

WHY DO WE KEEP OUR USED MOBILE PHONES? CULTURAL AND BEHAVIORAL OBSTACLES TO CIRCULAR STRATEGIES IN CAMBODIA

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ABSTRACT

The high usage rates of mobile phones and their short lifecycles are leading to a great and increasing amount of electronic waste (e-waste) globally, with a negative impact on the environment. This trend can also be seen in Cambodia, a developing country in Southeast Asia. Circular strategies, such as the refurbishment of used mobile phones and bringing them back to the market 'as good as new', are established in the more developed regions of the world with the potential to reduce e-waste. As of today, such strategies are of very low market relevance in Cambodia, and potential positive impacts on the environment remain unfulfilled. The aim of this paper is therefore to obtain insights into how barriers to returning used mobile phones in Cambodia can be reduced to achieve environmental and economic benefits. To meet this aim, 28 semi-structured interviews with Cambodians ('Khmer') were conducted. The results show a strong tendency to not return their used mobile phones due to emotional attachment, practical reasons such as backup or data storage, and cultural habits of handing items down within families. Moreover, a widespread lack of knowledge and awareness of the option to return and refurbish these devices has been found.

KEYWORDS

Circular Economy, Closed-Loop Supply Chains, Circularity, Refurbishing, Remanufacturing, Sustainable Manufacturing, Mobile Phones

1 INTRODUCTION

Mobile phone use has increased significantly in recent decades. Today, these electronic devices are the standard for communication and many other sorts of activities worldwide. This is also the case in Cambodia [Statista 2024a, Taylor 2024]. Fast technological advancement and consumers' perceived obsolescence lead to short product lifecycles of mobile phones [Santana 2021, Wieser 2018]. This is resulting in high amounts of waste from electronic devices with a strong negative impact on the environment [Coffey 2019, Santana 2021, Statista 2024b].

Refurbishing is a circular strategy to recover the key value of used mobile phones and to return them to the market, giving

them a second life. This industrial process aims to gain a circular economy and to reduce waste with positive effects on the environment and economy [Pamminger 2021, Sharifi 2021]. Based on previously conducted research by the authors, such circular strategies currently have hardly any relevance in the Cambodian market [Nanthakorn 2024].

This paper aims to explore the major reasons, people in Cambodia are refraining from returning their used mobile phones to gain circularity. It focuses on the behavioral and cultural drivers of this phenomenon. To receive these insights, four specific research questions have been developed:

RQ1: What are the reasons mobile phone users in Cambodia are refraining from returning their used mobile phones?

RQ2: What cultural values and habits influence mobile phone users in Cambodia in their decision-making process of whether to return or refrain from returning their used mobile phones?

2 THEORETICAL FRAMEWORK

2.1 Electronic Waste in Southeast Asia

In the last three decades, the importance of mobile phones for all kinds of usage has risen globally. Nowadays, mobile phones are the key electronic devices for communication, purchasing, payments, entertainment and many other functions. This global trend is also true for Cambodia. Despite its economic challenges, with 19.5 million devices in 2022, the country has more registered mobile phones than its inhabitants. Moreover, the Cambodian market for mobile phones is forecast to increase annually by 3% [Statista 2024a, Taylor 2024].

Besides the high number of mobile phones in use, the product lifecycles of these devices have become shorter. Research carried out in Europe concluded that mobile phones are, on average, only used for two years [Mugge 2017]. One reason for this phenomenon is obsolescence resulting from fast technological advancement. But, besides this technical obsolescence, research describes perceived obsolescence and unconscious buying behaviour on the consumer side for mobile phones: A desire to buy a new device based on additional or more advanced functionality, the wish to possess something new, the strive to be 'up to date' and peer pressure to meet certain standards [Santana 2021, Wieser 2018].

The high quantity of mobile phones and their short product lifecycle leads to excessive electronic waste (e-waste) from used devices. The amount of such waste has doubled in the last decade and is forecast to increase strongly worldwide. Mobile phones are an important part of this development. Often, the disposal of this waste is not performed professionally and has a strong negative impact on the environment and the people [Coffey 2019, Santana 2021, Statista 2024b].

To reduce the negative impact on the environment from products reaching their End-of-Use/Life (EoU/L), circular strategies for retaining and recovering the key values of the used products have been designed: One of those circular strategies is refurbishing, in which the original performance of the initial part is restored in an industrial process [Pamminger 2021, Sharifi 2021]. Used parts are collected, cleaned, checked, and repaired. Defective parts are replaced. After the refurbishing process, the part is returned to the market and sold and labelled as a 'refurbished part' at a lower price than the original [Hazelwood 2021, Sharifi 2021, van Weelden 2016]. By returning used products to the market again, the classical linear supply chain, in which products at their EoU/L are disposed of as waste, is transformed into a Closed-Loop Supply Chain (CLSC). This circumstance has a positive impact on the environment, as material, labour and energy used in the production of the initial part can be regained. This can reduce

material consumption and energy usage and lower the carbon footprint [Ghorab 2022, Mahat 2021]. Additionally, such strategies can reduce issues related to the scarcity of rare materials (e.g. rare earth materials) needed for the production of IT devices [Ongondo 2011].

CLSCs can be realized by adapting different strategies: 'Reuse' is using the same product or component without a major change by the same or a different user again. 'Remanufacturing' is an industrial process including disassembly, cleaning, repairing/replacing components, assembling and testing, aiming to return the same product in a good-as-new condition back to the market. 'Recycling' processes are recovering the materials of parts and components, aiming to produce new products [Davis 2024, Gharfalkar 2016]. Fig. 1 provides an overview of the different strategies of closed-loop supply chains, as adapted from ERN [ERN 2025].

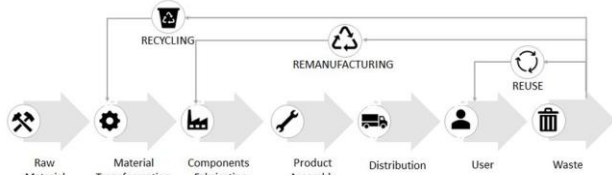


Figure 1. Reuse, remanufacturing and recycling in a closed-loop supply chain (adapted from ERN, 2025)

Initial data was collected during a pre-study conducted by this research team. It concluded that the majority were not aware of refurbished mobile phones as an alternative to new mobile phones. A high level of risk was perceived, especially related to battery health, the accessories and the quality of the screen of refurbished mobile phones. The overall attitude was mainly negative, and only one-fifth of the explored sample was willing to buy a refurbished mobile phone [Nanthakorn 2024].

The research performed in Cambodia also investigated what young Cambodians are doing with their used mobile phone when deciding to buy a new mobile phone: More than half of the survey participants stated that they are keeping their used phones. One-quarter hand it over to someone else (e.g. a family member), and a small group sell it or throws it away [Nanthakorn 2024].

These used mobile phones kept by the previous users could be the basis for refurbishing and helping to establish a CLSC. Remaining stored in Cambodian drawers, their value remains dormant. This phenomenon is further explored in this study.

2.2 Theories on Consumer Behavior

As previously demonstrated, returning used mobile phones is crucial in gaining a closed-loop supply chain (CLSC), leading to environmental and economic benefits. The used phone serves as the basis for the refurbishing process. It can be seen as the essential 'raw material' ('main input') in this process. Without the availability of a used device, a refurbished mobile phone is impossible. Two key theories have been identified to further explore the phenomenon:

- A theory exploring the influence of the cultural background on decision making: Consumer Culture Theory (CCT)
- A theory analyzing the behaviour of consumers: The Theory of Planned Behavior (TPB)

2.3 Consumer Culture Theory (CCT)

The Consumer Culture Theory (CCT) analyzes patterns in consumption. Its key intention is to analyze and better understand phenomena in consumer research in a social and cultural context and to explore consumption in the light of experiential, symbolic, and ideological aspects [Askegaard 2015, Sherry 2009]. In their research on CCT, Joy and Li [Joy

2012] describe this theory as an approach to understanding consumption "apart from the usual frames of economics and psychology". Major contributions to the theory have been provided by Arnould & Thompson [Arnould 2005], who identified four main domains of CCT:

Consumer Identity Projects: Analyzes how consumers are using products to identify or express themselves

Marketplace Cultures: Describes subcultures, groups, and communities and their influence on consuming

Sociohistoric Patterning of Consumption: Explores the influence of factors such as gender, origin, and status on consuming

Mass-Mediated Marketplace Ideologies and Consumers' Interpretive Strategies: Takes into consideration what kinds of influence the media has on consuming

2.4 Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) is a psychological framework aiming to explore, describe, analyze, forecast, and explain behaviour. It deals with a wide variety of behaviors, ranging from purchasing decisions to making choices for all kinds of matters [Ajzen 2020]. In her systematic literature review on TPB, Rozenkowska [Rozenkowska 2023] describes the difficulties in the prediction of consumer behavior due to the complexity of internal (e.g. attitude) and external factors (e.g. subjective norms). Kondo & Ishida [Kondo 2014] summarized the three major dimensions of TPB influencing behavioral intentions:

Attitude: Refers to how positively or negatively a behavior is evaluated [Ajzen 1991].

Subjective Norm: Describes the relevance of people interacting with the consumer and in which form these people's views, perceptions, and actions have effects on the behavioral intention ('social pressure') [Ajzen 1991, Kondo 2014].

Perceived Behavioral Control: Relates to the expected ease or challenge to opt for certain behavioral intentions [Ajzen 1991].

3 METHODOLOGY

In a quantitative research approach from late 2023 till mid-2024, a large number of young Cambodians have been approached using surveys [Nanthakorn 2024]. A key finding in this pre-study was that a large majority are keeping their used mobile phone and are refraining from returning them. Subsequently, end-2024 a qualitative research approach using interviews has been used to explore the reason for this phenomenon.

Initially, interview questions were designed to be feasible to collect data to answer the defined research questions. After an initial question analyzing the overall behavior after buying a new mobile phone (Option 1: Non-returning phone; Option 2: Returning phone), additional questions were raised aimed at different perspectives of the exploration and analyzing the different theories previously described in the literature review:

- Questions analyzing the behavior related to the used mobile phones by interview participants.
- Questions exploring the influence of cultural background on the decision-making of interview participants.

The interviews were conducted in person ('onsite') in English by experienced researchers. Before the interview, the participants were informed about the background of the research project, their voluntary participation, their right to withdraw at any time from the interview, the possibility to refuse any question, their anonymity, and the fact that the interview would be recorded for documentation and later analysis. Participants were at least 18 years old, with efforts made to ensure

demographic diversity (age, gender, education, social background).

The professional qualitative, open-source web-based data analysis software 'Taguette' has been used to perform open coding to define and analyze themes and patterns. A coding tree has been developed reflecting the research purpose and research questions. Findings broken down by each research question and their different perspectives are presented in the following sub-chapters.

4 REASONS MOBILE PHONE USERS IN CAMBODIA ARE REFRAINING FROM RETURNING THEIR USED MOBILE PHONES (RQ1)

The interviews were all conducted in December 2024 and were between 4 and 17 minutes long, with an average length of 7 minutes. In total, 28 interviews were conducted. Among the participants were 15 women (54%) and 13 men (46%). All participants were adult Khmer people between 20 and 55 years old. The average age of participants is 25 years.

In the first set of questions, the reasons why Cambodian mobile phone users are refraining from returning their used devices were investigated. The most common ways to deal with those devices are analysed, what the motivation for that behavior is, what kinds of risks are presumed with returning, how many used devices are stored, and what kinds of benefits are seen in storing them.

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4.1 The most common ways to deal with used mobile phones

The participants were asked what they do with their used mobile phones as soon as they decided to buy a new phone. Around half of the participants stated that they were not returning it as they were aiming to hand over the used phone to a family member, such as siblings, parents, or grandparents. Another significant group is also not returning the phones and is keeping them, for example, by storing them in their drawers. These two groups of non-returning used phones represent around 70% of the participants. A small remaining group of around one-fifth return their used mobile phones. Most often, this is done by trading it in when buying a new device. A very small group disposes of their mobile phones (see Fig. 2).

Interview Question #1: What do you do with your used mobile phone after buying a new phone?

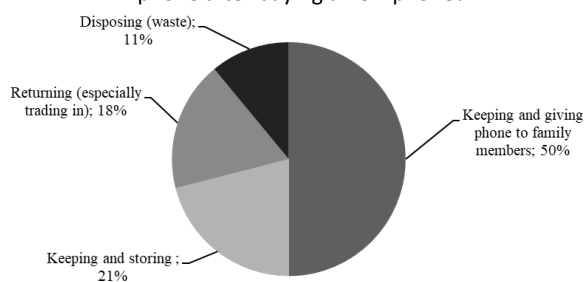


Figure 2. Most common ways to deal with used mobile phones stored by Cambodians (N=28)

"We are a family of six people. I have a little sister and a little brother. So, after I buy a new phone, I transfer it to them" (Respondent #18)

"Normally I keep it in a box. I will not resell it." (Respondent #28)

4.2 Reasons for ways to deal with used mobile phones

Participants handing over their used mobile phones to family members explain this action with the desire to support their family, who might have no or older devices and limited financial resources to upgrade their phones.

"By giving my phone to my sister or my parents, they could move over from an old phone that they are currently using." (Respondent #1)

The motivation of people just storing their used phones in their desks and drawers varies. Many participants described a strong emotional attachment to their used mobile phone and stated that they are keeping it for 'sentimental reasons', 'keeping it as a memory' of an item which has accompanied them for a long period of time or seeing it as unsuitable to give away as it has been a present from someone. A lot of participants also state technical reasons: They describe the wish to have a backup device in case the new mobile phone is not working, lost or stolen, or use the used phone as a data storage device.

"I don't sell the phone unless, because it was a gift given to me, so I felt it was very close to me." (Respondent #9)

For participants trading in their mobile phones when buying a new device, financial incentives are the key motivators. By leaving the used phone with the seller of the new phone, the purchase price decreases and makes buying a newer or more advanced item more affordable.

"I sell it to get extra money to buy a new one." (Respondent #12)

Interview participants stating that they are disposing their used mobile phones mainly state two reasons: On the one hand, they see no financial or other value in the used phone, as it is either very much outdated or not anymore usable due to major defects. On the other hand, a group explains the disposal with a lack of knowledge about alternatives.

4.3 Information on return options for used mobile phones

The lack of knowledge on ways to return used mobile phones described in the previous section has been confirmed by the participants being asked if they are aware of options to return their used mobile phones or about the refurbishment of mobile phones. Around half were aware of return options. Nevertheless, the return option they knew was in nearly all cases to trade in the old phone. Refurbishing and recycling options were hardly known. Often, the terms were known, but most participants were unaware of the background and procedure of such strategies.

"In Cambodia, we don't know where we can go to recycle something." (Respondent #4)

70% of participants stated explicitly that they feel not well informed about return options for mobile phones. Only around one-quarter of participants stated that they saw information (e.g. advertising) for such options. In most cases, this information was provided via social media channels, such as Facebook and TikTok.

4.4 Perceived risks related to returning used mobile phones

The participants have been asked what kinds of risks they perceive with returning their used mobile phones. Two-thirds perceive risks, and one-third do not. Of the group seeing risks, nearly all cases stress potential misuse of their data stored on the used phone. This is especially related to personal messages and pictures, as well as information about the financial status, e.g. from banking applications. Participants in the group not see any risks, often also address potential risks related to the

misuse of data, but having measurements to handle such risks efficiently by deleting personal data before returning used mobile phones.

"I'm concerned about the stored data. What if I sell it to someone, and then they get access to my photos and other information?" (Respondent #24)

4.5 Quantity of and benefits from stored used mobile phones

To investigate the whereabouts of unused mobile phones in Cambodia, the participants who are not returning their mobile phones have been asked how many used items they are storing at home in their desks and drawers. Four main groups could be identified: (see Fig. 3)

- Roughly one-third of the participants are storing 1-2 used mobile phones
- Around one quarter are storing 3-4 used mobile phones
- About 15% are storing 5 or more used mobile phones
- Approximately one quarter are not storing any used mobile phone

Interview Question #6: How many used mobile phones do you store?

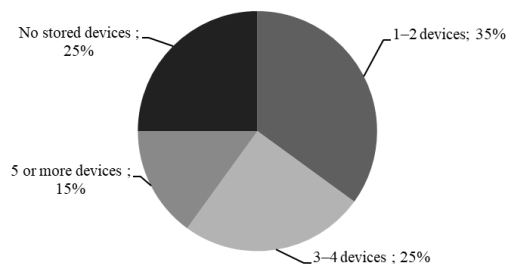


Figure 3. Number of used mobile phones stored by Cambodians (N=28)

Additionally, the interview participants who stated that they were storing one or more used mobile phones were asked what kinds of benefits they saw in this action. The majority (~40%) see a sentimental value in the used devices. Several participants stressed the fact that those items were part of their lives for a long period of time and always accompanied them. Some participants stressed the fact that they received the mobile phone as a present, for example, from a close family member, making it not suitable for giving away. A second group described more practical reasons for keeping the used devices: Some participants (~20%) stated that they would like to have a backup solution in case the new phone would not be available: the new phone has technical problems, or gets lost or stolen. Other participants (~15%) see a benefit in the used mobile phones as a data storage device, storing old data like pictures and contact information, which have not been transferred to the new device. Finally, a few participants described the habit of just collecting used items without seeing a direct benefit in them. The main groups can be summarized as follows:

- Sentimental or emotional value (~40%)
- Backup devices (~20%)
- Data storage (~15%):
- Collection habits (minor group)

5 CULTURAL VALUES AND HABITS INFLUENCING MOBILE PHONE USERS IN CAMBODIA IN THEIR DECISION-MAKING PROCESS OF WHETHER TO RETURN OR REFRAIN FROM RETURNING THEIR USED MOBILE PHONES (RQ2)

In a second set of questions, participants were asked about the perception of returning mobile phones in Cambodia. Additionally, they were invited to share their views on the low return rates and to deliver potential explanations. Finally, they were asked to share their opinions on the influences of cultural habits and traditions on the return of used mobile phones in Cambodia.

5.1 Perception of returning used mobile phones in Cambodia

Besides the low rate of Cambodians returning their used mobile phones, the perception of such a strategy is seen rather positively. Around 60% of the interview participants stated that the return of used devices is viewed in a positive way by people around them. 20% were unsure, and only 20% saw it rather negatively. Often, the group seeing it critically explained it with perceived risks (data security) or unattractive return programs (low resale prices when trading in).

5.2 Perceived reasons for low return rates for used mobile phones in Cambodia

The interview participants were asked about their perceived reasons for the low return rate of used mobile phones. A large number of participants (40%) stated that many Cambodian people show sentimental and emotional attachment to items. This number strongly corresponds with the individual reasons why participants were keeping their own used mobile phones. Additionally, a lack of information about returning used mobile phones (30%), perceived risks (25%) and unattractive return programs are mentioned as reasons.

When asked whether people around them are dealing with used mobile phones in the same way as their own behavior, most participants agreed. This is supported when comparing the data from their behavior (see chapter 4) with the perceived reasons for low return rates for used mobile phones in Cambodia (see data above).

5.3 Perceived influence from cultural habits and traditions on the return of used mobile phones in Cambodia

The participants were asked if they see a culture, history or tradition in Cambodia to keep used things in general and used mobile phones specifically. A large number of participants (35%) described a tendency within the Cambodian society to show emotional and sentimental connections to items. This leads to keeping those items beyond the phase of usage as a memory of certain life periods, of their hard work to gain the item, or presents from people close to them. Another significant group (25%) describes the cultural habit of passing valuable items down to the younger generations. It might be needed to analyze whether this observed emotional and sentimental attachment to used items is a specific Cambodian cultural phenomenon or part of a broader regional or even global circumstance. A third group (20%) describe practical habits within society to keep things for future usage, for example, in a case of emergency or the need for a backup solution. In many cases and within all groups, participants stated that they were unsure if their observations were due to habits or traditions. A fourth group (20%) rejected any influence from cultural habits (common practices and behaviors within Cambodia, such as seeing practical and sentimental benefits in used things) and traditions (rituals passed down through generations, such as handing over used items to other generations) on returning used mobile phones in Cambodia. (see Fig. 4)

"It could be a cultural thing. The love of keeping something. But to me, when you keep a lot of stuff, your home could become a museum." (Respondent #4)

"I think it's not really related to tradition. More to culture. We tend to have a lot of strong attachment to the phone or the asset that we own because we're really having a hard time earning that." (Respondent #18)

Interview Question #10: Do you think keeping your used mobile phone reflects who you are or has a connection to Cambodian tradition, culture and values?

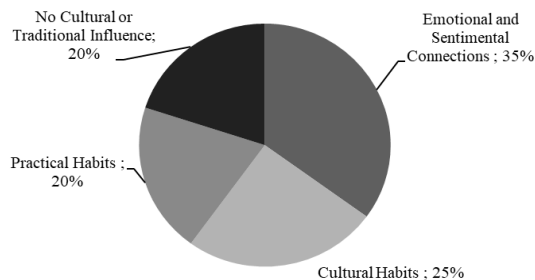


Figure 4. Influence of cultural habits and traditions on the return of used mobile phones in Cambodia

5.4 Barriers related to the planned behavior

To summarize, four out of five interview participants kept their used mobile phones and refrained from returning them. They explain this behavior with the desire to hand it over to family members, using the used phone as a backup solution or data storage device. Moreover, it serves as a 'souvenir' related to persons, occasions and prior achievements. Partly, participants were addressing difficulties in returning used mobile phones due to a lack of information. Summarizing, these barriers exist due to..

- .. behavior to return the used phone to family members,
- .. technical benefits seen in the used phone,
- .. sentimental benefits seen in the used phone, and
- .. perceived difficulties in returning used phones.

5.5 Barriers related to culture, tradition and habits

In summary, four of five interview participants see a relation between local culture, traditions or habits and the return of used mobile phones: A general tendency of being emotionally attached to things is described by the participants. Moreover, there is a culture of handing over items from one generation to another. Additionally, it is seen as a practical habit to keep things in case of an emergency. Finally, participants described that the level of information on return options is insufficient. Summarizing, these barriers exist due to..

- .. a culture of emotional attachment to items,
- .. cultural habits,
- .. practical habits, and
- .. insufficient access to information.

6 DISCUSSION

Reducing barriers to mobile phone collection in Cambodia can lead to ecological as well as economic benefits [Ghorab 2022, Mahat 2021, Pamminger 2021]. Besides the potential positive environmental impacts such as reduced material consumption, lower energy usage, and an increase in carbon footprint, refurbished mobile phones offer potential financial advantages: As they are priced around one-third of the price of a new phone, cost savings for consumers are possible, and products might be accessible to additional consumer groups, in line with

the business drivers for remanufacturing [Sundin 2016]. This is of special interest for a cost-sensitive country like Cambodia.

At the same time, mobile phone return and refurbishment differ regionally: In regions like Europe and North America, a high consumer awareness, a range of financial incentives and increased return rates can be observed [Holmstrom 2017, Van Weelden 2016]. Previous research in Asian countries found a risk-focused perception of refurbished mobile phones [Chun 2022] and an overall rather negative attitude towards such items [Olorvida 2023]. Own research in Cambodia also concluded a mainly negative perception [Nanthakorn 2024].

All barriers to mobile phone collection in Cambodia identified in the previous section are summarized and justified below (see Fig. 2). Additionally, actionable recommendations are provided to overcome or reduce them.

6.1 Barriers within the Theory of Planned Behavior

The barriers related to the behavior of Cambodian people consist of the handing over of used mobile phones to family members, seeing technical and sentimental benefits in items, and perceiving difficulties in ways to return used devices. These barriers can be linked to TPB dimensions as shown in Table 1.

Table 1. Barriers within the Theory of Planned Behavior dimensions (TPB)

Barrier	TPB Dimension / Justification
Behavior to return used phone to family members	Subjective Norms : Subjective norms ('social pressure') within a culture have the potential to influence the behavior of people. This research has also shown that this relates to the return of used mobile phones. An example for this is the cultural expectation for supporting siblings, parents, and grandparents, which is understood as an obligation: The handing over of a used phone to a family member is in Cambodia partly seen as a 'moral duty'. In those cases, it prevents the return of the used device.
Technical benefits seen in the used phone & Sentimental benefits seen in the used phone	Attitude : Attitude represents the individual's positive or negative evaluation of alternative options. In this research, in several cases, participants expressed benefits in keeping their used mobile phones. Seeing these benefits ('positive evaluation') made them choose to keep the used device and not opt for the alternative (returning it).
Barrier due to sentimental benefits seen in the used phone	
Perceived difficulties in returning used phones	Perceived Behavioral Control : Perceived Behavioral Control relates to the perceived ease or difficulty of alternative options. This exploration has demonstrated that participants were facing obstacles in the return process of used mobile phones. Such obstacles ('perceived difficulties') are seen as barriers to returning used mobile phones. The easier alternative (not returning) is chosen.

6.2 Barriers within the Consumer Culture Theory

Besides the identified behavioral barriers to the return of used mobile phones in Cambodia described above, the interviews also showed the relevance of culture, tradition and habits. Barriers related to this can be linked to the different dimensions of CCT as shown in Table 2.

Table 2. Barriers within the Consumer Culture Theory domains (CCT)

Barrier identified	CCT Dimensions / Justification
Barriers due to a culture of emotional attachment to items	Consumer Identity Projects: Consumers identify and express themselves through items. This gives the item, besides its practical value, an additional function, such as identification or personal memory. Such an additional function has been identified as a barrier to returning used mobile phones.
Barriers due to cultural habits	Marketplace Cultures: Consumers are using habits influenced by subcultures around them and by practices performed by previous generations: For example, the culture in Cambodia of handing over used items from generation to generation. Such habits, rooted in historical circumstances and norms within the local society, have been seen as a barrier to returning used mobile phones in Cambodia.
Barriers due to practical habits	Sociohistoric Patterning of Consumption: Consumers are influenced by their economic status as well as the difficulties they were experiencing in the past (e.g. periods of scarcity such as the genocide or the civil war in Cambodia). Such influences might lead to keeping used items as emergency or backup solutions and were identified as a barrier to returning used mobile phones in Cambodia.
Barriers due to insufficient access to information	Mass-Mediated Marketplace Ideologies and Consumers' Interpretive Strategies: Consumers are influenced by information around them, such as advertisements. The lack of information on the ecological and economic benefits of refurbished items is influencing consumer perception. This exploration has shown that there is a considerable lack of clarity about refurbishing strategies in general and ways to return used mobile phones specifically, which leads to barriers to returning used mobile phones in Cambodia.

6.3 Recommendations to reduce barriers to returning used mobile phones in Cambodia

Besides exploring and defining the barriers to returning used mobile phones in Cambodia, this research aimed to provide actionable recommendations to reduce these barriers. Derived from the findings of this study, the following recommendations,

broken down into the key groups of stakeholders, can be provided:

Recommendations for **mobile phone manufacturers**

- Providing attractive trade-in programs: A large number of participants stated that the provided resale price in trade-in programs is seen as rather unattractive. More attractive trade-in programs providing fair resale prices might increase the return rates of used mobile phones in Cambodia. (ref. Example Interview #12: "I sell it to get extra money to buy a new one.")
- Guaranteeing data security: Most interview participants described perceived risks related to data security. Mobile phone manufacturers should guarantee data security for returned used mobile phones by using a certified data cleaning process and should communicate this actively.
- Promoting refurbished products: Often, refurbished products are unknown as an alternative to new devices. 70% of respondents felt uninformed about return options, and refurbishment was hardly known (ref. example Interview #4: "In Cambodia, we don't know where we can go to recycle something"). The level of information is seen as insufficient. Advertisements for return options are often not seen. Promotional activities might increase the awareness of such products and lead people to more sustainable consumption, including returning their used devices.

Recommendations for **policymakers**

- Introducing Awareness Campaigns: This exploration has shown a deficit of knowledge on refurbishment. 70% of respondents explicitly stated they did not feel well-informed about return options. Using governmental channels to share information on the background and benefits of such circular strategies can reduce uncertainty and perceived risks. As a result, more Cambodians might opt to return their used mobile phone.
- Implementing financial incentives: Interview participants stressed the fact that financial incentives might make them more likely to return their used mobile phones. Participants expressed dissatisfaction with current trade-in offers and requested better financial incentives. Policymakers in Cambodia might support this by implementing tax reductions for such items or financially supporting businesses offering such alternatives to new devices.

Recommendations for **academics**

- Providing educational workshops: The level of information on refurbishment has been identified as insufficient. Workshops could increase the level of information and raise awareness of the need for sustainable production concepts.
- Extending research activities: Further exploring and understanding the challenges and opportunities of circular strategies can be the key to supporting improvements and increasing the share of refurbishment.

6.4 Limitations and Outlook

This exploration is providing new insights into the barriers to the return of used mobile phones of Cambodian people. A research topic which has not been investigated before and therefore is highly explorative. At the same time, findings are limited:

- Limitations related to the sampling: The data collection process has been performed within the context of a university. Therefore, the low average age of participants and the higher educational background might influence the generalizability of the findings. Moreover, data has predominantly collected in the urban context of the capital. Future research might analyze more diverse samples, especially people of higher age and lower education.
- Limitations related to the research focus: This research only analyzed the phenomenon, focusing on mobile phones. Other IT devices, such as laptops, tablets, and desktop computers, have not been considered. Future research might extend this research and potentially include electronic items in general.
- Limitations related to cultural focus: This research exclusively focuses on Cambodian people ('Khmer'). Findings might differ from cultural influences from neighbouring countries (e.g. Vietnam or Thailand), which might be a matter for future research work.
- Limitation related to the research design: The interviews have been carefully designed and conducted. Nevertheless, they have been done by non-Cambodian people in English. This limits the sample on the one hand (here: only English-speaking people) and might limit the quality of answers in a foreign language on the other hand. Future research might use the Khmer language for more advanced and deeper explanations by the participants.
- Limitations related to the research scope: This research is based on the conceptual frameworks using a theory exploring the influence of the cultural background on decision making: Consumer Culture Theory (CCT) and a theory analyzing the behaviour of consumers: The Theory of Planned Behavior (TPB). There is potential to extend it to a theory describing how incentives can influence customer behaviour: Behavioral Economics, for example, by using the Nudge Theory.

7 CONCLUSION

This research provides a comprehensive overview of the barriers to returning used mobile phones in Cambodia. It analyzes the existing literature on this matter, which is strongly limited to insights into other regions and does not provide data on Cambodia directly. It examines the behavior and culture as well as potential incentives with local people by performing semi-structured interviews.

Key barriers to returned used mobile phones were identified related to the consumers' culture (handing over used items to other generations, seeing practical and sentimental benefits in used things) and their planned behavior (emotional attachment, practical habits, insufficient information).

Based on those barriers (emotional attachment, practical usage habits, cultural traditions of passing down items, a lack of public awareness, and insufficient incentives) the research provides actionable recommendations (promoting trade-in programs and securing data privacy to launching educational campaigns and strengthening e-waste policies) for key groups of stakeholders intending to reduce or eliminate the identified barriers.

Finally, the research provides an overview of its limitations and provides potential for future research work: Comparative studies across Southeast Asia could further clarify regional differences, while explorations of other electronic devices and broader demographics could enrich understanding. Using this dual-theory approach can be a replicable model for similar

studies in other countries and a basis for cross-country comparisons. Concluding, this research supports the development of more effective circular strategies for mobile phones and sustainable consumption and production in developing countries.

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REFERENCES

- [Ajzen 1991] Ajzen, I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 1991, Vol. 50, No. 2, pp. 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
- [Ajzen 2020] Ajzen, I. The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, 2020, Vol. 2, No. 4, pp. 314-324.
- [Arnould 2005] Arnould, E.J. and Thompson, C.J. Consumer culture theory (CCT): Twenty years of research. *Journal of Consumer Research*, 2005, Vol. 31, No. 4, pp. 868-882. <https://doi.org/10.1086/426626>.
- [Askegaard 2015] Askegaard, S. Consumer culture theory (CCT). In: M. Ryan (Ed.), *The Wiley Blackwell encyclopedia of consumption and consumer studies*. J. Wiley & Sons. Hoboken, NJ. doi.org/10.1002/9781118989463.wbeccs054.
- [Chun 2022] Chun, Y.Y., Matsumoto, M., Chinen, K., et al. What will lead Asian consumers into circular consumption? An empirical study of purchasing refurbished smartphones in Japan and Indonesia. *Sustainable Production and Consumption*, 2022, Vol. 33, pp. 158-167. <https://doi.org/10.1016/j.spc.2022.06.015>.
- [Coffey 2019] Coffey, P. and Toland, J. The sustainable management of used mobile phones: A repertory grid analysis. In: *Pre-ICIS Workshop Proceedings*, 2019. Available from <https://aisel.aisnet.org/sprouts_proceedings_siggr_2019/4/>.
- [Davis 2024] Davis, C., Hall, R., Hazra, S., Debattista, et al. Reuse, remanufacturing and recycling in the steel sector. *Philosophical Transactions of the Royal Society A*, 2024, Vol. 382, No. 2277. <https://doi.org/10.1098/rsta.2023.0244>.
- [ERN 2025] ERN - European Remanufacturing Network. What is Remanufacturing and how does it benefit jobs, the economy and the environment? [online]. 2025 [cited 2025-04-09]. Available from <www.remanufacturing.eu/about-remanufacturing.php>.
- [Gharfalkar 2016] Gharfalkar, M., Ali, Z. and Hillier, G. Clarifying the disagreements on various reuse options: Repair, recondition, refurbish and remanufacture. *Waste Management & Research*, 2016, Vol. 34, No. 1, pp. 1-11. <https://doi.org/10.1177/0734242X16628981>.

- [Ghorab 2022] Ghorab, H. Unveiling refurbished mobile phones consumers' characteristics using a social media analytics approach. Social Science Research Network. <https://doi.org/10.2139/ssrn.4197948>.
- [Hazelwood 2021] Hazelwood, D.A. and Pecht, M.G. Life extension of electronic products: A case study of smartphones. IEEE Access, 2021, Vol. 9, pp. 144726-144739. doi.org/10.1109/ACCESS.2021.3121733.
- [Holmstrom 2017] Holmstrom, S. and Bohlin, H. Towards a circular economy: A qualitative study on how to communicate refurbished smartphones in the Swedish market (Master's thesis). Umea University, Faculty of Social Sciences, Umea School of Business and Economics (USBE). Available from <<https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1119794&dsid=-2588>>.
- [Joy 2012] Joy, A. and Li, E.P.H. Studying consumption behaviour through multiple lenses: An overview of consumer culture theory. Journal of Business Anthropology, 2012, Vol. 1, No. 1, pp. 141-173.
- [Kondo 2014] Kondo, F.N. and Ishida, H. A cross-national analysis of intention to use multiple mobile entertainment services. Journal of Global Information Technology Management, 2014, Vol. 17, No. 1, pp. 45-60. <https://doi.org/10.1080/1097198X.2014.910991>.
- [Mahat 2021] Mahat, P. Carbon footprint of a refurbished smartphone retailer and carbon handprint of refurbished iPhone (Master's thesis). Lappeenranta - Lahti University of Technology. Available from <<https://urn.fi/URN:NBN:fi-fe2021092747223>>.
- [Mugge 2017] Mugge, R., Jockin, B. and Bocken, N.. How to sell refurbished smartphones? An investigation of different customer groups and appropriate incentives. J. of Cleaner Production, 2017, Vol. 147, pp. 284-296. doi.org/10.1016/j.jclepro.2017.01.111.
- [Nanthakorn 2024] Nanthakorn, B. Circular strategies for IT devices: Perception of young Cambodians on refurbished mobile phones. NUM Research Series, 2024, Vol. 7, No. 1, pp. 78-112.
- [Olorvida 2023] Olorvida, R.C., Bande, R. A., Ngalot, D., et al. Grey weighted influence non-linear gauge systems (WINGS) for evaluating consumption barriers of refurbished mobile phones for a circular economy. Cleaner and Responsible Consumption, 2023, Vol. 8, 100091. doi.org/10.1016/j.clrc.2022.100091.
- [Ongondo 2011] Ongondo, F.O. and Williams, I.D. Mobile phone collection, reuse, and recycling in the UK. Waste Management, 2011, Vol. 31, No. 6, pp. 1307-1315. doi.org/10.1016/j.wasman.2011.01.032.
- [Pamminger 2021] Pamminger, R., Glaser, S. and Wimmer, W. Modelling of different circular end-of-use scenarios for smartphones. International Journal of Life Cycle Assessment, 2021, Vol. 26, pp. 470-482.
- [Rozenkowska 2023] Rozenkowska, K. Theory of planned behavior in consumer behavior research: A systematic literature review. International Journal of Consumer Studies, 2023, Vol. 47, No. 6, pp. 2670-2700.
- [Santana 2021] Santana, J.C.C., Guerhardt, F., Franzini, C.E., et al. Refurbishing and recycling of cell phones as a sustainable process of reverse logistics: A case study in Brazil. J. of Cleaner Production, 2021, Vol. 283, 124585. doi.org/10.1016/j.jclepro.2020.124585.
- [Sharifi 2021] Sharifi, Z. and Shokouhyar, S. Promoting consumer attitudes toward refurbished mobile phones: A social media analytics approach. Resources, Conservation and Recycling, 2021, Vol. 167, 105398. <https://doi.org/10.1016/j.resconrec.2020.105398>.
- [Sherry 2009] Sherry, J.F.Jr. and Fischer, E. (Eds.). Explorations in consumer culture theory. Routledge, 2009.
- [Statista 2024a] Statista. Consumer electronics: Smartphones – Cambodia [online]. 2024 [cited 2024-05-29]. Available from <<https://www.statista.com/outlook/cmo/consumer-electronics/telephony/smartphones/cambodia>>.
- [Statista 2024b] Statista. Electronic waste worldwide: Smartphones – Cambodia [online]. 2024 [cited 2024-05-29]. Available from <<https://www.statista.com/topics/3409/electronic-waste-worldwide/#topicOverview>>.
- [Sundin 2016] Sundin, E., Sakao, T., Lindahl, M., et al. Map of Remanufacturing Business Model Landscape, Report from the Horizon 2020 project called ERN – European Remanufacturing Network, Grant Agreement No. 645984, 2016. Available from <www.remanufacturing.eu>.
- [Taylor 2024] Taylor, P. Number of mobile cellular subscriptions in Cambodia from 2000 to 2022 (in millions). Statista, 2024. Available from <<https://www.statista.com/statistics/497125/number-of-mobile-cellular-subscriptions-in-cambodia/>>.
- [Van Weelden 2016] Van Weelden, E., Mugge, R. and Bakker, C. Paving the way towards circular consumption: Exploring consumer acceptance of refurbished mobile phones in the Dutch market. J. of Cleaner Production, 2016, Vol. 113, pp. 743-754. <https://doi.org/10.1016/j.jclepro.2015.11.065>.
- [Wieser 2018] Wieser, H. and Troger, N. Exploring the inner loops of the circular economy: Replacement, repair, and reuse of mobile phones in Austria. Journal of Cleaner Production, 2018, Vol. 172, pp. 3042-3055. <https://doi.org/10.1016/j.jclepro.2017.11.106>.

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