of the environmental impact of streaming, stream more intensively and frequently, more frequently use a mobile connection, and have higher quality preferences.

4 Conclusions

Below we present the most important conclusions from the user behaviour survey.

Important purchase factors

- Overall, there is a high consistency across devices when it comes to which factors consumers find important when deciding to buy a new device:
 - Price is almost always the most important factor, except for laptops, where it ranks seconds closely behind hardware performance and processing speed
 - Performance-related factors are consistently more often selected as more important compared to factors that relate to the sustainability of the device. This is particularly the case for the factor hardware performance and processing speed, which ranks as one of the top three factors for all devices, and is the most important factor for laptops. Battery life, storage space (when asked), and internet connection quality / speed also rank as above average across devices.
 - Sustainability-related factors rank almost consistently low in terms of importance, particularly cashback/trade-in services, customer care services and repairability of the device. The major exception to this is the expected lifetime of the device, which ranks in the top three of important factors (behind price and hardware performance / processing speed), except for tablets where it also ranks behind internet connection quality and speed. Energy label class is also found relatively important for the only device where this factor is relevant (smart TVs).
 - This indicates that the technical performance of the device is the most important for consumers when deciding to buy a device. At the same time, consumers do find it very important that their device will last a long time, and for Smart TVs they do find the energy label class also important. Device sustainability thus has some importance for consumers, but mostly to the extent that it can be estimated at the point of purchase. Those aspects that require taking action *after* purchase – repairing the device or replacing parts, using customer care service or making use of take-back/buy-back/trade-in services – are of much lower importance for consumers, which suggests that options to improve the devices sustainability after purchase are not likely to have much influence on consumer behaviour or convince consumers to buy a particular product.
- Different consumer groups (in terms of sociodemographic and user behaviour profiles) overall do not show significantly different purchase behaviour. Across different groups the overall trends as described above hold. Some notable observations are:
 - Younger consumers attach somewhat less importance to price than older consumers.
 - Consumers who find it difficult to make ends meet find price more important than those who find this easy. They attach slightly more importance to factors related to sustainability, but this does not hold for expected lifetime of the device – which is important for both groups but not more so for people with a difficult financial situation. This indicates that consumers with a difficult financial situation would not necessarily aim to use a device longer, but would be slightly more likely to make use of after-sales options to extend the product's lifetime. It should be kept in mind

however, that within this group too overall sustainability factors remain much less important than performance factors when buying a device.

- Consumers with a basic or below basic digital competence level attach slightly more importance to sustainability factors compared to those with an above basic level of digital competence.
- the longer consumers envisage to use the device, the more important they also find the price of the device – although this does remain also one of the top factors for those who intend to use the device only up to three years. Notably, consumers who intend to use their device longer find other sustainability factors not more important than those who intend to use it up to three years.
- How much people use devices for streaming has no strong impact on what factors they find important when buying a device, although heavy streamers attach somewhat more importance to hardware performance and processing speed than moderate or light streamers.

Streaming behaviour:

- Across devices, the most frequent streaming activities are the streaming of content from video sharing platforms and social media, and the streaming of content from (S)VOD platforms, which just above half of consumers do at least once a month. More than two in three consumers has also at least once streamed TV programmes and participated in video chats or videoconferencing, while only around one in three has ever done cloud gaming. This is largely consistent across consumer subgroups. Younger consumers, employed consumers and consumers with an above basic digital competence level do stream more frequently (in all the above streaming activities) than older consumers, non-employed consumers and those with a basic or below basic digital competence level.
- The average consumer who streams video content does so for 11 hours and 14 minutes per week. Streaming time is highest among consumers who are younger, highly educated, in employment and with an above basic level of digital competence.
- Smart TVs are overall the most used device for streaming, ahead of laptops. Smartphones, tablets and gaming consoles are used considerably less. This holds across sociodemographic subgroups, except for the fact that among younger consumers, laptops are the most used streaming device. Looking at specific activities, the most used devices are as follows:
 - VOD platform streaming: laptops and smart TVs
 - Streaming from video sharing platforms and social media: tablets
 - Video calls/videoconferencing: laptops
 - Cloud gaming: tablets and gaming consoles
 - TV program streaming: smart TVs

Usage preferences

- When streaming video content, consumers use an ethernet or WIFI connection much more often than a mobile connection (such as 4G). This is the case for laptops, tablets and smartphones, although on smartphones 35% of streaming is done via a mobile internet connection, more than on laptops and tablets. This preference for streaming via WIFI/ethernet over streaming via a mobile connection holds for all consumer subgroups, and across all groups mobile connection streaming is also always more frequent on a smartphone compared to laptops and tablets. It is, however, notable that heavy streamers use a mobile connection slightly less often than medium and light streamers, at least when it comes to laptops and tablets.
- A majority of consumers does not change the quality settings of the video content when they stream, and instead opts to use the default streaming quality. This is the case for streaming via a WIFI/ethernet connection as well as streaming via a mobile connection. Consumers do *lower* the quality settings when streaming via a mobile connection somewhat more often compared to when streaming via a WIFI/ethernet connection,
- Overall, the more people stream, the more likely they are to prefer maximising the quality of the video content, and the least likely they are to decrease the quality. they *increase* the quality settings also less often when streaming on a mobile connection.

Device replacement and use length

- For laptops, smartphones and tablets, the three most important reasons to replace a device are always related to device usability and performance: general performance decrease, ending of support/updates, and the fact that recent software or apps can no longer run. For smart TVs, the trend is largely the same, with the slight difference that the availability of a new device on the market ranks third for this device, tied with the lack of updates.
- Gaming consoles are the only device where the availability of a new device on the market is the most important reason to replace a device, ahead of reasons related to the performance of the device. This is likely linked to the fact that gaming consoles are introduced in the market following “generational” life cycles, with little availability of new devices in between new generations.
- For all devices, only a minority of consumers indicates that they will continue using the device until it breaks down, before replacing it with a new one. Older consumers are however more likely to keep using a device until it no longer functions, as well as consumers with a basic or below basic competence level. Notably, consumers with at least some knowledge about the environmental impact of streaming are much less likely to keep using their device until it no longer functions, compared to those who have little or no knowledge about this. Also, consumers’ financial situation has only very limited impact on the likelihood that they would keep using a device until it stops functioning.
- For all devices, a majority of consumers expects to use their device for at least 3 years from the moment they buy it. Consumers are most likely to think they will use their smartphone for only up to three years, and smart TVs are the device most consumers think they will use for more than five years. Consumers who report to know at least a bit about this on average expect to use devices for less long before replacing it compared to those who know only a little or nothing about this, and this is the case for all devices. Similarly, Consumers who do not use the device for streaming overall expect to use devices longer

than those who do use the device for streaming. This holds for all devices, but is most notable for gaming consoles and smartphones

- For all devices, consumers who think cosmetic damages and the availability of a new device on the market is an important reason to replace a device are more likely to replace their device after up to three years. Those who think performance-related reasons are important, the likelihood to replace a device after up to three years is notably lower. As can be expected, consumers who intend to use a device until it no longer functions intend to use their device the longest.

Environmental impact awareness

- A minority of consumers (just over one in three) who stream video content report to know at least a bit about the environmental impact of streaming. This knowledge is highest among younger consumers and consumers with an above basic level of digital competence, but is associated with consumers' general education level only in a limited way.

A clear majority of consumers who report to know at least a bit about the environmental impact of streaming say that this knowledge influences their streaming behaviour at least to some extent. However, in as far as this would indeed be the case, this does not result in behaviour that would be less impacting on the environment, or. Overall, consumers who report some influence on their behaviour in fact stream more, more often via a mobile internet connection, and more often on maximised quality settings. These seemingly contradictory findings could however be caused by consumers limited awareness of their behaviour, and be more reflective of the fact that such consumers are generally more tech-savvy – resulting indeed in more intensive streaming

