Acceptance of Mobile Phone Return Programs:
A Case Study Based Analysis

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ABSTRACT
The need of recycling obsolete mobile phones has significantly increased with the worldwide propagation of mobile phones and their inherent rapid turnover. In this article, we examine the acceptance of mobile phone return programs by using the Technology Acceptance Model and multiple case studies. Our findings can provide valuable recommendations for the setup of future mobile phone return programs.

Keywords
Sustainability, Mobile Phones, Return Programs, Technology Acceptance Model, Green IT, Green IS

1. INTRODUCTION
The increasing utilization and proliferation of information and communication technology (ICT) has drawn attention to the related economic and environmental sustainability effects [2][16] [40], especially when it comes to end-of-life management of the devices as stated in the WEEE-directive [39]. Each year, approx. 560 thousand tons of ICT waste is being collected in Europe [11]. Mobile phones, like computers and other ICT devices, contain many valuable and rare metals [15][23][25][27][32]. Due to the large quantity of mobile phones sold worldwide, the relatively small constituent per single device total to a significant amount of highly valuable, non-renewable resources [32]. Moreover, incorrect disposal of mobile phones can release toxic leftovers into the environment [31][32][39] and pose potential health risks [30]. Nevertheless, mobile phone recycling still only accounts to a few percentage of recycled material [23][31].

Studies show that substantial amounts of unused mobile phones are being stored in people's drawers [3]. To increase the return rates, organizations and institutions have implemented various mobile phone return programs. Some of the programs are more successful than others. The success rate highly depends on the acceptance of a program by the mobile phone owners. Revealing the drivers and barriers influencing the acceptance of a

mobile phone return program would help developing more successful mobile phone return programs. This article therefore aims to answer the research question:

Which factors explain the acceptance of mobile phone return programs?

To answer this question we analyze mobile phone return programs and their accomplishments from various countries. The theoretical basis is provided by a modified version of the Technology Acceptance Model (TAM) [7]. We assess the possibility to transfer the factors of TAM to explain acceptance of mobile phone return programs. Results of this study can help to enhance future projects and thereby increase sustaining valuable resources.

2. RELATED RESEARCH

2.1 Recycling and Return Programs
For this paper, the term "return program" takes all actions into account where mobile phones can be returned to ensure reuse or their proper recycling. Mobile phone return programs have different scopes, time frames, execution models and participating groups, e.g. ranging from charity events to bridging information and awareness for resources programs.

Although electronic waste recycling is a relatively new issue that evolved over the past years, research on determining the operative factors for recycling programs started in the 1980s and 1990s [12] [37]. According to [12], the success of return programs depends much on the policies chosen, how they are selected, and how they are implemented. Lacking knowledge is seen as one important barrier that prevents the separation of waste [5]. [17] summarize results of previous literature and identify the following variables as factors of recycling behavior: extrinsic incentives, intrinsic incentives, internal facilitators, and external facilitators.

Compared to other electronic waste, the recycling chain of mobile phones seems to be especially wedged when it comes to customers returning the mobile phone to any type of take back program (see for example Tanskanen and Butler [28]).

### 2.2 Basis of the Technology Acceptance Model
This paper uses TAM to investigate the acceptance of mobile phone return programs. An adopted model of the Unified Theory

of Acceptance and Use of Technology (UTAUT) provides the theoretical background to increase the expressiveness of our results. The UTAUT was developed by [34] and evolved from previous versions of the original TAM 1 [7] and the later TAM 2 [36] version. The TAM concepts are well-known and widely applied in information systems (IS) research literature, articles of highly rated scientific journals [19] and proceedings of actual IS conferences, for example [18].

Figure 1: Theory of Acceptance and Use of Mobile Phone Return Programs Based on [34]
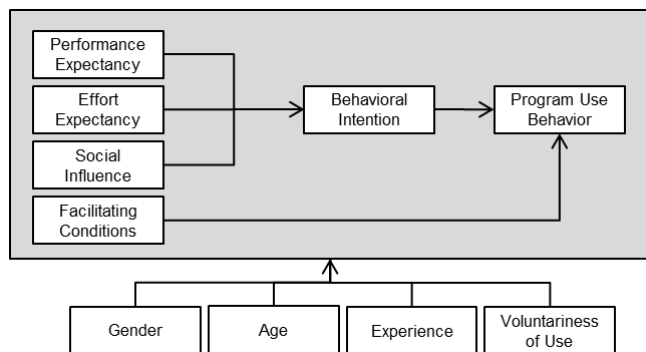
The TAM models describe why people use certain technologies. Their original objective was to explain the acceptance of computer technology. But the concept has proven to be applicable to various IT related topics, e.g. explaining the acceptance of cloud computing [26].
The model can be used both for explanations and forecasts [7]. A characteristic of the model is the high level of abstraction and the consequent low number of model variables.

For our research we apply the latest TAM concept, the UTAUT to the scope of mobile phone return programs.
Based on the original UTAUT the following factors are used to explain the acceptance of mobile phone return programs (see Figure 1) [33]:

- Performance expectancy: The degree to which an individual believes that using the system will help him or her to attain a personal objective, such as environmental protection
- Effort expectancy: The degree of ease associated with the use of the program
- Social influence: The degree to which an individual perceives that important others believe he or she should use the program
- Facilitating conditions: The degree to which an individual believes that an organizational and technical infrastructure exists to support program
- Behavioral intention: The degree to which a person has formulated conscious plans to perform or not perform some specified future behavior

Gender, age, experience, and voluntariness of use serve as moderating variables. They affect the strength of the relation between the independent and the dependent variables [4].

3. METHODOLGY

To answer the research question we use case study research. Case study research is a widely known and accepted research methodology in IS [8]. It generates insights by examining a phenomenon in its usual setting [5].

Case study research can be applied to describe phenomena, test theories or develop new theories and hypotheses [5][9]. This corresponds with the paper's objective to describe the phenomenon of varying acceptance of mobile phone return programs in multiple settings. Case study research employs various data collection methods, such as document and literature analysis, interviews, observations or questionnaires [8]. Our investigation is based on:

- A comprehensive market and media research regarding mobile phone return programs

- An extensive literature research

- An in-depth case study regarding the return program of the Austrian Ö3 Wundertüte (literally: "wonderbag") and two programs of the Deutsche Telekom (German Telekom)

These tasks were performed between October 2011 and Mai 2012. We avoided using a numerical numerical performance rating, instead, we will summarize the results from our case study as recommendations based on the UTAUT-concepts of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. Due to the limitations of case study research our findings demand further validation through quantitative and qualitative research regarding the applicability of UTAUT to explain the acceptance of mobile phone return programs.

4. FINDINGS

The data collected is shown in Table 1, listed by regional and worldwide return programs. We sorted the information by region and initiator, followed by a short description of the return process. We analyzed the programs by comparing the advertisement and effort used to introduce the return program, the year or period it took place and the incentive provided to make the return program attractive to users. The success of the programs was measured by the amount of returned mobile phones.

All European production and network companies take back mobile phones in their shops, as the WEEE directive has been asking since 2003 [39]. Therefore, this option is not explicitly listed in the table.

Charity includes all supportive actions (e.g.donations) for charity or social organizations. Environmental protection accounts to all actions taken to support environmental projects or active organizations.

In general, the governmental run or supported programs in the USA and UK seem to be relatively successful [13] [10], while company-run programs seem to be less effective, regardless of the incentives.

To deepen the comparison and give better implications, programs from two initiators were closer investigated about how the program was set up, and how well their collection of mobile

Table 1. Overview of International Mobile Phone Return Programs

Region	Initiator	Return Process	Incentives	Period	Collected mobile phones in Millions	Reference
Australia	Australian Mobile Telecommunications Association (AMTA)	Different campaigns, e.g. "MobileMuster", school challenges; drop-off points and free mail-ins	Environmental protection / Charity	1998-2011	6.31	Mobilemuster [1] [21]
Austria	Ö3 (federal supported radio station), partnered with Austrian Post, Caritas, Red Cross	Send free mail-in envelopes "Ö3 Wundertüte" ("wonderbags") before Christmas to 270.00 households in Austria; placed return boxes at partner's locations; expanded programs for schools as challenge	Charity / Contests in schools	2005-2012	2.5	Ö3 Radio [24]
UK	British Government; partnered with companies and organizations e.g. BBC	„Regenersis – Fonebak" / UK – very first recycling-program worldwide / Freepost service: customer will get money for the returned phone and select amount to donate (at least £5)	Charity / Money / Voucher for valuable phones	1999-2009	almost 20	Fonebak [13]
USA	EPA (US government Environmental protection agency), partners with retailers and companies	Drop-off and free mail-ins / at US westcoast: ATMs (automatic machines to give out voucher of estimated value)	Content information / environmental protection/ some voucher	2008 2007	11 14	EPA [10]
Germany	T Mobile	Free mail-ins; choice to donate phone or exchange for a shop-voucher / School competitions	Environmental protection / Charity	2009-2012	1.0	T-Mobile [29]
Germany	Vodafone	Company donates money for each returned mobile phone to social organizations in the area where mobile phone was returned / Customer can print out postage return label	Charity	2003-2012	1.0	Vodafone [38]
Germany	NABU (German nature protection coalition); Partner: E-Plus; former partner: Vodafone	Company donates up to 3€ per returned mobile phone for a project of the NABU / 200 collecting locations, free mail-ins (together with Vodafone and other partners)	Environmental protection	2006-2012	0.050	NABU [22]

phones was received: 1) The Austrian "Ö3 Wundertüte" [24] and 2) campaigns by the German Telekom Company [29][30].

1)

In Austria, the return-program supported by a federal run, over-regional radio station called the "Ö3 Wundertüte" has been running since 2005 for every year. The feedback has been very positive, and 2.5 million phones have been returned altogether (respecting that Austria has approx. 8 million inhabitants). Every year in late autumn, right before the advent season, envelopes are sent out to households throughout Austria with the prospect of donating money to two different charity organizations, helping needful people in Austria. For each returned phone a donation is made (three Euro for a functioning phone, 50 Cent for a non-working phone). It is reported that people even call throughout the year and ask whether they will again receive the envelope to send in their phone(s). In 2011, 467.000 mobile phones were collected in 275.000 envelopes.

We called Ö3 for a Telephone-Interview, asking for their practical experience and opinion why the return-program might have achieved a higher return-rate than other actions in other countries. Here, we summarize their opinion:

- Partners: They partnered with non-profit institutions well known for their reliability and trustworthiness and non-scandalous history

- Objective: The collection was primarily not communicated as a PR-activity but always made a point in being a charity-program; it was also visible and clear where the donations went

- Running-time: They established and strengthened seriousness though the long-term nature of the call by being not only a single action but continuously running over a long time

- Reachability: Austria has the advantage of having an over-regional, country-wide radio station that reaches up to 2.8 million people per day

- Content: the content of the topic (especially social and ecologic aspects) became part of the radio-program ("educated" the listeners)

2)

The German Telekom Company has been spending an extensive amount of resources in investigating the relatively low amount of returned mobile phones for many years [30]. Recently, they also launched a marketing research investigated the knowledge base (need of separate disposal of mobile phones for

preservation of resources) in German households. Here, we included two of their prominent take-back campaigns in our paper:

- Winning game (raffle for 5 cars), year 2010: collected 62.000 mobile phones in 3 months (total 2010 collected: approx. 200,000)

- Charity event (donation for children), year 2011: collected 585,700 mobile phones in 3 months (total 2011 collected: 762,000)

These are only two of recent German campaigns, but they seem to undermine the trend that we believe to see: the most effective activity has been the medial attentive and widely advertised activity in 2011 with a prominent German entertainer for a well-known children donation project.

From the second campaign, we can draw some similar conclusions as success factors compared to the activities in Austria. The second program included in our analysis was clearly marked as a charity event, even though coming from a large corporation; an aspect, which might raise some suspicions from people as this is often seen as marketing activity. However, it was made clear where the donations went (a quite well known charity organization in Germany). Furthermore, the corporation chose a set or media known of reaching quite a large part of the German population. Therefore the setting is close to the Austrian case, even though the campaign was embedded in a different country-specific situation.

In terms of educational measures supporting the campaign as seen in Austria, both activities in Germany did not really include such communication efforts. The content of the topic, such as environmental effects of mobile phone production, use and recycling, was presented to a limited extend; information about these issues was included but no deeper explanation of the whole picture of sustainability and mobile phones. This, however, would not have been the type of information and in-depth content suitable for the media chosen in both campaigns – thus, the content was quite fitting for the chosen communication channels.

Another aspect which was not discussed in the Austrian case but which we see as quite important in the German campaigns was the selection of take-back channels and possibilities for people interested in participating. Both German campaigns provided tools for returning the mobile phone as easy as possible, including special postal envelops, which could be returned free of charge and with as little effort as possible. In our research underlying this paper, we found some articles discussing this aspect as quite important for such campaigns to succeed.

5. IMPLICATIONS

Summarizing the results to promote recommendations for return-programs, we would like to stress that no single factor accounts for a successful program. Rather, a combination of proposed conditions appears to be the key.

Here, we give an overview of aspects that seem to have influenced the investigated worldwide programs, concentrating on the two further investigated programs in Austria and Germany, and referring the results to the UTAUT measures. An overview of all identified success factors can be seen in table 2 below, the most important ones being explained in the following paragraphs.

- **Performance expectancy**: Charity objectives seem to have a stronger impact than other intentions (raffle, price-winning for returned phones etc.); also, clear and visible goals are important. Still, programs offering money for returned phones also could have a noticeable influence but only account to newer mobile phones that can still be used and therefore rather support the category of re-use, which is not the topic of our investigation.

- **Effort expectancy**: minimum effort seems to be the key factor in this category, so that no cost or extra-ways arise and participating people can easily drop off or mail in their mobile phones. E.g. free envelopes sent to households showed a reasonable positive impact. Still, one of the German campaigns showed clearly that this factor is indeed important but not sufficient on its own for a successful campaign.

- **Facilitating Conditions**: Reliable and trustworthy partner: The fact that governmental or non-profit organizations and well-known NGO's were involved seemed to have a positive impact. In general, governmental supported actions seemed to run well, implicating that a legal and trustworthy factor might also be one of the key factors in these programs. It seems to influence people that reliable partner reduce the chance of misconduct of their mobile phones; trustworthy partner seemed to give a certainty that the mobile phones get treated correctly (e.g.in terms of possible deletion of private content as well as being sent to reliable recycling processes and not being sold to deceptive businesses, nor making money in any way with it). This way, the program does not have the character of a business or selling program but rather a trustworthy idea with a clear incentive.

- **Social Influence**: The image of the initiator and their partners seem to influence people's decision in returning their mobile phones. Therefore, an activity initiated by a large corporation might get a less positive reaction than one initiated by a local radio station, as included here in this paper (see facilitating conditions).

Table 2. Measures Influencing the Return Program Acceptance Factors; in bold the seemingly most inductive factors

Performance Expectancy	Effort Expectancy	Social Influence	Facilitating Conditions
• **Donations to charity** • Vouchers or money for returned phone • Games/competitive character • Verifiable environmental protection measures (e.g. planting trees)	• **Minimizing the effort** in terms of time and costs for using a return program (e.g. free mail ins, return boxes at favorite and frequented locations, pick-up services) • Enabling easy ways to save and delete own data from mobile phones	• **Image of the initiator** • Raising awareness in groups (e.g. school competitions, social media networks) • Testimonials (e.g. people from politics, culture and sports)	• **Trust in the initiator** of the program by high levels of transparency • Providing information and knowledge on why, where, how, when (e.g. TV, radio, internet ads)

6. CONCLUSION

By combing the UTAUT theory with the investigated case studies we can assign different measures to specific factors of technology acceptance (see Table 2). This provides decision makers with a structured overview of possible measure to successfully implement mobile phone return programs. Researchers can use the model, included in this paper and extended by the identified success factors, to evaluate return programs and to determine drivers and barriers of adoption. Depending on the context (country, target group, duration of the campaign, etc.) some of the identified factors here can take a more prominent role than others. This may change according to the different campaigns, therefore, there is no universal "check list" for setting up a successful mobile phone return program. Still, based on the results from this paper, we can recommend taking into account these findings and applying them according to the characteristics of the defined target group.

In order to refine the recommendations deducted from the model and its aligned success factors, needing more research, the model can be further developed and refined for explaining and understanding human behavior in terms of responding to such campaigns and changing their behavior accordingly. Such campaigns in this context of mobile phone recycling are just starting, thus, more empirical data is needed besides the theoretical background gathered for this paper.

Therefore, to refine the results from our research so far, our future research will follow these next steps:

- In depth case studies and continuing expert interviews
- Small and large scale surveys with users and non-users of mobile phone return programs

Given the rising prices for rare materials and the increasing awareness regarding environmental protection, the topic of mobile phone recycling is destined to gain more importance in the future. Hence, related concepts and measures have an increased relevance for policy makers, practitioners, and researchers. Here, again, it is important to design, implement and evaluate respective campaigns successfully in order to reach expected outcomes and behavioral changes and avoid wasting resources. This paper is a first tentative step towards such concept for both designing a successful campaign and evaluating it for further improvements in this context.

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