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Investigating Employees' Intentions to Extend the Lifespan of Portable Electronics

Using the Theory of Planned Behavior to Predict Intentions to Act Pro-Environmentally in a Public Organization

Master's thesis in Management and Economics of Innovation

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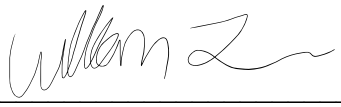

William Zingmark – June 2022

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Abstract

The pressure on organizations to become sustainable is increasing as the matter of sustainability grows in urgency. While there has been focus on how organizations can make the transition to more sustainable business models, there has not been as much focus on how an organization can influence its employees' intention to contribute to a more sustainable workplace. In addition, E-waste is the fastest growing source of waste in the world. Therefore, this study had the aim to unravel which factors influence employees' intentions to contribute to extending the lifespan of portable electronics in a public organization, and by that also research pro-environmental behavior (PEB). This was achieved by applying the theory of planned behavior (TPB) as well as adding a construct labeled exemplary environmental leadership (EEL). Thus, the factors researched in this study to evaluate the intentions of employees were attitudes, subjective norms, perceived behavioral control (PBC) and EEL. A survey was conducted at Göteborgs Stad where the mentioned factors and intentions were measured, which yielded 524 answers (i.e., a response rate of 26.7%). Furthermore, a multiple regression model was used to identify which of these factors and to what degree they had a significant impact on the intentions to contribute to extending the lifespan of portable electronics. The regression analysis indicated that attitudes and subjective norms had significant impact on intentions, while PBC and EEL had not. Attitudes was concluded to have the strongest effect, followed by subjective norms. Based on this, implications for improving intentions regarding extending the lifespan of portable electronics at workplaces were presented.

Keywords: *Sustainability, E-waste, Pro-environmental behavior, Portable electronics, Theory of planned behavior, Public organizations.*

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1.Introduction

The introduction consists of a background, with an overview of relevant subjects and motivation for the research topic, in combination with a discussion of the research gap. Furthermore, the reports' aim and limitations as well as the problem statement with resulting research questions will be presented.

1.1 Background

The urgency for organizations to act sustainable is becoming increasingly important (Haanaes, 2016) and according to the EU (European Council, 2021), fighting climate change is imperative worldwide. A major problem for reaching sustainability is the number of new products that are being produced and later turn into waste. This waste is a function of industries' production and peoples' consumption patterns and the increasing number of products in the market leads to additional waste (European Environment Agency, 2021). Positively, a decreasing amount of waste is however ending up in landfills and are instead being seen as a resource. To visualize this, the EU has adopted the *Waste hierarchy*, which is depicted as an upside-down triangle (figure 1) that ranks different initiatives according to their degree of sustainable positive impact, where waste prevention is the most favorable option (European Commission, n.d.-a). However, it is not always possible for everyone and everywhere to prevent waste, and thus, other types of initiatives are also presented, such as re-use, recycling (where composting is included), energy recovery and lastly waste disposal to landfills.

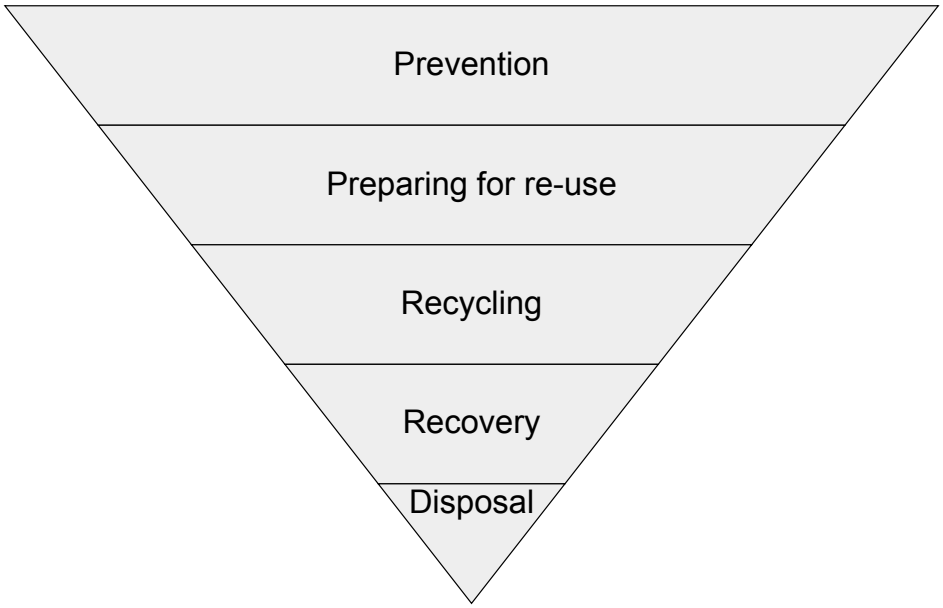

Figure 1. An adoption of the waste hierarchy as depicted by the EU, presenting the different initiatives on how to manage waste (European Commission, n.d.-b).

A particular type of waste that has received attention in society is electronic waste (e-waste), which is defined as waste from "a broad and growing range of electronic devices ranging from

large household appliances such as refrigerators, air conditioners, hand-held cellular phones, personal stereos, and consumer electronics to computers" (Puckett & Smith, 2002, p. 5). According to the authors, this type of waste has become problematic because of two reasons; the first being that it is hazardous and can cause serious harm to both the environment and human health if not managed properly (Geneva Environment Network, 2021), and the second being the fast rate at which it is increasing, i.e., it is now the fastest increasing waste in the world (TCO Certified, n.d.). E-waste does also have a severe effect on climate change (Geneva Environment Network, 2021). Every product produced derives a carbon footprint, and by considering all carbon dioxide emissions stemming from an electronic product during its lifespan, its overall impact on human-caused global warming is evident. Furthermore, according to Forti et al., (2020), e-waste is increasing faster than predicted and was in 2019 measured to 53.6 million tons worldwide. Thus, to conclude this section, there are environmental incentives to take better care of electronics to prevent e-waste.

1.1.1 Extending the Lifespan of Portable Electronics

An efficient and direct measure to prevent and reduce the amount of e-waste is to extend the lifespan of electronics (Atea Sustainability Focus, 2022). This initiative is a way to capture the full intrinsic value of IT and optimize return of the investments, thus yielding economic benefits as well, since the amount of electronics that need to be acquired decreases. It is claimed in Atea Sustainability Focus (2022, p. 8) that "extending the lifespan of products and components is the one action that most likely will lead to the biggest reductions of emissions and resource consumption, including minerals and metals, water and energy".

Furthermore, according to Prakash et al. (2020), electronic equipment is responsible for a considerable impact on the climate, which is mainly because of two reasons. The first being the increasing number of products that are being produced and sold, and the second being the short usage times that are observed. The authors argue that "increasing numbers of electrical and electronic appliances are being replaced although they are still in working order" (Prakash et al., 2020, p. 5) and claim that this is mainly because of a desire to own something better. Likewise, Crafoord et al., (2018) also argue that the lifespan of both consumers' and professionals' electronics are becoming shorter, since individuals tend to replace the products regularly. The authors thus state that extending the lifespan of the electronics can yield considerable benefits to the environment. In a similar manner, Gåvertsson et al. (2020) stress on the importance of extending the lifespan and use of electronics, because of the increasing utilization of natural resources that are necessary for the manufacturing of electronics and the resulting increase of electronic waste.

Another fact that motivates the importance of extending the lifespan of electronics, and specifically laptops, is that about 80% of the carbon footprint of a laptop stems from the activities prior to the point of sale (Atea Sustainability Focus, 2022). Both Prakash et al., (2012) and EBB (2019) agree that the none-use phase contributes to a majority of the greenhouse gas emissions during the lifespan of laptops and smartphones (and it is assumed in this report that it should be the same for tablets as well). Furthermore, taking the perspective of global warming

and the time it takes to compensate for the none-use phase's greenhouse gas emissions, it is always beneficial to extend the lifespan of these electronics (EBB, 2019). According to the source, this is because exchanging a device consumes resources, as well as new units consuming more energy than their predecessors. Extending the lifespan, and by doing that, delaying the production of a new electronic, is thus clearly beneficial from an environmental perspective (Atea Sustainability Focus, 2022).

Furthermore, EBB (2019) illustrates why the extension of electronics' lifespan, especially laptops and smartphones, is important. According to the report, a one-year extension of the lifespan of all laptops (beyond the set 5-year lifespan) and smartphones (beyond the set 3-year lifespan) in the EU would save 1.6 megatons and 2.1 megatons CO_2 per year respectively by 2030. These CO_2 savings correspond to removing 870 000 cars from the road for laptops and for smartphones, this number would amount to over one million cars. From the above arguments, it could therefore be argued that using one's electronics, e.g., smartphones, laptops or tablets, longer, will subdue the climate impact, as well as yield economic incentives in the form of cost savings to organizations.

1.1.2 Employees' Engagement in Sustainability Initiatives

Corporations are acknowledging their responsibility in working towards a sustainable society (Lozano, 2013) and thus it could be argued that succeeding with sustainable initiatives in organizations is imperative. However, to succeed with sustainability initiatives, such as minimizing waste, and increasing the performance of the initiatives, there is a need to focus on employees' engagement in such activities, and in particular the voluntary participation is an important factor to succeed in implementing green initiatives (Yuriev et al., 2018). Lamm et al. (2013) agrees with this and states that whether an organization's sustainability ventures will succeed is highly influenced by individual employees' efforts. The authors further state that these kinds of sustainable efforts are cumulative and that even smaller endeavors, e.g., double-sided printing, can in the end largely affect both environmental impact and limit organizations' resource use. Stern (2000) concur by stating that even though a single individual's actions can seem small, the impact of them will be considerable in aggregate.

In the same line of argument, Sawang and Kivits (2014) state that while looking to implement environmental initiatives, the level of adoption by employees of the initiatives needs to be considered. Moreover, Daily et al. (2009) argue that individuals voluntary engagement in environmental initiatives correlates positively with environmental performance. In relation to this, Koger and Scott (2016) claim that lack of focus on the psychological and motivational part of employees' environmental sustainability efforts might hinder such initiatives. In particular, the authors argue that the environmental problem might be seen as a behavioral problem since a large proportion of the blame for the environmental crisis can be directed towards consumption which in turn is a result of behavior.

1.1.3 Pro-Environmental Behavior and the Theory of Planned Behavior

A notion that can be attributed to the argument that individual effort is important for sustainable initiatives to succeed is pro-environmental behavior (PEB), which is defined as a behavior that limits the negative impact of individuals' actions on the environment (Stern, 2000). Further, in order to acknowledge factors that might ignite pro-environmental behavior, the theory of planned behavior (TPB) is useful and has been applied in several studies that have researched different forms of pro-environmental behavior (e.g., Blok et al., 2015; Blok et al., 2017; Bouarar & Mouloudj, 2021, Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013, Lopes et al., 2019). TPB is a psychological model that predicts behavior from intention (and to some extent also perceived behavioral control [PBC]), which in turn is a mediator for the relationship between behavior and the three constructs: attitudes, subjective norms and PBC (Ajzen, 1991). Both PEB and TPB will be further explained in the literature chapter.

Although several studies have evaluated and tried to explain pro-environmental behavior through the lens of TPB (Blok et al., 2015; Blok et al., 2017; Bouarar & Mouloudj, 2021, Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013, Lopes et al., 2019), there is still a need to extend this field of study. To begin with, these studies have been conducted under certain contexts and adding a study within a different context would thus be interesting. In particular this has, to the author's knowledge, not been done in a larger public organization in Sweden. Further, Bouarar & Mouloudj (2021, p. 655) also recommends future research to "focus on particular practices, such as conserving energy, water, or paper in the workplace". This study is aiming to look at how this applies to the initiative of extending the lifespan of portable electronics and thus aims to take on the future research claim of Bouarar & Mouloudj (2021). Similar to other studies on this matter (e.g., Bouarar and Mouloudj (2021) studied environmental knowledge as an additional factor within the TPB), an additional factor will be included into the TPB in this report, to increase the explanatory power of the theory. Thus, it will be an addition to the field of study and assist in developing the TPB.

1.2 Purpose and Research Questions

The aim of this study is to provide insights on what factors that make employees intend to contribute to reducing e-waste by extending the lifespan of portable electronics in a public organization through environmental handling and management of the devices. In particular, this study will point out the specific factors that make individuals intend to behave pro-environmentally with regards to the electronics they have been provided by their employer. Furthermore, the study will also contribute with managerial insights on where an organization should focus its resources and actions in order to maximize the returns of an initiative looking to extend the lifespan of portable electronics. Hereafter, the notion of extending the lifespan of portable electronics in the organization through environmental handling and management by the employees will be referred to merely as extending the lifespan of portable electronics. With regards to this, the two following research questions have been formulated:

- *What are the factors that influence the intentions of employees at a public organization to engage in behaviors to extend the lifespan of portable electronics provided to them by the organization?*
- *To what degree do these factors influence the intentions of employees at a public organization to engage in behaviors to extend the lifespan of portable electronics provided to them by the organization?*

1.3 Limitations & Delimitations

This report will be limited to only consider the management of smartphones, laptops and tablets, in this report referred to only as portable electronics. It will also be limited to only consider employees that work for a committee and who are not at a managerial level, since the report will take into consideration employees' views on their managers. Furthermore, because of time constraints, the report will not try to cover and study all possible factors that can affect the intentions of employees at a public organization to engage in behaviors to extend the lifespan of portable electronics provided to them by the organization. Instead, the factors will be based on the literature and cover a reasonable, in relation to the time constraint, set of factors that is expected to influence such intentions. Lastly, the study will only consider a single case organization, namely Göteborgs Stad. This might affect the generalizability of the study onto other organizations, mainly because of contextual factors.

1.4 Disposition

The next chapter will contain a literature review, with consequential hypotheses, followed by the methodology chapter, explaining how the study was conducted. In the subsequent chapter, the results will be presented, and a discussion of the results and practical implications will follow this. Lastly, a conclusion is presented.

2.Literature

The literature chapter will consist of theory regarding public organizations, sustainable handling and management of electronics to extend its lifespan and pro-environmental behavior. Furthermore, the theory of planned behavior and its qualities will be discussed, an additive extension of the theory will be presented, and from this, the hypotheses of the study will be synthesized to a conceptual framework.

2.1 Public Organizations

Hugrée et al. (2015) show in their study that there are differences between the public and private sector with regards to several factors, and in particular with respect to the employees working in these organizations. The authors claim that working in the public sector creates some specific characteristics regarding relationships with the state, public interest, or even public life.

One phenomenon that distinguishes employees at a public organization is the concept of *public service motivation* (PSM). Stritch and Christensen (2016) mentions several definitions of PSM and the most fundamental of them is from Perry and Wise (1990, p. 368): "an individual's predisposition to respond to motives grounded primarily or uniquely in public institutions and organizations". Another definition is taken from Rainey (2009), who describes PSM as the ethic that makes people want to work and serve the public. There are additional definitions of PSM and the subject has received attention from academia (Stritch & Christensen, 2016).

Furthermore, regarding the organizational setting, Rainey (2014) points to previous research in academia that often fails to find distinctive differences between private and public organizations. For instance, studies of variables such as size, task, and technology in government agencies show that these variables are more responsible for the characteristics of the organization, rather than the mode of ownership. For example, a private-owned versus publicly-owned hospital have many similarities, and are in general more similar than a private-owned school and a private-owned dentist.

Moreover, since there seem to be larger differences between organizations with different scopes than their ownership mode, a brief evaluation of the concept of municipalities will be presented. According to Britannica (1998), a municipality is a "political subdivision of a state within which a municipal corporation has been established to provide general local government for a specific population concentration in a defined area". These kinds of organizations are organized under constitution and laws, which are in general formed by the government. The power inside the municipality is exercised through a governing body, which in turn are elected by the people living in the municipality. In broad terms, a municipality can be looked at as a function that provides public services that are not provided by the national governments in the area.

2.2 Sustainable Management of Electronics to Extend their Lifespan

As stated in the previous chapter, extending the lifespan of electronics is a way to make electronics more sustainable. However, there are reasons why electronics are being replaced prematurely and thus mitigates initiatives to extend the lifespan of the products. In particular, smartphones are often replaced prematurely because of three reasons (Cordella et al., 2021). Firstly, they are replaced because of socioeconomic reasons, which could be that the buyer basically fancies a new or the latest model or upgrade. The second reason is because of misuse of the user, while the third and last reason is because of technical problems. This could for example be problems related to the battery, display or back cover, but also software. The authors continue by stating that to avoid replacing old but still functioning smartphones, a way is to educate consumers and provide them with information that is reliable, understandable and relevant for using, maintaining and repairing smartphones.

There are differing opinions on how to manage electronic devices in a sustainable way to make sure that they last longer, especially regarding how to charge them (Griffith, 2021). The best handling of electronics depends on the battery they contain (Battery University, 2021a), and the most used battery type in electronic devices today is the lithium-ion battery (Sofeast, n.d.). The best way to extend the lifespan of these batteries is to keep the battery percentage at about 30-80%, keep the battery cool and avoid using chargers that are said to charge fast (*ultra-fast charging*) (Battery University, 2021a). However, there is more consensus regarding managing the electronics as a whole. These practices include keeping the electronics clean (Chen, 2020; Tavin, 2021), protect them using cases and screen protectors (Chen, 2020); Tavin, 2021) and shutting the electronics down (mainly computers) when not in use (Omega Computer Services, 2019; University of Michigan, n.d.).

Additionally, the more an electronic device is used, the worse it becomes, especially the battery. As a result of high temperatures and aging, the battery's performance decreases with time and although manufacturers sometimes state that a battery should be replaced after a certain amount of time, this can vary greatly, since they usually do not account for varying usage (Battery University, 2021b). Batteries can fail within this timeframe because of heavy usage of the electronics or conditions of high temperature. It could therefore be argued that extensive usage of electronics will make them worse and degrade the battery faster.

2.3 Pro-Environmental Behavior in Workplaces

Pro-environmental behavior (PEB) is an "umbrella concept describing a variety of actions directed toward the environment" (Boiral et al., 2015, p. 19). As noted in the Introduction, Stern (2000) defines it as a behavior that intentionally limits the negative impact of individuals' actions on the environment. Boiral et al. (2015) further presents some examples on how variations of this concept have been used in literature. For instance, Ramus and Steger (2000) study *eco-innovations*, Andersson and Bateman (2000) study *individual environmental*

initiatives while Lamm et al. (2013) study *behaviors directed toward the environment*. There are several additional examples of similar concepts, but Boiral et al. (2015) argue that, even if they have been used in different contexts, they all describe the same phenomena.

Moreover, inside the workplace, Ones and Dilchert (2012) categorizes PEB into several categories: working sustainably by e.g., monitoring environmental impact, avoiding harm by e.g., preventing pollution, conserving by e.g., reusing or recycling, influencing others and also taking initiatives, by e.g., initiating programs and policies. Further, Andersson et al. (2005) claim that determinants of pro-environmental behavior that occur inside organizations are different compared to other types of pro-environmental behavior. A reason for this could for instance be that employees are typically not concerned about e.g., the energy-usage in the workplace since they do not pay for the energy themselves, as they do in their own households (Chen & Chen, 2021; Siero et al. 1996). The same could be argued in other settings as well. As a result of the difference between PEB within organizations and in private settings, it is interesting to study this concept in the context of behaviors within an organization.

In relation to the previously described notion of the importance that employees are motivated and engaged for an initiative to be successful, it can be reasoned that if an individual is prone to engage in pro-environmental behavior, it is also likely that the same individual will be responsive and adapt to sustainability initiatives implemented in the workplace, for instance the initiative of extending the lifespan of portable electronics.

2.4 Theory of Planned Behavior

To understand what influences employees' behavior, the theory of planned behavior (TPB) is useful (Ajzen, 1991). The TPB was developed from the theory of reasoned action (TRA), which had the preposition that humans always have volitional control of their behavior (Ajzen, 2002). In TRA, behavior is predicted from behavioral intentions, which in turn is formed from an individual's subjective norms and attitude towards a behavior (Kuhl & Beckmann, 1985). Thus, according to Ajzen (2005, p. 100), "barring unforeseen events, people are expected to do what they intend to do" and the author also states that as long as a behavior is under volitional control, intention is a good predictor of performance of a behavior.

2.4.1 Intention–Behavior Discrepancies

However, even though research has shown that intentions can predict behavior to a high extent, it has also revealed low correlation between the two concepts and some discrepancies between intentions and behavior have been uncovered (Ajzen, 2005). The first one is *intention–behavior incompatibility* (Ajzen, 2005, p. 101), which states that the intentions and behaviors that are measured are not compatible. For example, the intention to exercise (a broad category of behavior) is not a good predictor of lifting weights (an instance of the behavioral category). Instead, better results are gained by measuring the intentions to engage in the specific exercise, e.g., lifting weights.

The second discrepancy is the *stability of intentions*, for example that intentions vary over time and the longer time that passes, the more likely are the intentions to change because of an unforeseen event or that an individual might have uncertain intentions of what to do. An example of this discrepancy is when deciding who to vote for in an election. An individual might have the intention to vote for a specific candidate, but some time before casting the vote, the individual learns that the politician has been in a scandal or stands for something that contradicts the individual's standpoint and as a result, the intention to vote for the politician might change. Thus, what usually decides the behavior is the most recent intentions.

The last discrepancy that Ajzen, (2005, p. 104) states is that "people say they will do one thing yet do something else", which the author calls *literal inconsistency*. However, the pattern of this discrepancy is usually and somewhat asymmetric, i.e., that individuals who have no intention of engaging in a behavior usually follow this intention, while individuals who say they will engage in a behavior might or might not follow this intention. It is clear that the first two discrepancies are related to the chosen research method and its execution. However, the third is a function of the individual and could thus probably not be minimized by executing the research in a better way or by choosing a better research approach.

2.4.2 From the Theory of Reasoned Action to the Theory of Planned Behavior

Not surprisingly though, individuals might not always have complete volitional control over a specific behavior (Ajzen, 2005). An example of this is the behavior of driving one's car to a store. This might be obstructed by engine failure or other car problems, thus making the behavior to drive the car to a store beyond one's volitional control. Therefore, to improve the predictive power of behavior both when an individual has and not has volitional control, intention could be complemented by taking into account the degree of actual control the individual has over performing a behavior (Ajzen, 2005). This means that if the actual control is higher, the effect of intention on behavior will also be higher. The author continues though, by stating that it is complicated and not clear what actual control over a behavior means or how it can be assessed. Some factors could possibly be measured, but mostly, there is a lack of information on all factors that may hinder or facilitate a behavior. Although, Ajzen, (2005, p. 112) makes up for this by arguing that "it is possible that people's perceptions of the extent to which they have control over a behavior quite accurately reflect their actual control", and this perception is labeled perceived behavioral control (PBC). PBC can thus be seen as a proxy for actual control to better improve behavioral prediction (Ajzen, 2002).

It is expected that the PBC will encompass some of the realistic and actual inhibitions that exist (Ajzen, 2005). However, PBC can be more or less of a behavioral predictor depending on the situation. When volitional control is high, intentions itself are a good predictor of behavior and the inclusion of PBC might only make the prediction a bit better, if any. Although, when there is low volitional control, PBC can be a relevant addition in explaining variance to predict behavior.

Consequently, the TPB was created as an extension of the TRA to encompass the non-volitional control of individuals by adding the construct of PBC to the model. In both TPB and TRA there are assumptions (Ajzen, 2005). These include that individuals generally behave in a reasonable manner, take account of information available to them and are able to, either explicitly or implicitly, "consider the implications of their actions" (Ajzen, 2005, p. 117). Given these assumptions, the TPB proposes that intention is the foremost immediate predictor of performing or not performing a behavior.

2.4.3 Elements of the Theory of Planned Behavior

The TPB states that behavior and intentions are dependent on three elements (Ajzen, 2005). One is of personal nature, while the other takes into account influence from the social context and the last encompasses the subject of control. The first is labeled *attitude towards a behavior*, the second *subjective norms* and the third is the construct called *perceived behavioral control* (see figure 2). Consequently, according to the theory, an individual will have the intention to perform a behavior when they judge the behavior to be beneficial, when they think that their social surroundings will acknowledge it and when they believe they can do it.

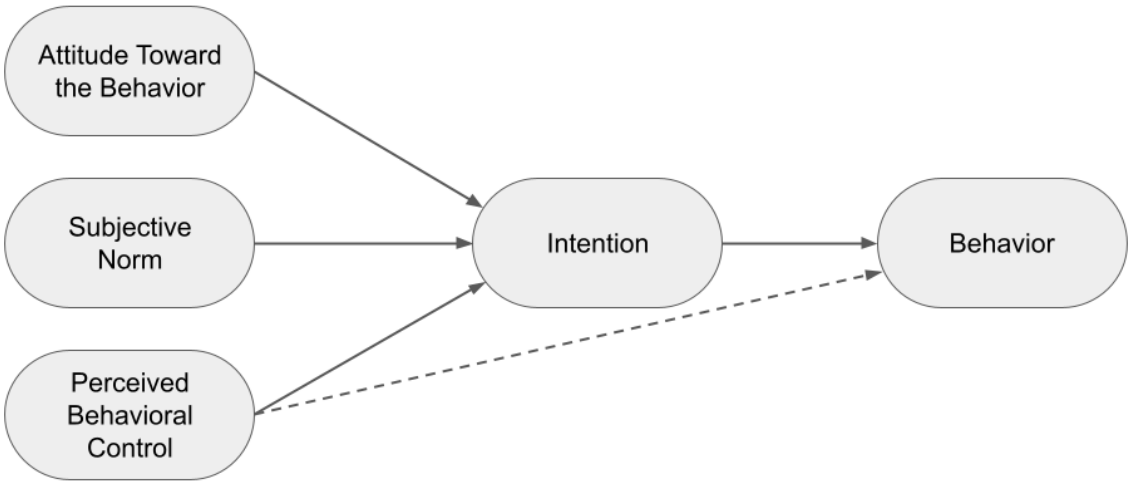

Figure 2. A depiction of the theory of planned behavior, adapted from Ajzen (1991). The dotted line between PBC and behavior illustrates the direct effect PBC can have on behavior.

However, depending on the application and the intention that is being investigated, the three constructs might have differing importance (Ajzen, 1991, Ajzen, 2005). Sometimes, only one or two constructs might be sufficient to predict the intention, while in other applications, the three constructs independently have considerable influence on intentions. It could therefore be argued that researching intentions in different contexts or different (intentional) behaviors is interesting from a research perspective, since it will broaden the foundation of predicting behavior in various situations. Furthermore, Ajzen (2005) claims that a high score in one factor can compensate for lower scores in other factors. For instance, people might conduct a given behavior if they feel social pressure to do so, even if they do not feel that they want to do it.

Thus, it is also interesting from a research perspective to measure the strength of a factor, and not only measure if it has a significant impact on the intention or behavior.

2.4.4 Prior Research and Extensions of the Theory of Planned Behavior

Prior research has used TPB to analyze environmental intentions and sometimes resulting behavior on employees based on these, as well as including additional predictive constructs into the model (Blok et al. 2015; Blok et al. 2017, Bouarar & Mouloudj, 2021; Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013; Lopes et al., 2019). However, some researchers have found that intentions cannot fully explain the variance in behavior (Bamberg & Möser, 2007). Although, Liu et al. (2020, p. 1) counteracts this in their study and conclude that "environmental behavioral intentions have a significant positive effect on pro-environmental behaviors". In addition, Sommer (2011) states that TPB is a highly supported social psychological theory and claims that TPB has proved to be an effective tool to predict and explain human behavior. For instance, Elliot et al. (2003) showed how the invention to drive according to the speed limits were positively correlated with the corresponding behavior, and further Ajzen (2005) mentions several other articles that have shown the link between intentions and behavior. Lastly, Blok et al. (2015) concludes from their study that pro-environmental behavior in a workplace setting can be explained by the TPB. The authors also argue that "intention to act is the most significant factor to determine PEB in the workplace" and "is an important driver for actual behavior in general" (Blok et al., 2015, p. 61).

Moreover, another way to counteract this critique of TPB and to increase its explanatory power is to add additional constructs to the model. Sommer (2011, p. 1) claims that "while the main elements of the theory [i.e., TPB] are generally accepted, it has been suggested at many occasions that the model would benefit by the inclusion of more constructs in terms of 'explanatory quality'". This has been done in many studies where authors have been including additional constructs with the aim of achieving a higher explanation power of behavior (Blok et al. 2015; Blok et al. 2017, Bouarar & Mouloudj, 2021; Gao et al., 2017; Lopes et al., 2019). Finally, Blok et al. (2017) adds a notion that TPB must be adjusted to the context where it is applied, which implies that additional factors might be important to add. Therefore, the additional generated construct of *exemplary environmental leadership* will be further researched, developed and tested in this study. This construct will further be evaluated in section 2.5.4.

2.5 Antecedents of Behavioral Intentions

Since it is important to understand what affects the intentions of people in order to alter them, the antecedents to behavioral intentions, i.e., attitudes towards behavior, subjective norms and PBC, will be further explained below. Also, the construct of exemplary environmental leadership will be presented as an additional, possible, antecedent to behavioral intentions.

2.5.1 Attitudes Towards the Behavior

The first construct in the framework of TPB is attitudes towards the behavior. This, according to Ajzen (1991), can be referred to as the degree a person believes that a given behavior is favorable or unfavorable, i.e., it is an individual's subjective view (Chen & Chen, 2021). Ajzen (1985) further states that it can be described as the person's evaluation of performing the behavior in question, which can be positive or negative. Consequently, the more an individual's attitude is favorable towards a behavior, the more likely and stronger the intention should be to perform that behavior (Ajzen, 1991), or as Unsworth et al. (2013, p. 213) puts it, attitudes decide "whether you think it [i.e., the behavior] is a good thing to do".

Another important issue regarding attitudes is to distinguish it from personal traits (Ajzen, 2005). Although both terms relate to latent, hypothetical constructs, they differ in their scope of predicting behavior. Attitudes in this context are evaluative and usually refer to a given, single object. In contrast, personal traits are not by definition measurable and usually predict a wider scope of behaviors, and personal traits could thus be used to predict behaviors in several domains. Further, it is granted that attitudes in general are more subject to change compared to personal traits. Attitudes can alter in a quick manner when new information is presented and interpreted while personal traits are expected to remain more stable. Finally, an important note to acknowledge regarding attitudes is that it is necessary to define the attitudes with regard to a specific behavior and not attitudes onto general behaviors. This is also the reason why the construct is called attitudes *towards* a behavior. According to Ajzen (2005), the predictability of attitudes is drastically decreasing if the attitudes are defined too broadly and unspecifically.

Further, Ajzen (2005) presents antecedents of attitudes, i.e., the factors that explain why people hold certain attitudes. These are defined as behavioral beliefs and describe the beliefs about the consequences that the behavior might lead to. The attitude towards behavior is a function of the individual's beliefs about the outcomes associated with the behavior and the strength of these associations. For instance, Ajzen (2005, p. 123) claims that if a person believes that "going on a low sodium diet reduces blood pressure", this will impact the persons' attitude towards certain types of food that contain sodium. In that way, a person's attitude to eating food that possesses sodium is formed by the belief that going on a low sodium diet reduces blood pressure.

Moreover, Ajzen (2005) points out that attitudes is a hypothetical construct which cannot be observed, but instead should be evaluated from measurable responses. The responses should reflect negative or positive evaluations towards the attitude item in question. Further, the application of the theory of planned behavior with the aim of predicting intention or behavior has been done in several studies (Blok et al. 2015; Blok et al. 2017; Bouarar & Mouloudj, 2021; Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013; Lopes et al., 2019). In particular, Blok et al. (2015) studied attitudes related to the intention to act in a pro-environmentally manner in a public organization. The authors claim that attitudes indeed have a strong positive effect on the intention to act pro-environmentally. This is however not replicated in a comparable study by Blok et al. (2017) on a private organization, where attitudes had no

significant effect on the intention to act pro-environmentally. Moreover, Bouarar and Mouloudj (2021) claim that a high level of attitude has a positive relationship towards employee's intention to implement green practices. Furthermore, Chen and Chen (2021) show that a high level of attitude correlates with energy-saving intentions of employees in their workplace. Also, Gao et al. (2017) and Lopes et al. (2019) found similar patterns with regards to energy-saving. Finally, Greaves et al. (2013) claim that a high level of attitude has a positive relationship towards recycling intentions, the intention to switch off the PC when leaving the desk and to use video conferencing in place of travel. Based on above notions, the following hypothesis is proposed:

Hypothesis 1: Employees' attitudes toward extending the lifespan of portable electronics in the workplace is positively correlated with the intention to engage in behaviors that contribute to this.

Attitudes towards extending the lifespan of portable electronics in the workplace is hereafter referred to only as *attitudes*.

2.5.2 Subjective Norms

The second construct in the TPB is subjective norms, which is a social factor (Ajzen, 1991). This construct takes into account the perceived pressure from the social environment, e.g., a workplace setting, to whether it is socially acceptable to perform a specific behavior or not. In other words, individuals are more likely to intend to perform a behavior if they "believe that important others think they should perform it" (Ajzen, 1985, p. 12) or as Unsworth et al. (2013, p. 213) states, subjective norms relate to "whether others think you should do it".

Similarly to the antecedents of attitudes, the antecedents of subjective norms are also a function of beliefs (Ajzen, 2005). However, these kinds of beliefs rather concern what the person believes other people or groups would think about the given behavior and if they would approve or disapprove of it. Some examples of people that could influence a person's behavior through subjective norms are a person's parents, spouse, close friends, coworkers, or if applicable, experts in certain fields. Further, Ajzen (2005) states that the beliefs that antecedents subjective norms are called normative beliefs. In practice, these beliefs work in the following way: If the people that a person usually comply with think that the person should perform a given behavior, it exerts social pressure on that person to perform it. On the contrary, if the people that a person usually does not comply with think that the person should perform a given behavior, it exerts social pressure on that person to not perform it.

Moreover, Ajzen (2005) claims that subjective norms can be measured in a direct manner by asking respondents how likely it is that people in their surroundings would approve or disapprove if they would perform a certain behavior. Furthermore, subjective norms has also been used as a predictor of behavior in several studies (Blok et al. 2017, Bouarar & Mouloudj, 2021; Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013; Lopes et al., 2019). The conclusions on whether subjective norms actually affect the intentions differ among the

mentioned authors. Gao et al. (2017) and Lopes et al. (2019) conclude that subjective norms do not correlate with energy-saving intentions in the workplace, while Chen and Chen (2021) come to the opposite conclusion. Blok et al. (2015) and Blok et al. (2017) conclude that subjective norms actually do correlate with the intention to act in a pro-environmentally manner. This is also supported by Bouarar and Mouloudj (2021) who argue that subjective norms are related to the intention to implement green practices. Finally, Greaves et al. (2013) show how subjective norms have a positive relationship towards recycling intentions, the invention to switch off the PC when leaving the desk and to use video conferencing in place of travel.

As can be concluded by the above notions, the majority of authors have found evidence that subjective norms affects the intention to engage in pro-environmental behaviors. As a result, the following hypothesis has been formulated:

Hypothesis 2: The subjective norms of employees is positively correlated with the intention to engage in behaviors that contribute to extending the lifespan of portable electronics in the workplace.

Intentions to engage in behaviors that contribute to extending the lifespan of portable electronics in the workplace is hereafter mainly referred to only as *intentions*.

2.5.3 Perceived Behavioral Control

The third construct in the TPB is PBC, which refers to the perceived difficulty or ease of an individual of conducting a behavior (Ajzen, 1991). As previously mentioned, the construct was introduced in the TPB to take the nonvolitional elements of behaviors into account (Ajzen, 2002). Thus, if an individual experiences high levels of PBC towards a behavior, it should enhance the individual's intentions, as well as the effort, to execute it. PBC is also said to be a consequence of past experience as well as future expected obstacles or impediments that could appear when trying to perform the behavior (Ajzen, 1991). Thus, perceived behavioral control can in other words be defined as "whether you think you can do it" (Unsworth et al., 2013, p. 213).

Regarding antecedents to perceived behavioral control, these can be said to be functions of beliefs, and are called control beliefs (Ajzen, 2005). These beliefs are constituted by presence or absence of factors that might hinder or facilitate the performance of the behavior. The root of these beliefs can be from past experience, second-hand information about the behavior, by observing others that conduct the behavior, and possibly other factors that might affect it. If a person believes that they possess the required resources and is presented with opportunities to conduct the behavior, it is more likely that the person follows it through. Similarly, absence of hindrances to conduct the behavior will also make it more likely that the person follows it through. Thus, Ajzen (2005) states that beliefs about resources and opportunities can be defined as the antecedents of perceived behavioral control. However, when there is little information

in relation to the behavior, when unfamiliar or unforeseen aspects have become apparent or when the resources or prerequisite have changed, PBC might not be high.

Ajzen (2005) also specifies factors, internal and external, that have an impact on the extent to which an individual has control of their specific behavior, which has the potential to influence the perceived control. The internal factors are *information, skills, and abilities*, and *emotions and compulsions*. The former three are said to be in an individual's control to overcome and are usually seen as a problem when there is a lack of them. However, the latter two are seen to be the contrary, i.e., beyond individuals' control, and when there are too intense emotions or high compulsion, they can impede control.

Moreover, the external factors can be categorized into *opportunities* and *dependence on others*. For a person to be able to conduct a certain behavior, there must be an opportunity for the individual to do so. For instance, if a person has intended to see a play, this act might be disrupted if the person cannot get hold of tickets or is involved in an accident on the way to the play. Further, for some instances, a person's behavior is dependent on others. An individual might have the intention to conduct a behavior, but fail because of reasons that can be attributed to other people. The issue of cooperation exemplifies this in an illustrative manner. A person might be willing to cooperate with another person, but this is only possible if the other person also has that intention. A lack of such intention of the other person might thus disrupt the link between the original person's intention and actual behavior. Both opportunities and dependence on others can therefore in certain cases explain the weakened predictive power that intentions have on behavior.

A way to directly measure perceived behavioral control is to ask people if they believe that they have enough resources and opportunities in order to perform a given behavior (Ajzen, 2005). This way of measuring PBC has been used in several studies (Blok et al. 2015; Blok et al. 2017, Bouarar & Mouloudj, 2021; Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013; Lopes et al., 2019). Blok et al. (2015) show that PBC does correlate with the intention to act in a pro-environmentally manner. Further, Chen and Chen (2021), Gao et al. (2017) and Lopes et al. (2019) show that PBC correlates with energy-saving habits. Greaves et al. (2013) present ambiguous findings depending on the context, while Blok et al. (2017) do not find supporting evidence for the correlation between PBC and the intention to act pro-environmentally. In addition, Bouarar and Mouloudj (2021) do neither find evidence for the relationship between PBC and the intention to implement green practices. The diversity of these findings does however make up for an interesting object to study, and the majority of authors have found a positive correlation between PBC and intentions. Thus, the third hypothesis of this study is:

Hypothesis 3: Perceived behavioral control of employees is positively correlated with the intention to engage in behaviors that contribute to extending the lifespan of portable electronics in the workplace.

2.5.4 Exemplary Environmental Leadership

As noted earlier, the explanatory power of TPB can be expanded by including additional constructs in the theory (Sommer, 2011). What is often seen at workplaces is that it is impossible or very complicated for leaders to force employees into conducting PEB (Blok et al, 2017). Rather, they can only encourage employees to engage in these initiatives. Moreover, Paillé and Boiral (2013, p. 126) state that "environmental leadership and formal policies can send a positive signal to employees and help promote green initiatives".

Managers leading employees and being committed towards increasing the environmental performance in the organization is thus important for employees in order for them to adopt the environmental changes and initiatives (Feasby & Wells, 2011). Although, the authors continue by stating that to make the implementation more effective, employees should see their leaders perform the behavior, both demonstrating how one should do it and participating in the initiatives themselves. An example of this is when leaders take the train to work instead of traveling by car, or another example, that is related to extending the lifespan of portable electronics, is when leaders turn off their computer monitor when leaving their workplace, instead of leaving it on, or using cases and screen protectors for their electronics.

Also, Ramus and Steger (2000) acknowledge the importance of leadership in acting as role models. Additionally, Yen and Yen (2012) concluded in a study regarding firms' success in adopting *green purchasing standards* that leadership in general is the primary driver of this success. It could be argued that this is also applicable to the adoption of *green initiatives* by employees, and specifically to the intention to contribute to extending the lifespan of portable electronics.

Moreover, Kim et al. (2017) found a direct relationship between leaders' *green behavior* and the green behavior of employees, which is a discovery that strengthens the importance and relevance of leadership and its role-modeling actions. Furthermore, Russel et al. (2016) present the notion of *perceived top management commitment*, which is another way of stating the importance of managers acting as role models. In the study, the authors demonstrated how perceived top management commitment led to positive changes in self-reported energy conservation behavior, which is a behavior that can be argued to have similarities with extending the lifespan of portable electronics. For instance, both can be argued to be categorized as a PEB.

Lastly, Blok et al. (2015) and Blok et al. (2017), have researched how different kinds of management, e.g., *leadership support*, *perceived organizational support* and specifically *leadership behavior*, affect employees' intention to engage in PEB. Both studies find that leadership behavior has a significant impact on the intention to act pro-environmentally. The result implies that employees have the intention of engaging in PEB given that their manager(s) show similar behavior.

The above notions of leadership are synthesized to the generated construct of *exemplary environmental leadership (EEL)*, which is defined in this study as whether the leader or manager is leading by example and how successful it is. From above, it is also clear that exemplary environmental leadership seems to influence and explain why employees in general engage in sustainable activities. Thus, it would be interesting to evaluate if this is also true in the context of this study. In line with this reasoning, an additional fourth construct, EEL, will be incorporated into the conceptual framework (see figure 3) of what constructs that make an employee intend to contribute to extending the lifespan of portable electronics. The fourth hypothesis is thus:

Hypothesis 4: Exemplary environmental leadership of managers is positively correlated with employees' intention to engage in behaviors that contribute to extending the lifespan of portable electronics in the workplace.

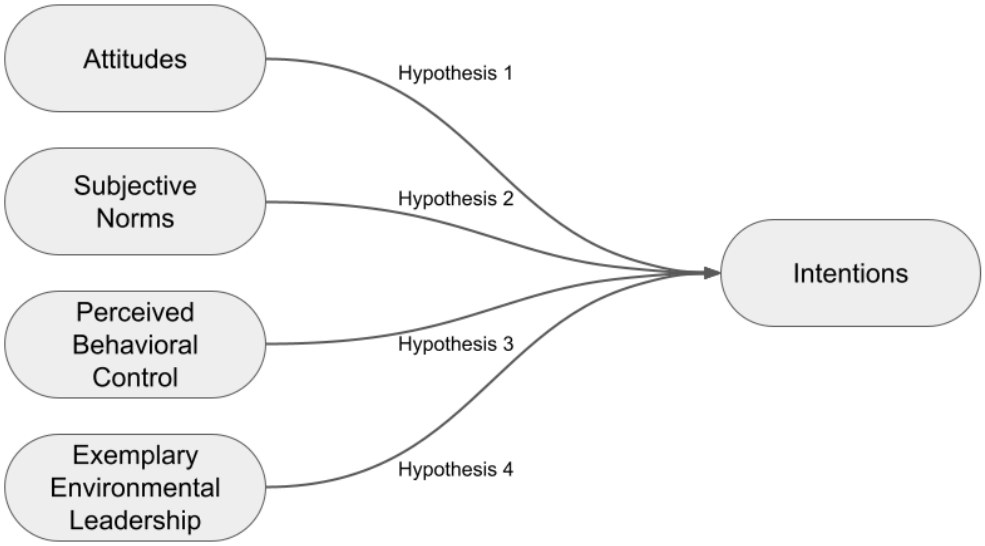

Figure 3. A conceptual framework of how attitudes, subjective norms, PCB and EEL relate to intentions.

2.6 Behavioral Interventions

The theory of planned behavior can also be used to gain insights into what kinds of interventions that are needed to change a given intention or behavior (Ajzen, 2005). One intervention can be used to alter one or several of the constructs anteceding intentions, which would result in a change in behavioral intentions and possibly behavior. Moreover, when designing an intervention there are two important steps (Ajzen, 2005). The first step would be to change the antecedents of intentions and find a way to motivate people to conduct the desired behavior. The next step is to assure that the favorable intentions are actually being executed. A method for achieving this is identifying potential obstacles and removing these, and any specific plans or implementation intentions has to be designed to maximize the effectiveness of the intervention.

3.Methodology

The methodology consists of nine sections and begins with a case description, followed by descriptions of the stepwise approach for how this study was conducted and how the result was reached. The survey used in this study was conducted in Microsoft Forms and the data analysis was conducted in Microsoft Excel.

3.1 Case Description

Gothenburg is the second largest city in Sweden, inhabits 580 000 people (Göteborgs Stad, n.d.-a) and is governed by the public organization called Göteborgs Stad, which employs approximately 55 000 people (Göteborgs Stad, n.d.-b). The organization consists of committees and companies (fully or partly owned) that manages various activities in the city with the aim of serving its citizens (Göteborgs Stad, n.d.-c). This includes everything from waste management to managing schools, taking care of the elderly and arranging events.

A subdivision of Göteborgs Stad is the committee called Intraservice, which employs approximately 700 people (Göteborgs Stad, n.d.-d). Its mission is to provide service to the different departments, organizations and companies under the name of Göteborg Stad and create preconditions for them to achieve their goals (Göteborgs Stad, n.d.-e). For instance, this could be by providing a journal system for a school or by providing staff with material and equipment. In all, Intraservice consists of six areas of operations, i.e., HR, communication, economy and purchasing, welfare, service center and IT. In addition, Intraservice has a specific focus on improving sustainability in the municipality, where the committee e.g., works towards sustainable IT and a 100% fossil free carpark (Göteborgs Stad, n.d.-f). Furthermore, with the increasing focus on sustainability in the world, the management of waste has become a critical factor in acting more sustainable. Apart from reducing the amount of waste, moving waste higher up the waste hierarchy, i.e., redesigning products to minimize waste or reuse products, has also been marked as important (Simon, 2019).

In line with this, Intraservice has been commissioned by Göteborgs Stad to evaluate how it could extend the lifespan of its portable electronics to become more sustainable and utilize the whole potential of the products, and thus avoid waste. As was shown in the literature, the engagement of individuals in such initiatives are critical for its success. Therefore, this study aims to understand what factors that could predict and explain why individuals intend to engage in initiatives to extend the lifespan of its portable electronics in a workplace setting. The following chapter describes the method that is leveraged in order to answer the issues above and thus also the research questions.

3.2 Methodology Approach

The chosen methodology approach for this study is quantitative. This research strategy has been chosen because it is useful for the purpose of testing theories, i.e., being deductive, and

highlights quantification in the data collection and -analysis (Bell et al., 2019), which suits the aim of this study. Furthermore, quantitative research is applicable for measuring and counting to what degree different factors influence each other, i.e., the relationship between them. This is useful in this setting since it allows for evaluating how and to what degree proposed factors influence the intention to engage in behaviors that extend the lifespan of portable electronics. Moreover, quantitative research also allows for a precise estimate of the degree of relationships measured (Bell et al., 2019). This is relevant in the study since it allows for comparing the different factors between each other and also makes it possible to point out which ones might be the most important factors that influence employees' intentions to extend the lifespan of portable electronics.

Moreover, the research questions concern what factors that influence intentional behavior of employees. One of the aims of the literature study was to find these potential factors, which were called constructs by the authors referenced in the literature chapter. Therefore, factors and constructs will hereafter be treated as synonymous and used interchangeably.

3.3 Literature Study

The study commenced with a literature review where secondary data was collected by searching in databases for keywords connected to the subject, as suggested by Bell et al., (2019). Keywords and subjects, e.g., TPB, PEB, electronics, e-waste, employee behavior, public organizations and a combination of these, that came of interest for the research questions were used to find additional and related literature, to first broaden and later narrow the scope. Referenced literature in the articles were also followed up to allow for a richer set of data and understanding of the subject, i.e., a snowballing technique was used until saturation was achieved (Bell et al., 2019). In addition to this, additional literature was collected to account for the specific settings of the organizations where the survey was conducted and contextual facts regarding portable electronics.

Further, literature on pro-environmental behavior was studied since this is a good starting point and facilitates placing the TPB in a context when applied in an environmental initiative. Finally, literature on TPB and its different constructs were described in order to build the foundation on which the analysis and discussion is built upon. From the literature, it was apparent that four of the constructs were treated as independent variables, i.e., attitudes towards the behavior, subjective norms, PBC and EEL, while the last one, i.e., intentions, was treated as the dependent variable. The hypotheses were created based on insights from the literature. Each independent variable was linked to the dependent variable through one hypothesis, as can be seen in the conceptual framework (figure 3). The hypotheses were also created in a way that allowed for specifying the direction of the relationships, e.g., that the independent variables positively correlate to the intention to contribute to extending the lifespan of portable electronics.

3.4 Administration Strategy

The next step was to create a survey, which was created in Microsoft Forms. The aim of the survey was to measure the constructs. The survey was conducted through an online self-completion questionnaire, which employees at Göteborgs Stad were invited to via their work e-mail. In addition, all questions and statements were made compulsory to answer.

According to Bell et al., (2019), self-completion questionnaires have several advantages, such as them being cheaper and quicker to administer, more convenient for respondents and there are no interviewer effects (affecting the answers given) or -variability (asking questions in different order or ways). All of these are applicable to this study, but the most prominent is that self-completion questionnaires are more convenient for respondents, which creates prerequisites for collecting a larger set of responses, which in turn is positive in this study since it typically increases the variance in the answers collected. It is also advantageous since it should, theoretically, decrease the non-responses and thus yield a more representative result.

Additionally, Demetriou et al. (2015) argue that self-reporting can lead to more accurate responses. This is a result of the respondents having a more direct connection to the statements or questions and their issues, than if someone were to e.g., observe or listen to the respondents and write down their interpretation of it. These interpretations would probably only catch the most obvious and shallow signs, while with self-reporting, it is possible for respondents to go deeper and closer to the issue.

However, self-completion questionnaires also have a few disadvantages, such as the researchers not being able to prompt, probe, ask more or other types of questions and unable to ask a lot of questions (Bell et al., 2019). These disadvantages might be prominent in this study, since possible misunderstandings of the questions or statements cannot be amended and additional interesting insights from the respondents cannot be discovered. Furthermore, a self-completion questionnaire might not be appropriate for all respondents because of language or literacy barriers, it is never certain that the intended person is the one answering the survey and there is a greater risk of lower response rates (Bell et al., 2019). A low response rate could mean that the sample is not representative of its population. The initial two disadvantages should not affect the study to a greater extent, since employees at Göteborgs Stad are assumed to have a habile literacy level of Swedish since they work at a municipality and since the survey is sent to each respondent's work e-mail, thus lowering the probability that the wrong person have access to and can answer the survey. The latter two disadvantages, i.e., risk for low response rates and partially answered questionnaires, are however of significance, since this can affect the data analysis and result. This was taken into consideration when devising the questionnaire to make it as convenient, simple and understandable as possible.

Furthermore, Demetriou et al. (2015) state that a disadvantage with self-reporting is a phenomenon known as the *social desirability bias*. Respondents who are affected by this might choose their responses in a way that they think is socially acceptable, thus yielding invalid and untruthful answers. This phenomenon is particularly prevalent when answering questions that

are of sensitive nature. Another disadvantage to be aware of is the *response bias*, which is implying that respondents are more inclined to give a consistent response on many questions, regardless of what the question is about.

Moreover, the survey was sent out to the respondents via an internal e-mail system at Göteborgs Stad. The survey was pre-tested with individuals that were not included in the final survey sample to make sure that the questions and statements were understandable and that the survey was working technically. A welcome message was presented in the beginning of the survey, which stated the aim of the research, how many questions and statements the survey contained and an estimation on how long it would take for the respondent to finish the survey.

3.5 Sampling Strategy

The chosen sampling mode in this study was probability sampling. This way of sampling minimizes the possibility of having a sampling error (Bell et al., 2019). Moreover, the chosen sampling strategy for this study is stratified random sampling. A stratified random sampling allowed for gathering data from several departments at Göteborgs Stad to yield representative data for the whole organization. Further, the survey was sent to 1990 employees at Göteborgs Stad and was open for answers during two weeks, from 28th March to 11th April 2022. Moreover, a reminder e-mail was sent out in an attempt to increase the number of responses.

3.6 Creation of Questions and Statements

Creation of the questions and statements (from here on used interchangeably) in the survey was facilitated by the reuse of questions from previous studies in the same field. Reusing questions from similar studies is beneficial since it strengthens the validity of the study (Hyman et al., 2006), and Bell et al. (2019) argue that examining other researchers' questions is beneficial for inspiration when creating own questions. Thus, when it was necessary, the questions were adapted to the specific context of this study. Further, since the employees that answered the survey are Swedish citizens, it is assumed that they have a better understanding of Swedish than English, and the questionnaire was therefore created in Swedish. This required a translation from the read questions inspired by previous studies in English to Swedish for use in the survey.

The constructs were measured through the respondents indicating to which degree they agreed to a statement and the answers were provided through a Likert scale with closed questions (the characteristics of the closed questions will be elaborated on below). Each construct was measured by three statements. The number of statements chosen was a consequence of how other, similar studies had been conducted. In these studies, the number of items ranged most commonly between one and five items per construct, and to make the survey both as convenient for respondents and as representative as possible, it was chosen to include three items per construct in this study.

According to Bell et al., (2019), an advantage with using Likert scale is that it is easy for both respondents to understand and for researchers to interpret the data. It is also more convenient for respondents to answer the questions since they have fixed answers to choose from. Moreover, the answers were stipulated on a five-grade Likert scale. A five-grade Likert scale have been used by several authors who have conducted similar studies (Blok et al. 2015; Blok et al. 2017, Bouarar & Mouloudj, 2021; Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013). The scale in this study ranged from "strongly agree" to "strongly disagree". This choice was inspired by Blok et al., (2015), who did a similar survey and thus the approach of this study could be seen as validated in this respect. The questions used in the survey can be found in appendix A.

3.6.1 Closed Questions

The questions were of a closed characteristic, meaning that the respondents were provided with already fixed alternative answers which they chose between (Bell et al., 2019). These types of questions yield benefits in the form of answers that are easy to process and also to compare between respondents, which facilitates the data analysis phase in both time and complexity. Furthermore, closed questions are also easy to complete by respondents, since they do not have to write extensive answers. Moreover, using closed questions also allows for pre-coding the answers which makes the process of analyzing the data more convenient (Bell et al., 2019). Pre-coding of answers was thus used in this study.

However, Bell et al. (2019) also discusses disadvantages with closed questions, e.g., that it is difficult to make the fixed answer alternatives exhaustive and mutually exclusive and that it can be irritating to answer the questions if no alternative applies to a respondent. The implementation of a balanced Likert scale has been thought to offset this, to give all respondents a category which is applicable to them and also to cover all possible answers and avoid overlap. Another disadvantage with closed questions is that respondents can have varying interpretations of answers (Bell et al., 2019). This is relevant in this study since employees can have different interpretations of e.g., what "disagree" implies. However, a fact that mitigates this disadvantage is that the analysis will make use of means of the answers, which should mitigate this potential weakness.

3.7 Coding the Data

The constructs developed from the literature chapter, i.e., attitude towards a behavior, subjective norms, PBC and EEL, acted as independent variables in this study and intention to engage in behavior to extend the lifespan of portable electronics acted as the dependent variable. In addition, age and gender were also included to act as control variables, to determine if the variance that occurred in the analysis was stemming from the four proposed constructs or from something else, i.e., age or gender. This is according to an approach described in Becker (2005). The answers from the questions regarding attitudes, subjective norms, PBC and EEL were then coded into numbers. The questions were constructed in order to facilitate that

an answer such as “strongly agree” can be coded to the highest number in the Likert scale, i.e., a 5, and conversely “strongly disagree” as the lowest number in the Likert scale, i.e., a 1.

Further, Bell et al. (2019) claim that answers from Likert scales should be treated as ordinal variables, which would make it inappropriate to do arithmetic operations as well as pursuing regression analysis (see below). Nevertheless, Bell et al (2019) also claim that many authors treat answers from Likert scales as interval variables, which allows for arithmetic operations and pursuing regression analyses. Wu & Leung (2017) agree with this and claim that Likert scales are in practice often interpreted as an interval scale. Furthermore, many researchers that have conducted similar studies to test the intention or behavior according to the TPB (e.g., Blok et al., 2015; Blok et al. 2017; Bouarar & Mouloudj, 2021, Chen & Chen, 2021; Gao et al., 2017; Greaves et al. 2013; Lopes et al. 2019) are using Likert scales and doing arithmetic operations, which implies that this is an accepted and validated approach in the field of study.

Furthermore, since the question regarding age was asked in such a manner that the respondents answered with the year they were born, the age had to be calculated from this. This was done through subtracting the birth year from the current year (2022). A note is that by calculating the age this way, the ages might become a bit higher than they should be, since some respondents might have been calculated to have had their birthday in 2022, when in reality they had not. Although, this was not seen as affecting the result to a significant extent.

Moreover, a challenge followed from incorporating the respondents’ gender in the survey is to code the data to metric values. Hair et al. (2013) proposes that this could be solved by the inclusion of dummy variables. These variables act as replacements for the given independent variable, in this study gender Each dummy stands for one category of the non-metric independent variable. Further, a non-metric category with n categories is represented with $n - 1$ dummy variables. Thus, in this study, the gender that was divided between “male”, “female”, “other” and ”do not want to answer" was represented by three dummy variables, where the latter was excluded to fit the correct number of dummy variables (the ”do not want to answer” is taken into action when all other variables are in non-action). The approach of this study for translating the non-metric values to metric values follows an approach that Hair et al., (2013) refer to as *indicator coding*. This implies that each dummy variable is either represented by a “1” or a “0”. For instance, in this study, if the respondent was a male, the dummy variable corresponding to “male” was set to “1”, and the dummy variables belonging to “female” and “do not want to answer” was set to “0” respectively, or if the respondent answered “other” all dummy variables were set to “0”. The three dummy variables were further included in the regression analysis.

The final step when structuring the data according to Mertens et al. (2017) is to combine relevant variables into one. Each construct was analyzed from three questions each and the questions were therefore combined in groups of three, where each group examined each of the constructs relevant for the study, i.e., attitudes, subjective norms, PBC, EEL and intentions. The mean value of the responses in each group was calculated and is the value used for the subsequent analysis.

3.8 Examining the Data

The next step in the data analysis is to clean the data, which in this study has been done according to the process proposed by Mertens et al. (2017) to achieve a *valid sample*. This step consists of deleting and dealing with the two categories: *invalid cases* and *unreliable data* respectively. The former category relates to the deletion of cases that do not represent the whole population intended to be studied. In this study, cases are referred to as the full set of answers to all questions from a single respondent, while answers and responses is hereafter referred to as an individual's answer and response to a specific question. Mertens et al. (2017) provide the example of a study that examines businesses with between 5 and 50 employees, then businesses with less than 5 or more than 50 employees would be categorized as invalid cases and should thus be removed.

The latter category, i.e., dealing with unreliable data, relates to when individual values for variables are not representing the real or actual values (Mertens et al., 2017). One example from the authors is responses with an age that is too high to be probable, e.g., being 174 years of age, which is not a possible number for the age of a person. If a case has a couple of unreliable values, then the case itself can become unreliable, but it is important not to remove cases because it is convenient and removing too many cases can make the result less credible. Thus, it is important to be consistent and thoroughly report what is being done when dealing with unreliable data. Furthermore, unreliable data can show itself in five different characteristics, i.e., in inconsistent data, missing data, extreme tendencies, improbable response times and as outliers.

The first characteristic, inconsistent data, relates to combinations of responses that are not probable, e.g., that the age of an individual is less than their work experience (Mertens et al., 2017). Inconsistent data can be a consequence of loss of interest or a mistake, indicating that the answers cannot be trusted. To locate these characteristics, it is important to find probable relationships between variables and analyze where these relationships do not hold up.

The second characteristic, missing data, is when e.g., a respondent has not responded to one or more questions (Mertens et al., 2017). The authors argue that for studies with only a small number of cases with missing data, the cases can either be entirely deleted from the dataset or be deleted likewise ("excluding a complete case from a group of related analyses") or pairwise ("excluding a case only for analyses that use the missing values") (Mertens et al., 2017, p. 138). However, excluding cases with missing data might introduce bias and when the amount of missing data is substantial, it is important to look for *systematicity*, i.e., that the missing values creates a pattern, that the data thus can mean something and that there might be an explanation to why the data is missing. If these cases would then be excluded, the result could be influenced and it might thus be more beneficial to replace the values with calculated values from the existing data. As with inconsistent data, it is important to report the original number of cases and possibly how many and why cases were excluded or replaced.

The third characteristic, extreme tendencies, appears as values which are surprisingly low, high or invariable (Mertens et al., 2017). For studies with Likert scales, this could be responses from an individual who has responded with the same answer throughout the survey, because of e.g., the respondent becoming uninterested. Such responses could indicate a case that is unreliable, but it could also be reliable responses coming from respondents being consistent in their answers, or be an outlier, i.e., not representing the population. Thus, it is difficult to confirm that a case is an extreme tendency and Mertens et al. (2017) provide the guideline that exclusion should only be made when a tendency has been found to be extreme, i.e., when a majority of the answers from one respondent are the same.

The fourth characteristic, improbable response times, is something that should be analyzed in conjunction with extreme tendencies, since these cases usually result in shorter response times (Mertens et al., 2017). Shorter response times can also be a consequence of uninterested respondents, but can as well be because some respondents are faster at completing surveys. Therefore, cases should only be excluded if they have a substantially shorter response time than predicted. As suggested by Mertens et al. (2017), the response times were cross analyzed together with extreme tendencies. The threshold was chosen to 90 seconds (all cases with shorter response time were highlighted), since this was the approximate time it took the authors to complete the survey thoroughly. Since the authors are accustomed to the survey and knew what the questions asked and what was said in the questionnaire, any response times below 90 seconds were deemed unlikely. For instance, a respondent that conducted the survey in 60 seconds and only answered with "neither agree or disagree" was removed since it is likely that this person did not conduct the survey seriously.

The last characteristic to look for in a data set is outliers, i.e., values that are extreme in relation to the other values in the set (Mertens et al., 2017). These values do not represent the typical population where the sample was gathered from and thus have the possibility of affecting or distorting the results or distribution. Mertens et al. (2017, p. 140) exemplifies outliers as an individual who is 174 years old (measurement error), a study of average white-collar workers where a prime minister is included (unrepresentative of the researched population) or "a Mozart in a large classroom of music students" (a unique case).

However, outliers are not always easy to find and one way of facilitating the analysis is to *standardize* the values and calculate *z-value* and then compare these to specific z-values, i.e., calculating the distance, expressed in standard deviations, for each value to the mean (Mertens et al., 2017). Almost 100% (99.9%) of the values should be between the z-values of +-3.29, which, according to the authors, makes all values with z-values outside of these boundaries probable outliers. The formula for standardizing values can be seen in equation 1.

$$\textit{Equation 1: } z = \frac{x - \bar{x}}{s}$$

In equation 1, x is the measure of the variable, $\bar{x}$ is the mean of the variable and s is the standard deviation of the variables. Using this method results in the values becoming more comparable,

since the mean is used as a reference point (Mertens et al., 2017). The standard deviation is also important to use for distance measuring, since the same distances in various populations can have different meanings.

After cleaning the data, the response rate was calculated according to the formula suggested by Bell et al. (2019) and is presented in equation 2.

$$Equation\ 2:\ Response\ Rate = \frac{Number\ of\ usable\ cases}{Total\ sample - Unsuitable\ or\ uncontactable\ numbers\ of\ sample} * 100$$

3.9 Analyzing the data

The subsequent step was analyzing the data. An appropriate measure for examining a relationship between the independent and dependent variables is according to Mertens et al. (2017) to conduct a regression analysis. Hair et al., (2013) further claim that this type of analysis both facilitates with predicting and explaining the relationships between independent and dependent variables. A regression model is also used in similar studies by e.g., Blok et al. (2015), Blok et al. (2017) and Bouarar & Mouloudj (2021), which strengthens its relevance.

The first step is to test the assumptions regarding multiple regression analysis (Hair et al., 2013). If these assumptions are not met, the validity of the study is threatened. The authors differentiate between two types of assumptions that are important when conducting multiple regression analysis. The first type of assumptions concerns the separate variables, i.e., the independent variables, while the second type of assumptions concerns the multivariate model variate, which represents the full extent of the multiple regression model.

3.9.1 Assumptions Regarding the Separate Variables

The first assumption is that the distribution of the independent variables follows the normal distribution (Hair et al., 2013). If the distribution of the variables is not behaving according to the normal distribution, the regression model risks being invalid. The reason for this is that a multi regression model is using the concepts of *F* and *t statistics* which are only valid when the variables behave according to the normal distribution. Finally, Hair et al. (2013, p. 70) claim that if the sample size is large enough, a violation of this assumption might not be as critical as they claim, i.e., "for sample sizes of 200 or more, these same effects [effects that occur because the variables are not normally distributed], may be negligible". In this study, it was tested by plotting the variables in histograms to find out whether the variables follow a normal distribution and thus if the assumption holds or not.

Moreover, the second assumption is *homoscedasticity*, which refers to the "assumption that dependent variable(s) exhibit equal variances across the range of the predictor variables" (Hair et al., 2013, p. 72). This is tested by plotting the independent variable towards the dependent variable and analyzing if the dispersion of the dependent variable is sufficiently small across the ranges of the independent variable. Thus, this was conducted in this study.

The third assumption covers the linearity between the independent and dependent variables (Hair et al., 2013). Since a regression model solely accounts for linear relationships, it does not capture nonlinear relationships between the variables. Therefore, it is important that the independent and dependent variables do not have such a relationship. To test linearity, Hair et al. (2013) propose an approach of plotting the independent variables towards the dependent variables and evaluating if the plot incurs a nonlinear relationship. This study followed the same approach.

Finally, the last assumption regarding the separate variables concerns the absence of correlated errors (Hair et al., 2013). This could be errors provoked by time aspects, that data was collected from different groups, or if there is a pattern among the errors. To identify these errors, Hair et al. (2013) propose that the researcher must find possible causes to this. For instance, that the data is collected from different groups or from different time periods. However, since this study collected data from the same group (employees at Göteborgs Stad) and from the same time period, this assumption will not be looked into further in this study.

3.9.2 Assumptions Regarding the Multivariate Model Variate

Firstly, there must exist a linear relationship between the independent and dependent variables. Since regression analysis explains correlation, it is critical that the relationships between the independent and dependent are indeed linear. Hair et al. (2013) claim that this can be analyzed by plotting the residuals of the model. The residuals are defined as the difference between the actual value of the dependent variable and the predicted values of the model. If the plotted residuals are not displaying any form of curvilinear relationships, the assumption of linearity between the variables holds. In this study, the residuals were plotted to evaluate if this assumption was valid or not.

The second assumption is that the residuals compared to the dependent variables are constant through all answers, a term usually referred to as homoscedasticity (Hair et al., 2013). In this study, this can be translated to if the regression model is equally effective to predict the intentions to contribute to extending the lifespan of portable electronics for both the first and final answers of the survey. This assumption can be tested by plotting the standardized residuals towards the dependent variable. If the plot shows signs of an either decreasing or increasing trend of the residuals, this assumption is violated. Consequently, such a plot was pursued in this study.

Moreover, the third assumption concerns that the residuals must be independent from each other, since this would imply that each respondent is also independent from one another (Hair et al., 2013). To test this assumption, plotting the residuals of the model is suitable. If there is a consistent pattern in the residuals, this assumption is violated. For this purpose, a plot of the residuals was constructed and analyzed accordingly.

Finally, the last assumption concerns whether the independent and dependent variables are following the normal distribution. This can either be evaluated by plotting the variables in a histogram and comparing it to the normal distribution or by using normal probability plots. In this study, the former procedure was used.

3.9.3 Multicollinearity

Furthermore, an important issue when studying multiple regressions is the absence of *multicollinearity* (Mertens et al., 2017). A high level of multicollinearity implies that at least two variables are too highly correlated, which means that they basically measure the same construct. This would however not harm the predictive power or reliability of the analysis, but it might affect the individual estimates in terms of size and increasing the standard errors. To examine if the variables are acting in a multicollinearity fashion, the correlations between each pairwise variable should be calculated, which was therefore conducted in this study by constructing a correlation matrix. Mertens et al. (2017) claim that if two variables have a correlation of 0.75 or higher between them, it would indicate that the variables are multicollinear and that additional measures need to be taken.

However, calculating the pair-wise correlation between each variable is not enough to test for multicollinearity according to Hair et al. (2013) and the authors argue that an additional measure, i.e., the tolerance level, needs to be calculated. The tolerance is defined as "the amount of variability of the selected independent variable not explained by the other independent variables" (Hair et al., 2013, p. 197). The following two-step procedure of calculating the tolerance level was conducted according to the steps advised in Hair et al. (2013). First, a regression model was created for each independent variable where the independent variable was acting as the dependent variable and the remaining independent variables were acting as its independent variables. For instance, to calculate the tolerance level for attitudes, the construct of attitudes was treated as the dependent variable and PBC, subjective norms as well as EEL were treated as independent variables. This was replicated for all four of the independent variables. From the regression models, R^2, which corresponds to the amount that the independent variable is explained by the other independent variables, was collected. The tolerance for each variable is then calculated as $1 - R^2$. If the tolerance level is high, it means that the variables have a low level of multicollinearity. A common threshold value for the appropriate tolerance level is 0.10 according to Hair et al (2013), i.e., that values above 0.10 are not multicollinear.

3.9.4 Estimating the Data

The subsequent step in this process is to calculate the descriptive data which typically consists of the mean and standard deviation of each variable (Mertens et al., 2017). This was conducted for all variables. Furthermore, the measure of Cronbach's alpha, a reliability measurement, was calculated in this step for each variable (excluding variables related to age and gender, since these were tested with one question each). This is a common way to test for internal reliability when conducting surveys and is in particular targeting the scale reliability of the answers (Bell

et al., 2019). Cronbach's alpha is a number that varies from 0 to 1. The value of 0.8 or higher is generally marked as an acceptable value that implies that the internal reliability is sufficiently high. However, Bell et al. (2019) claim that many authors accept a slightly lower number. In connection to this, Salvucci et al. (1997) provides a range for reliability measurements, where values above 0.8 is seen as highly reliable, values between 0.5-0.8 is seen to have moderate reliability, while values below 0.5 are considered to display low reliability. According to Ekolu and Quainoo (2019), low values of Cronbach's alpha can be a consequence of the items being badly interrelated or the number of items being too small. However, Streiner (2003) argues that the Cronbach's alpha on the other hand cannot be too high either, since this could be a result of item redundancy, and sets the maximum threshold for alpha to 0.9.

The next step is to estimate the regression model and two types of data should be presented from this (Mertens et al., 2017). The first one is overall model fit, which measures if the overall regression model fits the data well, meaning that the model can explain the relationship between the dependent and independent variables. This is measured with R^2 and the *F-statistic* generated from the regression model. R^2 measures how much of the variation in the dependent variable can be attributed to variation in the independent variables, while the *F-statistic* compares the regression model to an empty model and describes the difference in quality of estimates between them. If the regression model is a significantly better fit in explaining the variances compared to the empty model, the model can be trusted. To test this, a multiple regression analysis was conducted through the inbuilt function "Regression" in Microsoft Excel, where the R^2 value and *F-statistic* were also calculated. Moreover, there are different opinions on what constitutes a high enough R^2. Falk and Miller (1992) claim that R^2 should at least be equal to 0.10. Further, Cohen (1988) states that in the context of social behavioral sciences, an R^2 of 0.26 could be considered substantial, 0.13 as moderate and 0.02 as weak.

The last type of data that should be presented is the parameter estimates (Mertens et al., 2017). The most important parameters are the coefficients that correspond to each construct. The greater the coefficient, the greater it affects the dependent variable. Finally, in relation to each coefficient, its corresponding p-value was presented. This value is used to determine whether each coefficient is significantly different from zero, and thus has an influence on the dependent variable. The p-value is compared with respect to different significance levels. In this study, these levels were chosen to be $p < 0.05$, 0.01 and 0.001. If a coefficient is significantly different from zero, the conclusion can be made that the independent variable related to the coefficient is indeed affecting the dependent variable and from this, each hypothesis can be rejected or confirmed.

4.Result

The result is divided between four sections. The first section presents characteristics of the data and the final data sample which will be analyzed. Further, the second section regards assumptions in multiple regression analysis. The following section presents the descriptive data from the analysis while the fourth and final section presents an evaluation of the hypotheses.

4.1 Final Data Sample

The survey was sent to 1990 employees at Göteborgs Stad, of which 549 responded. However, not all cases were deemed valid when examining the data according to the steps described in chapter 3. Some cases experienced only one of the below mentioned criteria, while others fell under more than one.

Invalid cases were defined as respondents who answered the survey twice or explicitly stated that they had not been provided with any portable electronic device. This resulted in five cases being excluded from the study. However, respondents who stated that they had not been provided a laptop, but did not say anything regarding a tablet or smartphone were still included, since no conclusion could be drawn whether the respondent had not been provided with the latter mentioned electronics.

Furthermore, unreliable data showed itself in inconsistent data, extreme tendencies in conjunction with improbable response times and lastly outliers. The cases were analyzed for missing data, but no such characteristics were found, since all questions were chosen to be compulsory to answer. Inconsistent data on the other hand manifested itself when respondents stated their age. Cases were removed when respondents had answered with a combination of letters, which did not correspond to an age or probable birth year, and when respondents stated their year of birth in ways that could have different interpretations (i.e., the respondents should only state their year of birth with four numbers, e.g., 1995, but instead only wrote 59, which could be interpreted as the respondent being 59 years old or being born in 1959). However, some respondents answered with a complete social security number and from these the year of birth could be extracted. Consequently, six cases were removed due to inconsistent data.

Furthermore, extreme tendencies (same answer on all questions) were analyzed together with improbable response times (90 seconds or less). In total, two cases were removed as a result of extreme tendencies in connection to improbable response times. Lastly, after the above-mentioned cases had been removed, the data was screened for outliers. 13 cases had at least one outlier among the answers and were thus removed from the study. The number of cases that were excluded from the study as a consequence of the above-mentioned criteria accumulated to 25, thus yielding a valid sample of 524 responses. This corresponds to a response rate of 26.7%. A summary of the removed cases is found in table 1.

Table 1. An overview of the final data sample.

	Sample	# of completed cases	# of invalid cases	# of cases with inconsistent data	# of cases with extreme tendencies & improbable response times	# of cases with outliers	Valid Sample
#*	1990	549	5	6	2	13	524

**The sum of the removed cases is more than 25 since one case experienced more than one violation of the above stated characteristics.*

4.2 Assumptions

The assumptions are divided between assumptions concerning the separate variables in the model, the multivariate model variate of the variables, correlation and finally assumptions regarding multicollinearity.

4.2.1 Assumptions Regarding the Separate Variables

The first assumption regarded that the separate variables had a normal distribution. As can be seen in appendix B, this assumption was violated for some of the variables. However, due to the large sample size, this was not considered an issue in this study. The second assumption regarded homoscedasticity. As can be seen in appendix C, none of the variables in the study violated this assumption. The same can be said for the assumption regarding linearity, where there were no violations (see appendix C).

4.2.2 Assumptions Regarding the Multivariate Model Variate

The first assumption regarded whether there is a linear relationship between the independent and dependent variables. As can be seen in appendix D this was not an issue in this study. Moreover, the second assumption concerns homoscedasticity of the standardized residuals in the study. This assumption was not violated in this study, as can be seen in appendix E. Similar conclusions can be drawn for the third assumption, independence of the residuals, which was not violated either (see appendix F). Finally, the fourth and final assumption was that the residuals were distributed according to the normal distribution. As can be seen in appendix G, the histogram of the residuals is displaying normally distributing characteristics and therefore this assumption was also not violated.

4.2.3 Correlation and Multicollinearity

The correlation matrix for the independent and dependent variables is presented in table 2. As can be noted, no pairwise correlation is exceeding the threshold of 0.75. Furthermore, none of

the independent variables had a tolerance level below the threshold of 0.1, which indicates an absence of multicollinearity (see table 3).

Table 2. Correlation matrix.

	Attitudes	**Subjective Norms**	**PBC**	**EEL**	**Intentions**
Attitudes	1.000				
Subjective Norms	0.166	1.000			
PBC	0.036	0.337	1.000		
EEL	0.166	0.235	0.215	1.000	
Intentions	0.272	0.266	0.163	0.169	1.000

Table 3. Tolerance level of the independent variables.

	Attitudes	**Subjective Norms**	**PBC**	**EEL**
Tolerance level	0.954	0.842	0.865	0.906

4.3 Descriptive Data

The responses were analyzed and the descriptive data for each construct are presented in table 4. The descriptive data for all constructs, except age and gender, originates from a 5-point Likert scale. As can be seen, attitudes has the highest mean of 4.42, with a standard deviation of 0.540 and a Cronbach's alpha of 0.681. Subjective norms on the other hand has a lower mean value of 3.66, a standard deviation of 0.693 and a Cronbach's alpha of 0.618. The mean value of PBC is the lowest with a value of 3.56, a standard deviation of 0.785 and a Cronbach's alpha of 0.457. EEL has a slightly higher mean value of 3.65, a standard variation of 0.734 and a Cronbach's alpha of 0.541, while intentions has the second highest mean value of 4.26, a standard deviation of 0.575 and Cronbach's alpha of 0.358. Further, the average age of respondents was 48.4 years with a standard deviation of 11.2 years. Lastly, 68.7% of respondents were female, 28.1% male, 3.05% did not want to disclose their gender and 0.191% responded with "other".

Table 4. Descriptive data.

	Mean Value	Standard Deviation	Cronbach's Alpha
Attitudes	4.42	0.540	0.681
Subjective Norms	3.66	0.693	0.618
PBC	3.56	0.785	0.457
EEL	3.65	0.734	0.541
Intentions	4.26	0.575	0.358
Age	48.4	11.2	N/A

Consequently, attitudes, subjective norms and EEL can be considered to have a moderate internal reliability, while PBC and intentions display a low internal reliability. The values for the latter two indicate that the items to measure the respective construct do not correlate to a large extent. Although the Cronbach's alphas indicate a low reliability, it has been decided to still include them in the analysis (which will further be discussed in the following chapter).

4.4 Estimates and Evaluation of the Hypotheses

The R^2 of the multiple regression model is 0.143 which indicates that the factors included in the model explain 14.3% of the variances in the intention to contribute to extending the lifespan of portable electronics (see table 5). This number is relatively low and indicates that there might be additional factors than the ones proposed in this study that affects the intention to extend the lifespan of portable electronics in the workplace. Moreover, the F-statistic of the regression is significant at the p-level of 0.001, which means that it is significantly better to predict the intentions compared to an empty model at the given p-level (see table 5).

Table 5. Overall model fit of the regression model.

	Coefficients	Significance F
Model F-statistic	10.7	5.23E-14*
Model R^2	0.143	N/A

*$p<0.001$

Moreover, from table 6, it is evident that attitudes have the strongest effect on intentions, and the coefficient is significant on a 0.001 p-level. Further, subjective norms also has a relatively strong effect on intentions and are likewise significant on the same p-level. However, neither PBC or EEL have a significant effect on the intentions at any of the chosen p-levels. It can be noted though, that the construct of PBC was close to being significant (0.0603) at a p-level of 0.05, while the construct of EEL was not as close (0.0966). Moreover, the control variables, age and gender of the employees, is not deemed significant for any p-value either and thus does not seem to affect the intention to extend the lifespan of portable electronics in the workplace.

Table 6. Effects on intentions to contribute to extending the lifespan of portable electronics in the workplace.

	Coefficients	**Standard Error**	**p-value**
Attitudes	0.237	0.0449	1.97E-07*
Subjective Norms	0.146	0.0376	0.000112*
PBC	0.0617	0.0328	0.0603
EEL	0.0563	0.0338	0.0966
Age	-0.000267	0.00216	0.900
Male	0.728	0.543	0.181
Female	0.780	0.541	0.150
Other (Gender)	0.599	0.557	0.282
Intercept	1.51	0.568	0.000821*

*N=524, *p<0.001.*

Finally, it can be concluded that hypotheses 1 and 2 are confirmed at a p-level of 0.001, while hypotheses 3 and 4 are rejected at a p-value of 0.05 (see figure 4).

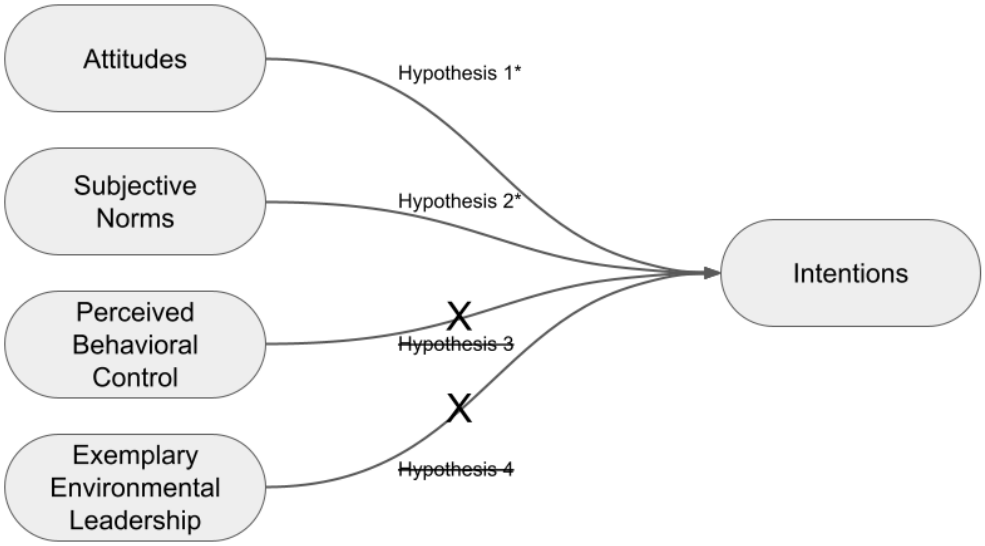

*Figure 4. The conceptual framework of this study with updated implications based on the result. *p<0.001.*

5.Discussion

This chapter consists of three parts. The first part discusses the result and connects it to prior research, while the second part discusses practical implications derived from the study. Finally, the last part reviews limitations and potential future research.

Before evaluating the results, it is important to acknowledge that TPB carries some important assumptions, i.e., that individuals think through the consequences of their behavior, consider the information they have available and behave reasonably. It is thus assumed that these assumptions generally will hold in the setting of this study as well. Moreover, it is important to take into account that this study examines voluntary behaviors, and thus not behaviors that are included in the employees' regular work tasks. That is, including the behavior as a work task might make the results and implications of this study invalid. Lastly, a final assumption in this study is that intentions eventually result in the intended behavior, which has been debated in research. This assumption will further be discussed in section 5.3.

In addition, it is important to acknowledge that answers collected from the survey in this study were collected in a self-reported manner, which may have its disadvantages as mentioned in the methodology chapter. However, Ajzen (2005) proposes this way of measuring the constructs in the TPB and self-reported answers might also give more accurate information since the respondents are closer to the issues themselves compared to other individuals (Demetriou et al., 2015).

5.1 Discussion of Results

The aim of this study was to investigate what factors influence the intentional behavior of employees to contribute to extending the lifespan of their portable electronics and to what degree these factors contribute to this. The proposed factors, or constructs, were attitudes, subjective norms, PBC and EEL. The result indicates that attitudes and subjective norms had a significant positive effect on employees' intention to extend the lifespan of its portable electronics in the workplace, at the p-level of 0.001. Thus, hypothesis 1 and hypothesis 2 were accepted. However, PBC and EEL were not deemed significant and therefore Hypothesis 3 and hypothesis 4 were not accepted at any of the chosen p-values. Hence, not all hypotheses in the study could be proven.

The result also indicates that attitudes has the strongest effect on intentions, followed by subjective norms. This is a valuable insight since Ajzen (2005) proposes that a high score (i.e., strong effect) in one factor might compensate for a low score in another factor. In addition, the factor with the strongest effect is also the factor that is most likely to maximize returns when investing in increasing the intention of employees to contribute to extending the lifespan of portable electronics. Based on this, it is likely that an employee that has a positive attitude towards extending the lifespan of portable electronics and feels that important people in the

organization find the behavior socially acceptable, intends to behave in a manner that contributes to this.

The R^2 of the study was 0.143 which means that the factors in this study could explain 14.3% of the variance of employees' intentions to contribute to extending the lifespan of portable electronics in the workplace. Moreover, the control variables, age and gender, did not seem to have a statistically significant effect on employees' intention to extend the lifespan of its portable electronics in the workplace. Thus, the variance of intentions between respondents cannot be attributed to these variables. The assumptions regarding multiple regression analysis were held in all cases except for the assumption regarding normality for the independent variables. However, since the sample size was larger than 200, this should not be an issue (Hair et al, 2013). That there were no violations of assumption means that there should be no error in the result that stems from violations of these assumptions.

5.1.1 Attitudes

The fact that attitudes has a positive effect on intentions to conduct behaviors that can be categorized as pro-environmentally is something that is in line with similar studies on this matter (Blok et al. 2015; Bouarar & Mouloudj, 2021; Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013; Lopes et al., 2019). However, the result contradicts findings of Blok et al. (2017). This study has thus contributed to the field of study and extended it by testing TPB on a new type of intentions in a public organization.

Since the coefficient for attitudes in the multiple regression analysis was positive and significant, this indicates that the more positive the attitudes of the employees are towards extending the lifespan of portable electronics, the stronger the intention will be to conduct such behavior, which is in line with the viewpoint of Ajzen (1991). Consequently, this also indicates that employees with negative attitudes towards this behavior will not have intentions to perform it. As stated in the literature, behavioral beliefs are antecedents of attitudes, and these are related to the consequences and outcomes of a behavior. Thus, it is important for a public organization to influence its employees to understand and incorporate that extending the lifespan of portable electronics is favorable from both a sustainable and economical perspective.

5.1.2 Subjective Norms

The result of this study also indicates that subjective norms has a significant impact on employees' intentions to engage in behaviors that contribute to extending the lifespan of portable electronics, i.e., to engage in pro-environmental behaviors. This is in line with previous findings of Blok et al. (2015), Blok et al. (2017), Bouarar and Mouloudj (2021), Chen and Chen (2021) and Greaves et al. (2013). However, Gao et al. (2017) and Lopes et al. (2019) show in their studies that subjective norms are not a significant predictor of intentional behavior.

Furthermore, the coefficient for subjective norms was positive. This indicates, as with the construct of attitudes, that the stronger the social pressure an employee experiences from e.g., co-workers, to extend the lifespan of portable electronics, the stronger will the individual's intention to perform that behavior be. Thus, a low experience of social pressure would indicate that the intentions would consequently be lower as well. Moreover, subjective norms also has antecedents, i.e., normative beliefs, which relate to the individual's beliefs of what people would think of their behavior and how they would value it, i.e., approve or disapprove of it. Therefore, public organizations should assure that every employee feels and believes that the co-workers in the organization approve of the employee extending the lifespan of its portable electronics and handling them sustainably.

5.1.3 Perceived Behavioral Control

This study showed that PBC had no significant effect on intentions. It should however be noted that the p-value was close to being significant at the 0.05 level. Previous studies on similar matters have found evidence for a significant effect of PBC (Blok et al. 2015; Chen & Chen, 2021; Gao et al., 2017; Lopes et al., 2019), while Greaves et al., (2013) had ambiguous findings on this matter and Bouarar and Mouloudj (2021) as well as Blok et al. (2017) did not find any evidence for it. This makes the result of this study contradict the majority of the above-mentioned research, which is interesting and emphasizes its contribution to the overall field of study.

The result further indicates that it is not important whether the employees feel that extending the lifespan of portable electronics is difficult or easy, this perceived feeling will not affect the intentions to do it, at the $p<0.05$ level. However, since the construct was close to being significant, it is arguably reasonable to not completely disregard its relevance on intentions. Therefore, it could be argued that public organizations should take into consideration the effects of PBC and consequently try to reduce possible future obstacles and facilitate the behavior in question, by e.g., providing employees with the necessary resources and capabilities. The beliefs that antecede PBC, control beliefs, is also related to past experience and second hand information, which might be difficult for an organization to affect. However, by doing the aforementioned, the current experience that it is possible to perform the behavior will soon become past experience, thus affecting the PBC in a positive manner. Although, one aspect to acknowledge is that since the coefficient for PBC was not as high as for attitudes and subjective norms, it should not be prioritized above managing the significant constructs first.

A possible explanation why PBC was not significant in this study could be the low Cronbach's alpha of the items that measured PBC, which implies that the items used in this study were not effective in measuring the levels of PBC among the employees at Göteborgs Stad. A consequence of the low Cronbach's' alpha is that the reliability of the study could have been harmed, which in turn might have affected the results. This will further be discussed in section 5.3.2 where additional implications from a low reliability measure will be discussed.

5.1.4 Exemplary Environmental Leadership

In contrast to studies from Blok et al. (2015) and Blok et al. (2017), this study failed to find evidence that EEL has a positive effect on employees' intentions to engage in a pro-environmental behavior. The result thus indicates that it is not important whether managers themselves try to extend the lifespan of portable electronics, the employees' intention to do the same will not change.

The effect of EEL on intentions was quite far from being statistically significant (p=0.0966). A possible explanation for this discrepancy could be that employees at Göteborgs Stad have limited insight in how their managers treat their portable electronics, which would thus limit the effect on the employees' intentions. In the studies conducted by Blok et al. (2015) and Blok et al. (2017), the employees arguably had better insights in how their managers acted, due to the nature of the studied behaviors. For instance, behaviors related to if the manager turns off the lights when leaving the room or traveling collectively might be easier to detect compared to a managers' behavior with their portable electronic devices.

5.1.5. Summary of Results

Lastly, a quick note on the differences in findings of this study compared to other findings in similar studies that also have studied the notion of pro-environmental behavior. It is likely that the differences between the results of the conducted studies are due to differences in settings and context. This does however not make the studies less interesting, instead it points to the importance of testing the theories in different settings and contexts.

5.2 Practical Implications

The result indicates that attitudes had the most significant effect on employees' intention to contribute to extending the lifespan of their portable electronics. Therefore, it is this factor that should be focused upon primarily. A way to do this is to educate and inform employees of the potential benefits that extending the lifespan of portable electronics might lead to. With inspiration from Cordella et al (2021), a way to achieve this is to provide employees with reliable, understandable and relevant information for how they should handle their portable electronics. In line with this, the discussion above regarding attitudes, 5.1.1, indicates that it could be favorable to also educate employees on what the consequences of such behavior can lead to and try to convince them of the positive effects. This could be to show employees the negative consequences of the increasing e-waste in the world, to create a frame of reference that the employees can relate to, as well as show what positive effects extending the lifespan of portable electronics can yield, i.e., reduced emissions and pollution, as well as cost benefits to the organization. Since employees at a public organization probably experience PSM and are thus motivated by serving and helping the public, education such as this should be able to affect employees to a large extent.

Moreover, the result also indicates that subjective norms has a significant effect on employees' intention to contribute to extending the lifespan of their portable electronics, which points to that this is a factor that should also be aimed to improve upon. An important first step could be to distinguish what is currently socially accepted in the organization and what is not. This would provide a starting point from where the interventions can be initiated. Similarly to the approach of increasing attitudes, a way to increase the subjective norms factor could also be to provide employees with information and education. Together with PSM, the education could inject a form of responsibility and obligation towards the society in the employees to act sustainably. Education could also make the employees more accustomed to extending the lifespan of portable electronics, thus making this behavior more socially acceptable. This way, social pressure can be created in the organization and in turn increase employees' intentions to extend the lifespan of portable electronics. To increase this further, with inspiration from Ajzen (2005), experts in the field of sustainable electronics could lead the education or workshops, to give the employees someone to look up to.

The subjective norms could also be a factor of the culture in the organization. Since Göteborgs Stad is a large public organization with many divisions, it is likely that the culture within these divisions differ across the organization. The culture and social norms regarding extending the lifespan of portable electronics is therefore likely to differ across the divisions. For initiatives such as these, it might be beneficial to have a consistent vision across the whole organization where the importance of extending the lifespan of portable electronics is clearly emphasized, as this would make the social norms and the culture related to this stronger. A reasonable aim for an organization is thus to create an organization where the social norm among employees is that they care about their electronics and do not change them prematurely. Thus, if everyone in the organization has this outlook, then the subjective norm of each employee should be beneficial towards extending the lifespan of portable electronics.

Although the factor of PBC was not significant in this study, it was close to be and this factor has been shown to be significant in other studies (Blok et al. 2015; Chen & Chen, 2021; Gao et al., 2017; Greaves et al., 2013; Lopes et al., 2019). Therefore, there is reason to also focus on improving the PBC of employees. As discussed above, PBC should not be prioritized above attitudes and subjective norms. Therefore, increasing PBC could be done as a side measure beside attitudes and subjective norms. As presented in the section on attitudes and subjective norms, they could be positively increased by educating employees. In the same manner, this education could also provide employees with the necessary knowledge needed to know how to practically extend the lifespan of portable electronics, thus increasing PBC. Employees could also be given a convenient and concrete list of actions on how to extend the lifespan of portable electronics. Though, it is important that this is distributed clearly, in order for employees to know where to find them and how to interpret them. In connection to this, presenting opportunities, e.g., providing employees with screen and back covers, and reducing obstacles, e.g., offering battery changes when it begins to diminish in power, are also initiatives that can increase the PBC of employees.

Lastly, the above strategies to affect the factors that precede intentions is an approach that Ajzen (2005) refers to as interventions. In this section it was argued that education is a measure that could improve both attitudes and subjective norms, and the fact that one intervention can stimulate several factors simultaneously is something that Ajzen (2005) also acknowledges. Moreover, when conducting these interventions, it is important to recognize that there are two steps. The first step is to change the factors, which has already been discussed in this section. However, the second step is to assure that these intentions are actually being executed and that the changes remain over time. In practice, this could be facilitated by regularly providing education to employees, providing them with new information if it appears, assess how effective a given intervention has been and how it has affected the intentions of employees. Furthermore, continuous follow up on the general vision on portable electronics in the organization is also important, while also acknowledging if and in that case where the vision has not been manifested and why.

5.3 Limitations and Future Research

The limitations and possible future research of this study are related to the response rate, reliability measures, the amount of variance explained, intention-behavior discrepancies and antecedents to the independent variables. These will further be presented in this section.

5.3.1 Response Rate

One limitation of the study might be that the response rate of the survey (26.7%) can be considered low. This could mean that not all employees at Göteborgs Stad who had their own portable electronic were represented in the study and whole committees could have been completely left out of the valid response set. The survey was sent out through e-mail to employees at Göteborgs Stad and the e-mail clearly stated what the survey was about, namely "your 5 minutes can help us extend the lifespan of electronics". It is probable that employees that have a negative attitude to this initiative and to sustainability in general might be reluctant to pursue the survey. This could lead to skewed results of the study. A possible measure to increase the response rate could thus be to create a more neutral heading in the e-mail send-out. However, if the e-mail is not stating what aim and potential benefit the survey has, employees might be unmotivated to conduct it. There is clearly a trade-off in this issue, and it is likely that it is context-dependent. This should however be taken into consideration in future, similar studies.

5.3.2 Internal Reliability

Another measure worth mentioning because of its low value is the Cronbach's alpha, which might harm the reliability of the study and affect its results. The internal reliability of attitudes, subjective norms and EEL is considered to be moderate according to the literature, while PBC and intentions have a low internal reliability. Overall, none of the measures could be classified as high, which according to Ekolu & Quainoo (2019), can be a consequence of the small number of items that were used to test each construct. It was seen as a trade-off between making

the survey convenient for the respondents in an attempt to increase the response rate and increasing the number of items per construct to yield a more representative measure of each construct. As described in chapter 3, the number of items used in this study was inspired by other authors that had used between one and five items per construct.

Moreover, the low internal reliability for PBC and intentions could also be explained by having items that were not highly interrelated. An explanation to why the Cronbach's alpha for PBC was low could be because respondents could have had dispersed responses on the questions regarding PBC. For instance, people might not know what would contribute to extending the lifespan of portable electronics, and thus answering low on question 9 (see appendix A), but still believe that they have resources (e.g., cases or protection) to extend the lifetime, and thus answering high on question 10 (see appendix A). However, a low Cronbach's alpha is not optimal and it might have affected the results of the study, which was also suggested as an explanation why PBC were shown to not have a significant effect on intention (see section 5.1.3).

Lastly, an explanation for the low reliability measure of intentions could be that these items were the ones that had to be altered the most from the original source. These items were constructed based on both the items from the literature and what the literature said was effective when trying to extend the lifespan of portable electronics. A possible reason for the low interrelatedness could be that the literature is divided in what measures actually are the best for extending the lifespan of portable electronics and thus the respondents might also not understand which measures are actually efficient in extending the lifespan of portable electronics, making the answers not as homogenous as they could have been. An example of this is the question asking if the respondent only used the work electronic for work related purposes. In a sense, it could be argued that using e.g., a work smartphone for personal use is sustainable, since it reduces the need for the employee to buy a private smartphone. This might then result in the employee answering that it would use the work smartphone for private use to be sustainable and thus answering against the other items measuring intentions. This in turn opens up for another interesting topic to analyze. Since this report only focuses on sustainability from a public organizational perspective, it would be interesting to also include the personal perspective and its use of electronics and weighting these perspectives together.

5.3.3 Amount of Variance Explained

Moreover, another result that could be seen as a limitation is that the R^2 of the model was only 0.143. This implies that the chosen variables in this study account for 14.3% of the variance of an employees' intention to extend the lifespan of its electronics. An interpretation from this is that the model of TPB is not extensive enough to fully explain the variance of employees' intentions to contribute to extending the lifetime of portable electronics in the workplace. However, an R^2 of 0.143 is a number that is deemed "moderate" in social sciences according to Cohen (1988) and Falk and Miller (1992) claim that R^2 should at least be higher than 0.10. That the variables only manage to explain 14.3% of the variance is, however, a problem and an opportunity. The problem would be that it is likely that there exist other factors that might

explain the variance in employees' intention to extend the lifespan of its portable electronics in the workplace and that this study only accounts for a part of the explanation. However, it opens up for future research opportunities to study if additional variables can assist in explaining the remaining variance and to what extent they can do so.

5.3.4 Intention-Behavior Discrepancies

As stated in the literature, there are three discrepancies between intentions and behavior. The first one, intention–behavior incompatibility, is not relevant in this study since it does not test for behavior. The second discrepancy, stability of intentions, is neither directly relevant, since this study does not research intentions over time. However, it is important to be aware that the intentions of employees can change in the future. Lastly, the discrepancy of literal inconsistency is relevant, since this study focuses on intentions and not behavior. Thus, it is important to acknowledge that employees might say they have the intention to perform a behavior, but actually do not follow it through in reality.

An aspect of this has been discussed in the literature, where both opponents and advocates argue for different standpoints in the question if intentions actually can affect behavior in every instance. As Ajzen (2005) claims, there are situations where the link between intentions and behaviors are disrupted. However, many authors have shown that intention is indeed an effective predictor of behavior, which is the standpoint used in this study. Nevertheless, it would be interesting to also include the behavioral aspects in the same context in a similar future study.

5.3.5 Antecedents to the Independent Variables

Another interesting topic related to TPB is the antecedent beliefs behind the factors in this study. For instance, Greaves et al. (2013) researched antecedents to the three original elements of TPB, i.e., attitudes, subjective norms and PBC, and put them in the context of understanding environmental behavioral intentions in the workplace. Something similar could be interesting to pursue in the future, by having the same context and area of focus as this study and evaluating in more detail what types of antecedents that affect the intentions of employees since this could help explain why the factors account for the variance of intentions in the workplace. This could also yield more direct measures and make the managerial implications more specific on where to focus resources to increase any of the researched factors.

6.Conclusion

Decreasing the amount of e-waste is of paramount importance for the world to become sustainable and companies and organizations need to act. An important measure to become more sustainable is to make electronics last longer, which is a measure where the individual effort of employees is crucial for its success. The aim of this study was therefore to examine which factors influence the intentions of employees to contribute to extending the lifespan of its portable electronics provided to them by their employer through environmental handling and management of the devices. The proposed factors, mainly originating from the TPB (attitudes, subjective norms, PBC and additionally EEL) were composed by evaluating relevant literature related to what is expected to explain intentions to engage in pro-environmental behavior, an umbrella concept in which extending lifespan of portable electronics can be categorized within. This was tested at a public organization where data was collected through an online survey, evaluating how employees scored in regard to the different factors, as well as their intentions. The data was further analyzed in a multiple regression model to find out if and how much the proposed factors actually affected the intention to extend the lifespan of portable electronics.

Two of the four factors that were expected to influence the intentions of employees at a public organization to extend the lifespan of portable electronics provided to them by the organization were deemed to be significant. These were the constructs of attitudes and subjective norms, while PBC and EEL had no significant effect on these intentions. Moreover, attitudes has the strongest effect on the intentions to extend the lifespan of portable electronics, followed by subjective norms. Thus, the research questions for this study have been answered.

It can be concluded that, since attitudes has the strongest effect on intentions, creating positive attitudes towards extending the lifespan of portable electronics should be focused on initially, followed by increasing the subjective norms regarding the same matter. A way to increase the intentions of employees to contribute to extending the lifespan of portable electronics is thus to increase attitudes. As stated in the discussion this can be achieved by education, e.g., pointing out the impact of e-waste in climate change and displaying the benefits of sustainable management of portable electronics. Another way to increase the intentions of employees to contribute to extending the lifespan of portable electronics is to increase subjective norms. In workplaces, it should be distinguished what is currently socially accepted in order to find out where the initiatives to improve this factor should begin. Moreover, and similarly to improving attitudes, education could again work as a measure for improving the intentions since education can strengthen employees' obligation towards society and acting sustainably, as well as making it socially acceptable by peers to conduct the behavior. Lastly, a unified vision across the whole public organization can be beneficial, since this can create a sense of belonging and make the efforts more consistent throughout the different divisions.

This study has contributed to the extensions of the concepts of PEB and TPB by applying them in a new context. Further, this study has also shown which factors included in the TPB that

have significant effects on the intentions to contribute to extending the lifespan of portable electronics in a public organization. It can also be concluded that the TPB can explain this intention to a certain extent. However, additional research should be conducted to further understand what might affect employees' intentions, and since the R^2 of the study is only moderate, it is likely that there are more factors than discussed in this study that might help explain this matter. Some of the reliability measures (Cronbach's alpha) of the report were deemed low. Thus, future research should look to replicate this study with a higher degree of reliability. In addition, a future study should also consider investigating the actual behavior of extending the lifespan of portable electronics in the workplace, to find possible gaps or consistencies between intentions and behavior in this context. Finally, investigating possible antecedents to the independent variables can provide concrete evidence to what directly affects these variables and should therefore be researched further.

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Appendix A: Survey Questions and Statements

This appendix contains the items testing the control variables and variables, both the dependent and independent, used in the survey.

A.1 General Information

Hi!
Thank you for taking the time to complete this survey. The survey consists of 17 questions and takes about 5 minutes to complete.

The survey contains statements where you choose the answer option that best suits you.

We appreciate it if you answer as realistically as possible. All answers are **anonymous**.

Below you will find a definition and a summary of the concepts of **portable electronics** and what it means to **extend the lifespan** of portable electronics.

Portable electronics refers to laptops, mobile phones and tablets **given to you by your employer.**

Extending the lifespan of portable electronics means:
Employees taking protective measures and handling the electronics in a sustainable way to reduce wear and tear and avoid damage to the electronics, so that they last longer. This would in turn lead to less frequent replacement of portable electronics and thus longer use by employees.

A.2 Control Variables

Regarding the gender question, the respondent could choose from “man”, “women”, “other” and “do not want to answer”.

1. Gender?
2. What year were you born? (Please enter the year in four digits: xxxx)

A.3 Statements Regarding the Independent and Dependent Variables

All statements below were answered through a 5-point Likert Scale with the alternatives “strongly agree”, “agree”, “neither agree or disagree”, “disagree” and “strongly disagree”.

Attitudes

3. Implementing measures to prolong the lifetime of portable electronics is positive
4. There is great value in implementing measures to extend the lifetime of portable electronics as it contributes to a reduced climate impact
5. I think that at my workplace we should implement more measures to extend the life of portable electronics

Subjective Norms

6. My colleagues expect me to contribute to prolong the lifetime of my portable electronics
7. My bosses expect me to contribute to prolong the lifetime of my portable electronics
8. I think my colleagues should turn off their computer when it is not in use

Perceived Behavioral Control

9. I believe that I have sufficient knowledge and skills to prolong the lifetime of portable electronics and treat the electronics in a sustainable way
10. I have resources (e.g., cases or protection) to prolong the lifetime of portable electronics
11. Treating the electronics in a sustainable way is for the most part up to me

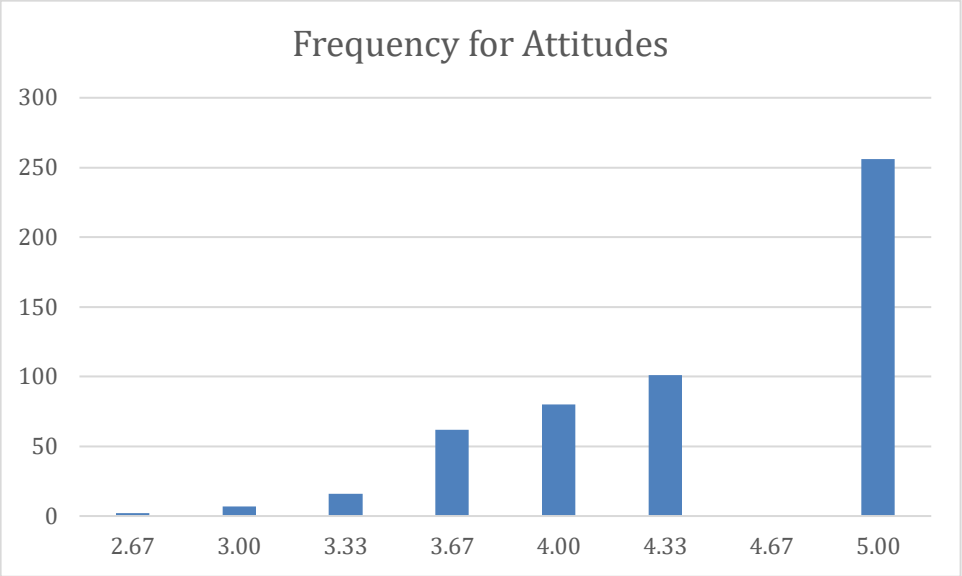
Exemplary Environmental Leadership

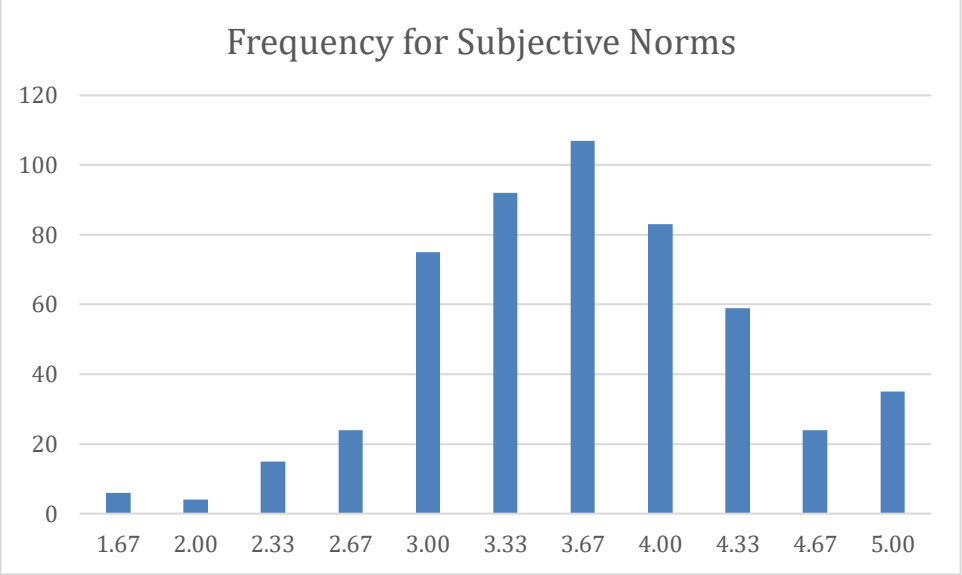
12. I take protective measures and handle portable electronics in a sustainable way if/when my boss does so as well
13. I think it is important that my boss also contributes to prolonging the lifetime of portable electronics
14. If I perceive that my boss is contributing to prolonging the lifetime of the portable electronics, I will be more motivated to contribute to this as well

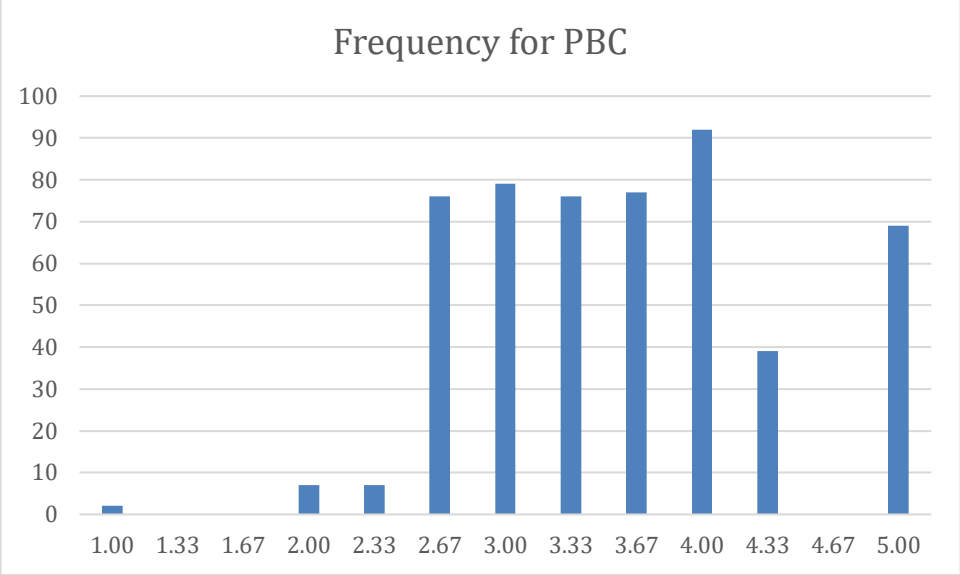
Intentions

15. I plan to turn off my computer when it is not in use for a prolonged period of time
16. I will only use the portable electronics given to me by my employer for strict job duties
17. I intend to use covers and cases for the laptop electronics given to me by my employer

Appendix B: Assumptions Regarding Separate Variables - Normal Distribution



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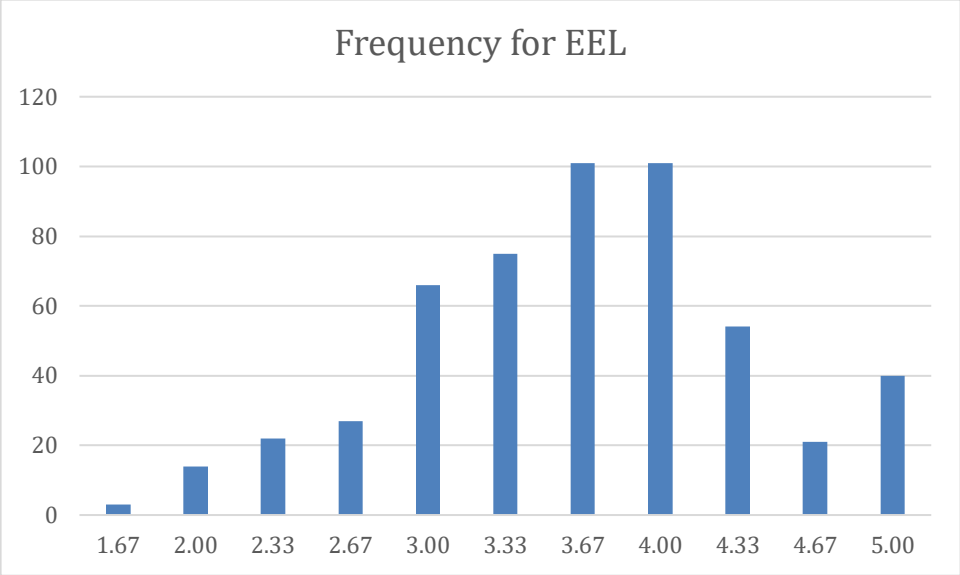
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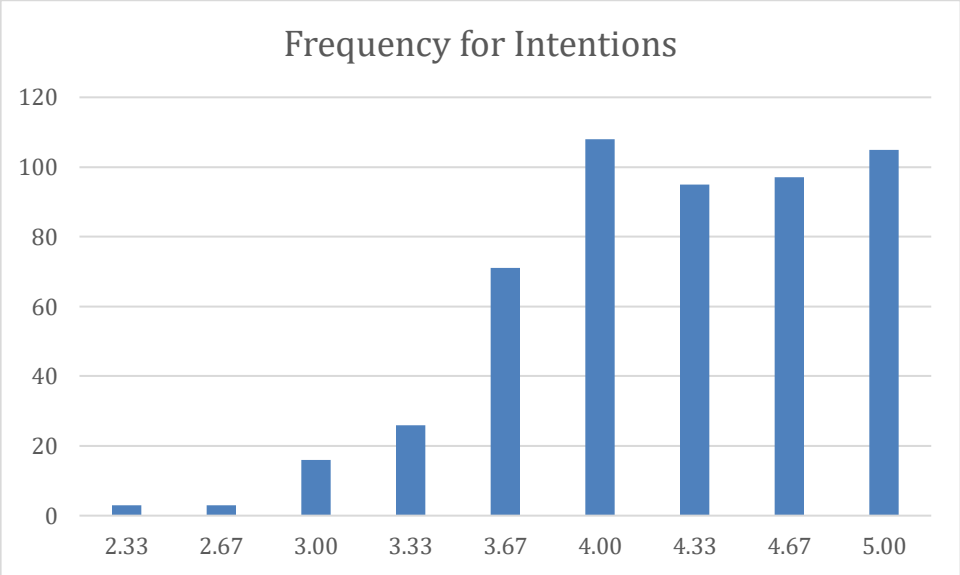
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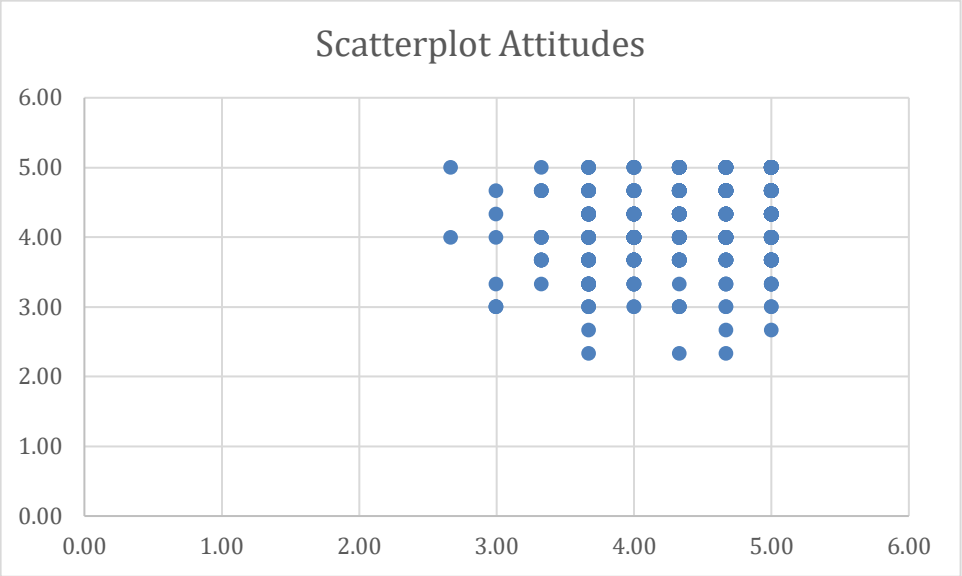
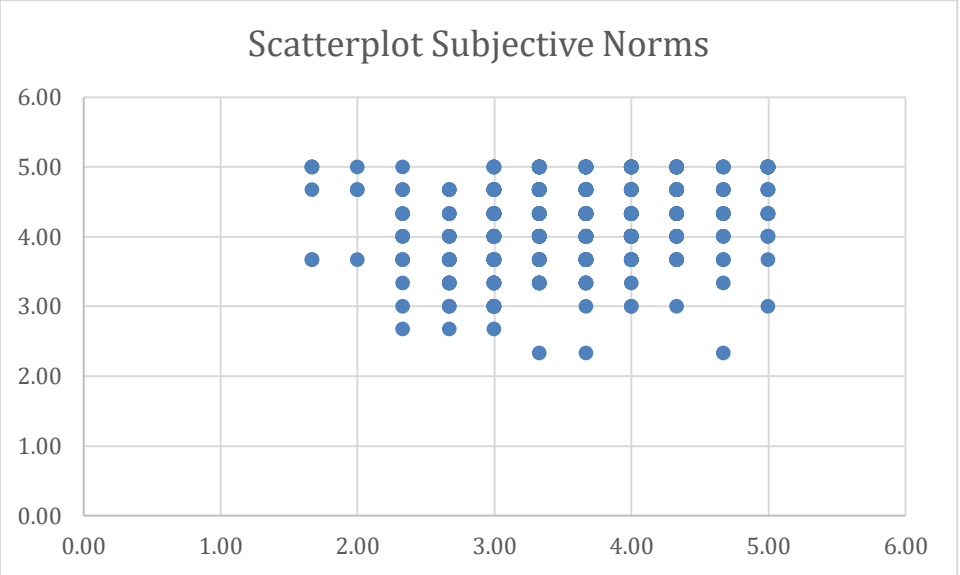
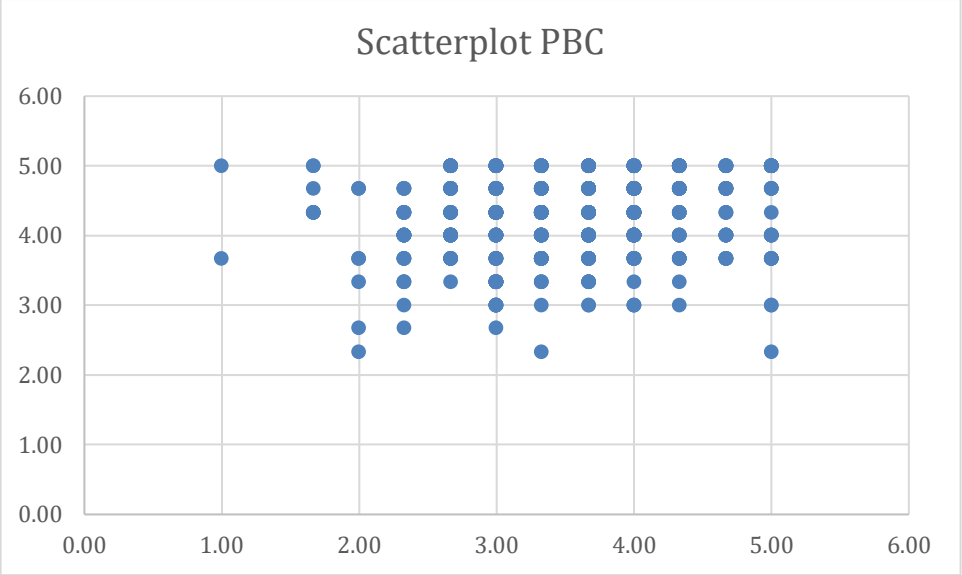
Appendix C: Assumptions Regarding Separate Variables - Homoscedasticity and Linearity



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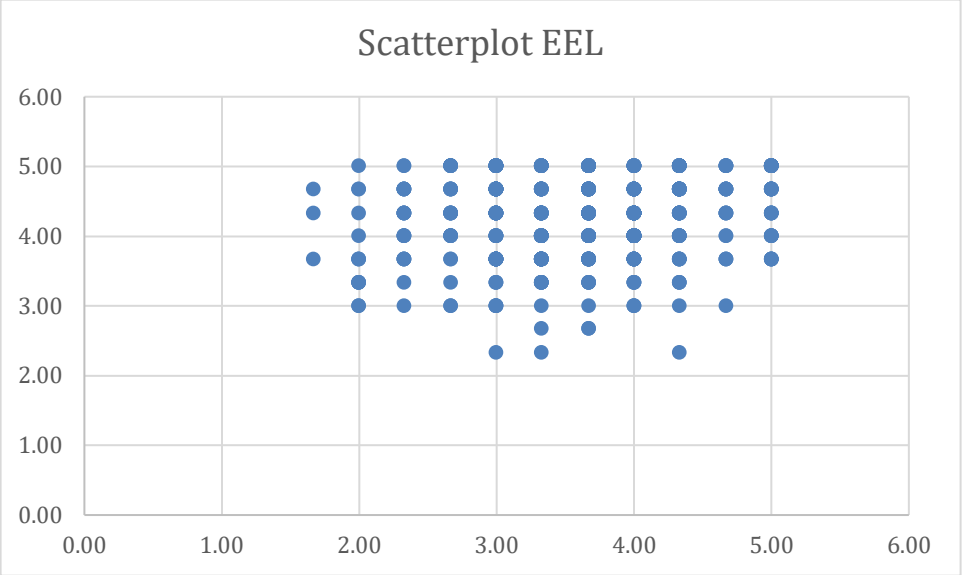
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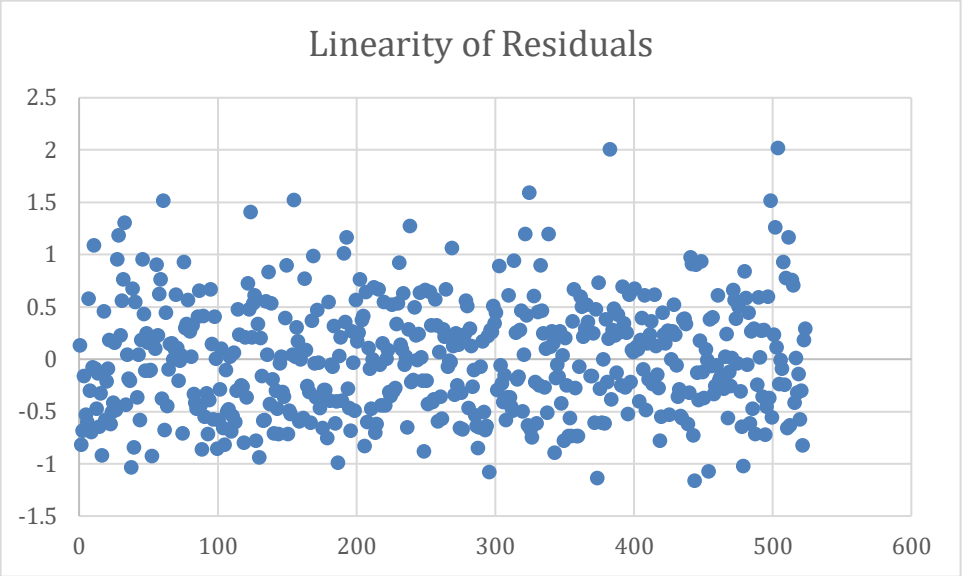
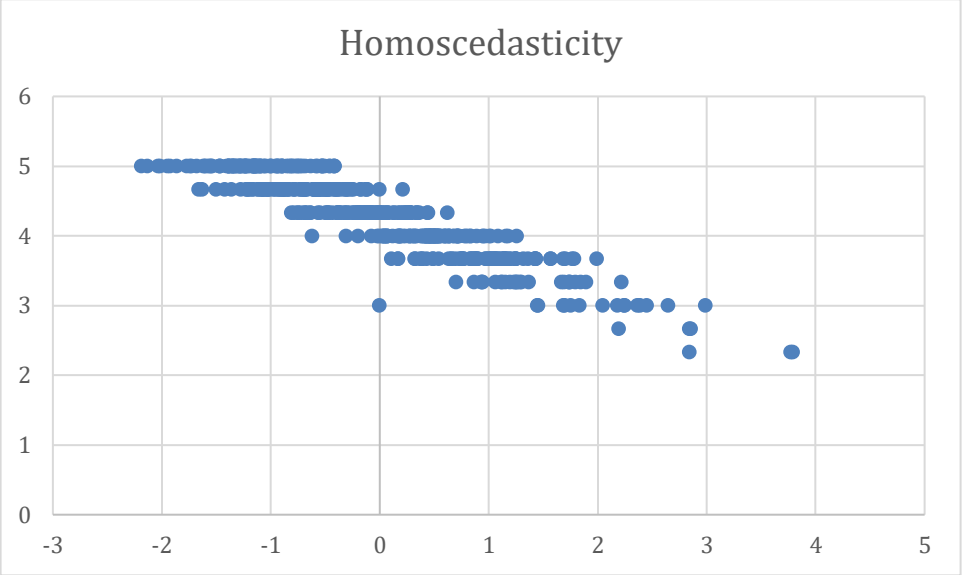
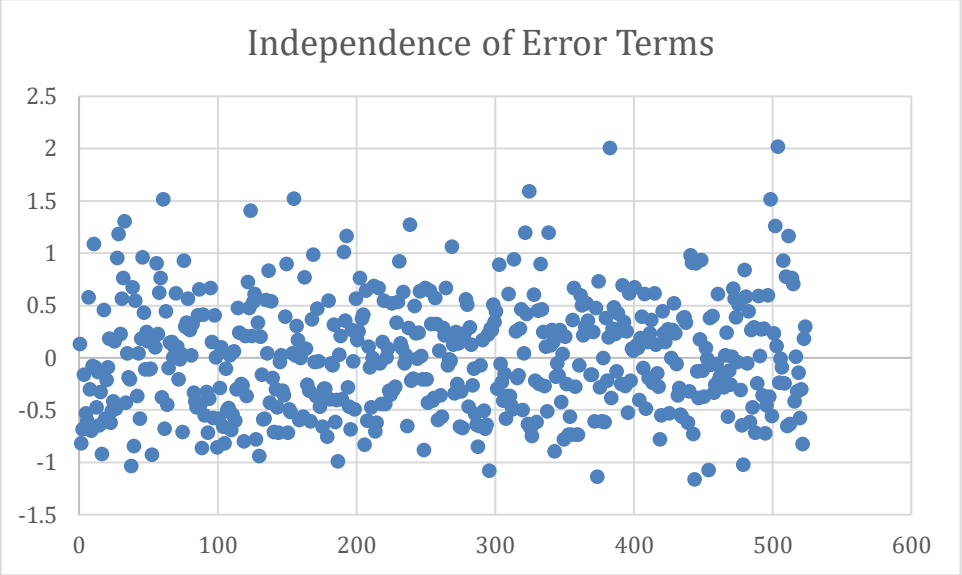
Appendix D: Assumptions Regarding Multivariate Model Variate - Linearity



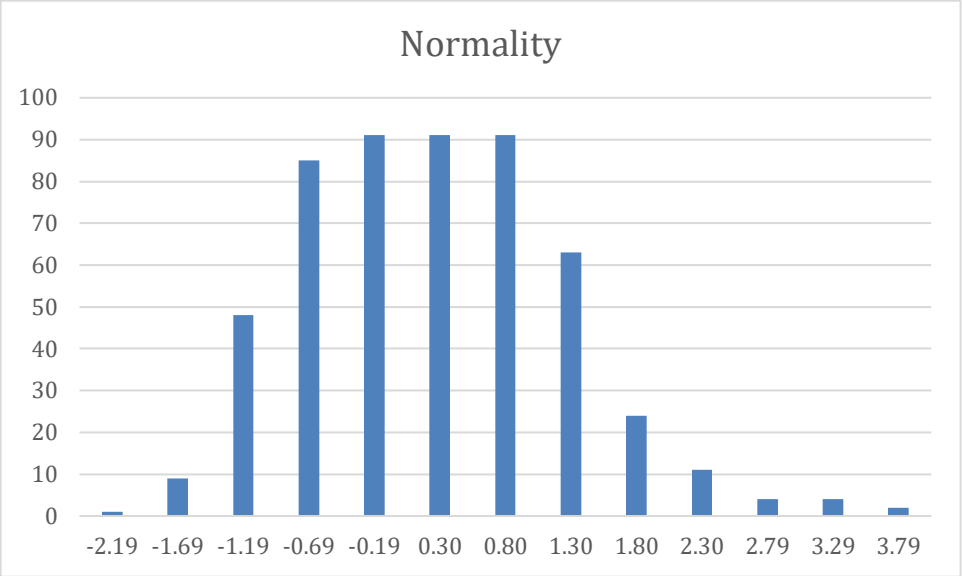
Appendix E: Assumptions Regarding Multivariate Model Variate – Homoscedasticity



Appendix F: Assumptions Regarding Multivariate Model Variate - Independence of Error Terms



Appendix F: Assumptions Regarding Multivariate Model Variate - Normality



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