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An Analysis of Driving Factors of Collaboration in Handling Used Cell Phones as a Waste Management Practice

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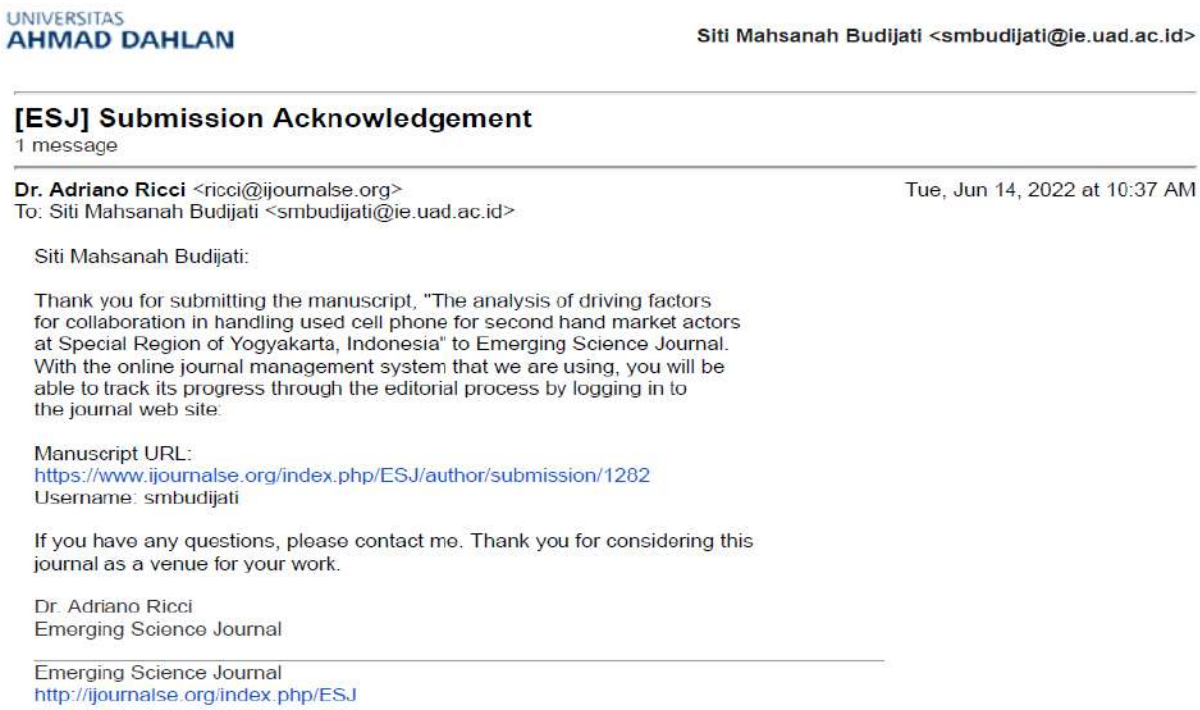

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The analysis of driving factors for collaboration in handling used cell phone for second hand market actors at Special Region of Yogyakarta, Indonesia

Abstract

The rate of cell phone usage is increasing from year to year, which has resulted in an increase in used cell phones. Reverse Logistics (RL) is one way to handle End of Life (EoL) or End of Use (EoU) products such as used cell phones. Like other developing countries, the handling of used cell phones in Indonesia is mostly carried out by informal actors starting from second-hand market actors. However, RL activities on informal parties often have an impact that endanger the environment and human health. One way to reduce this impact is to transfer some of RL's activities to formal parties. This requires collaboration from both parties. This study aims to explore the factors driving the collaboration intention of informal actors for handling used cell phones. Second hand market actors in five districts in the Special Region of Yogyakarta Province are respondents in this study. The actors in each district have a driving factor in influencing the intention to collaborate in handling used cell phones. Government support is a factor that often appears in every district and also at provincial level studies. The results of this study can be used as a consideration for the government and cell phone companies to design cell phone waste management.

Keywords:

collaboration intention;

driving factors;

reverse logistics;

used cell phone.

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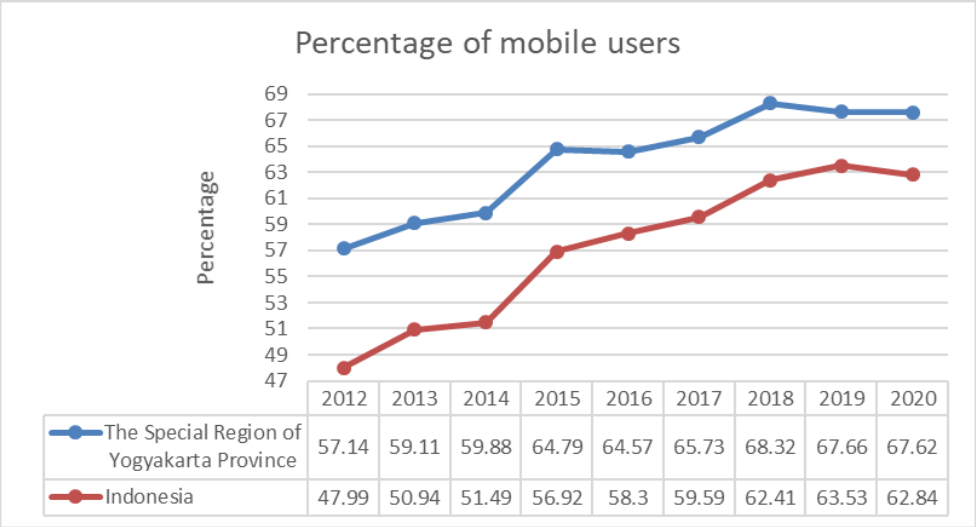
1- Introduction

Mobile phone users in Indonesia, especially in the Province of the Special Region of Yogyakarta (DIY) are increasing from year to year. Data from the Central Bureau of Statistics (BPS) generally shows that the percentage of the population using mobile phones has increased from 2012 to 2019, although there has been a slight decline in 2020, possibly due to the COVID-19 pandemic. The increase in mobile phone users is shown in Figure 1.



	2012	2013	2014	2015	2016	2017	2018	2019	2020
The Special Region of Yogyakarta Province	57.14	59.11	59.88	64.79	64.57	65.73	68.32	67.66	67.62
Indonesia	47.99	50.94	51.49	56.92	58.3	59.59	62.41	63.53	62.84

Figure 1. Data on the percentage of mobile phone users in the Province of the Special Region of Yogyakarta (DIY) and Indonesia in 2012-2020

(Source: Data of the year 2012-2018 was taken from: (*Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah, 2012-2018*, 2020)

Data of the year 2018-2020 was taken from: (*Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah 2018-2020*, 2020)

The increase in the number of cell phone usage means that there is also an increase in cell phone waste, which is e-waste. E-waste that is not managed adequately will be harmful to the environment and human health. The content of hazardous metals in e-waste such as lead, cadmium, mercury, hexavalent chromium, and refractory materials (Chatterjee and Kumar, 2009; Chi et al., 2011; Joseph, 2007, Realff et al., 2004; and Schwarzer et al., 2005). These hazardous metals in the long term can have an impact on human health and environmental damage, such as mentioned in Robinson (2009) that for every 1 kg of e-waste, there is 180 mg of cadmium and 0.8 mg of mercury, especially in the battery component. Furthermore, the BBC (2002) in Polak & Drápalová (2012) states that cadmium from a cell phone battery can contaminate 600.000 liters of water. From research conducted by Robinson (2009) in Guiyu City, Guangdong region, China, which is the largest e-waste recycling area in the world, it was found that dioxin contamination in Guiyu air resulted in the level of exposure to humans reaching 15–56 times the maximum standard recommended by WHO. Elevated levels of dioxins are found in breast milk, placenta, and hair, indicating that dioxins are acquired by humans from the air, water, or foodstuffs, at levels sufficient to pose a serious health risk. Children in Guiyu had significantly higher blood lead and cadmium levels than normal children. It was also reported that e-waste recycling workers from villages in the Jinghai region had chromosomal aberrations at about 20-fold higher than villagers who were not exposed to e-waste. For this reason, it can be said that e-waste is a potential source of genetic mutations and can cause cytogenetic damage in the general population exposed to e-waste pollution. Furthermore, it was conveyed by Orlins & Guan (2016) that during the process of dismantling e-waste without adequate technology, the content of hazardous materials in e-waste will remain in the environment for a long time.

Consumers around the world tend to store their small electronic devices as they reach their End of Life (EoL) rather than throwing them away. This is a dilemma because if end-of-life devices are not collected from consumers' homes, those devices cannot be reused or recycled, resulting in increased production (Nøjgaard, 2020). One of the activities that can be used to manage EoL or End of Use (EoU) products such as used cell phones is reverse logistics. Reverse logistics (RL) is an activity aimed at handling products that have expired or their useful life or products returned by partners in the supply chain to be managed to the original point. RL activities perform recovery of the product so that part or all of the product can be reused.

Rogers & Tibben-Lembke (1998) stated that RL is the process of moving goods from the end user to return to the original point in order to save the value of the goods. Likewise, Jingbo (2005) stated that the essence of RL is to get value from products that are no longer used. When a product has lost its value, RL activities can recover the product to become a new product again by recycling some parts or components of the product. On the other hand, Aquino (2020) proposed a mathematical model to determine the best location to install waste electrical and electronic equipment collection points.

An ideal RL activity is not only providing economic benefits for the actors, but also has a positive impact on the environment. Economic benefits can be as alternative materials for production of raw materials, so that it reduces the use of virgin materials, which are likely to be increasingly scarce. The positive impact on the environment is the avoidance of the disposal of parts or all of the hazardous used products, without adequate processing. In line with this, Jingbo (2005) stated that RL was not only creating economic benefits but also promoting green supply chain

construction. It is also stated in Srivastava (2007) that RL is part of green supply chain management. Not only economic and environment, RL is also have social benefits (Feng, 2019) and (Iserna, 2019). However, obstacles are often encountered in implementing RL, such as the results of research by Makaleng & Lambert (2021), where lack of skills and skills transfer, transport, and gatekeeping are barriers to implementing RL in the pharmaceutical industry.

In Indonesia, mobile phone waste is mostly managed by informal actors, through the starting point of the second hand market. Informal actors will get economic benefits from the activities of managing used cell phones. However, if used cell phone management activities are carried out without safe technology, the impact can disrupt the health of informal actors and damage the environment. Several authors such as Chatterjee & Kumar (2009), Chi et al. (2011), Joseph (2007), Li et al. (2011), Kyere et al. (2018), and Robinson (2009) elaborated contamination of the environment due to e-waste management activities by informal parties.

On the other hand, Original Equipment Manufacturers (OEMs) as formal actors have the technological capabilities to handle used cell phones. However, the offer of a used cell phone return program in Indonesia is not carried out routinely and according to Budijati et al. (2015), that program is not well known by the public, so that consumer behavior after cell phone consumption is identified in the form of selling to the second hand market, throwing away, storing, and donating to other people.

To reduce or eliminate the negative impact of the management of used cell phones by informal parties, but still provide economic benefits for them, it is necessary to collaborate in the management of used cell phones between informal and formal parties. This collaboration aims to regulate the distribution of the stages of managing used cellphones to the disposal process that is safe for the environment and health.

Several authors provide a definition of collaboration within the supply chain framework, including Simatupang & Sridharan (2002) who define collaboration as two or more independent companies that work together to plan and implement supply chain operations in order to get a better success rate than if they were done alone. Next, Dung (2015), Hudnurkar et al. (2014), Soita (2015), and Wu & Chiu (2018) elaborated the definition of collaboration based on the writings of previous authors. Then, Maheswari (2019) proposed an engagement model between government and intermediary businesses in handling e-waste problems in Indonesia that included empowerment, collaboration, and participation.

The potential or possibility of collaboration between informal and formal actors was conveyed by Ezeah et al. (2013). They reviewed the situation in several countries and proposed the integration of ISR (Informal Sector Recycling) into the formal sector by taking into account contexts and local conditions. Furthermore, Sasaki et al. (2014) investigated the possibility of integrating the informal sector into formal waste management in Indonesia. Meanwhile, based on an analysis of the situation in four countries regarding informal sector business processes, Wilson et al. (2009) stated that there was a clear potential for mutually beneficial cooperation between the formal and informal sectors. Furthermore, Li & Tee (2012) suggested that to minimize the negative impact of informal channel activities, RL activities and the integration of IWS (Informal Waste Sector) into the formal sector are required.

To the best of the authors' knowledge, no formal and informal forms of cooperation have been found in Indonesia in handling used cell phones. However, there's a community of secondhand market actors in some regions. This community has regular meetings to strengthen their relationship.

This study aims to explore the intention for collaboration between formal and informal parties in RL activities managing used cell phones and the driving factors of collaboration intentions. For this reason, the intention of collaboration in this study is the intention to carry out management activities for used cell phones so that used cell phones can return to their original point for the handling process or if the disposal is required to do, it does not damage the environment or endanger human health.

Meanwhile, the factors driving collaboration intentions are based on factors that can encourage informal actors to carry out activities that lead to the prevention of environmental damage or environmental behaviors in general. Several authors who explain the environmental behavior of managers include Leszczynska (2010), who examines the environmental awareness of managers and sees further whether this awareness is related to socio-economic development. This study involved managers in three countries, namely 200 managers in Australia and Ukraine and 250 managers in Poland. Lopez-Gamero et al. (2011) examined the environmental attitudes of hotel managers in Spain in the form of perceptions of the natural environment which are influenced by internal and external factors of the company. Next, Nambiar & Chitty (2014) examines the views of business managers in India on the relationship between sustainability and the environment. Ye et al. (2013) examined the attitudes of top managers in 209 companies in China regarding the implementation of reverse logistics in companies in the form of product returns and product recovery. Therefore, the research objectives in this study are:

1. Explore the collaboration intention of informal actors to manage used cellphones with formal actors so that cellphone waste remains safe for the environment and human health
2. Find out the driving factors of the collaboration intention of informal actors in handling used cellphones

3. Examine the influence of the driving factors on the collaboration intention of informal actors in handling used cellphones.

2- Literature review and hypotheses development

This sub-section, the driving factors that can influence collaboration intentions for informal channel actors will be described. This collaboration intention means the intention to behave in the environment. The driving factors for environmental behavior comes from internal or external. Internal driving factors are factors that come from individuals as part of the company or factors that describe the company's internal conditions. The external driving factors are factors that come from outside the company, outside the company's control but are able to affect the company's performance.

Fraj-Andrés et al. (2008) stated that the environmental behavior of firms depends on some internal and some external forces, where it is mentioned that one example of an external force is the new environmental law. He et al. (2017) also proposed the existence of internal and external pressures on corporate environmental behavior in their study of 702 paper-making companies in China. Testa et al. (2015) conducted a study to determine the effect of external pressure, internal factors, and environmental attitudes of entrepreneurs on a small and micro-scale of the company's proactive environmental strategy. Yen & Yen (2012) stated internal and external motivations for green purchasing activities in electronic companies in Taiwan.

Furthermore, the factors considered in this research include internal and external factors, which consist of three internal factors (environmental attitude, management commitment, and financial benefits) and two external factors (government support and competitor pressure). These factors were determined based on a literature review of the factors that can motivate environmental intentions and behavior in a company and adjustments to the case studies in this research through field validation by asking several initial respondents in each research area whether the conditions of informal actors have felt these factors involved.

The driving factors considered in this study are explained as follows.

2-1- Environmental attitude

The environmental attitude in this study is intended as a positive attitude of informal actors (secondhand cellphone actors) towards the environment, commonly referred to as an environmentally friendly attitude. In line with Janmaimool and Khajohnmanee (2019), they define environmental attitude as a person's belief in the relationship between humans and the environment. This belief also includes understanding the consequences when environmental damage occurs. Meanwhile, Chan et al., (2017) stated that environmental attitude is often equated or interchanged with environmental concern. Arshad et al. (2022) and Okumus et al. (2019) explored environmental attitudes in environmental knowledge, awareness, and concern.

He et al. (2017) showed that internal pressure could affect corporate environmental behavior, where employee and top management environmental awareness are part of internal pressures. Then, Okumus et al. (2019) presented that the environmental attitude (in terms of environment concern) of hotel employees in Turkey is the best predictor of ecological behavior. Furthermore, Arshad et al. (2022) stated that employees with an excellent environmental attitude would encourage organizations to implement environmental management system policies. Moreover, Long et al. (2017) examined the impact of attitude toward environmental behavior on environmental innovation intention in 182 companies of various types in China. Then, Drag et al. (2020) examined the relationship between employees' environmental attitudes and employees' ecological behavior in employees of 65 small and medium-sized hotels operating in Pakistan's tourist areas. Next, Testa et al. (2016) conducted a study to determine the effect of environmental awareness of managers to adopt a proactive corporate environmental strategy in 355 small and micro-scale businesses in Liguria, a region in central Italy. Then, Zientara and Zamojska (2018) examined the relationship between environmental values or beliefs held by hotel employees in Poland with organizational citizenship behavior for the environment (OCBE), and the results showed a positive relationship. From the previous research reviewed, it is expected that someone with a high environmental attitude will also show positive environmental behavior. Therefore, the hypothesis of this research is as follows.

H1: Environmental attitude has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2-2- Management Commitment

Management commitment referred to in this study is a form of responsibility and commitment from the owners and employees of the second-hand cellphone market to carry out activities that support the environment. In this case, it can be realized by collaborating in the management of used cell phones among formal parties so that the activities of handling used cell phones do not damage the environment or endanger workers' health.

In general, as stated in El-Kassar & Singh (2019), management commitment is the encouragement given by the

company to carry out environmentally friendly activities and the response to these ideas to be incorporated into the corporate culture. Yusliza et al. (2019) presented that to achieve the goal of successful implementation of green activities, top management must provide a high commitment so that the implementation of green activities can offer a competitive advantage for the company. In addition, Ates et al. (2012) stated that organizational capability plays a role in facilitating the implementation of the company's environmental strategy and impacts environmental performance, where one source of organizational capability is organizational commitment.

Ates et al. (2012) demonstrated that organizational commitment positively impacts the extent to which firms adopt a proactive environmental strategy in manufacturing firms in Turkey. Ghazilla et al., (2015) stated that management commitment is one of the drivers for implementing green manufacturing practices in SMEs in Malaysia. Likewise, Nordin et al. (2014) showed that top management commitment is one of the main drivings of sustainable manufacturing implementation in manufacturing companies in Malaysia, involving respondents from operation managers, manufacturing managers, and the environmental, safety and health managers. In addition, He et al. (2017) stated that internal pressure affects corporate environmental behavior, where one form of internal pressure is commitment management. Drag et al. (2020) found that Manager's environmental commitment strengthens the relationship between employees' environmental attitudes and employees' ecological behavior. Yen & Yen (2012) show a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities in the electronics industry in Taiwan. Yusliza et al. (2019) found that top management commitment influences various green human resource management (GHRM) activities, which include green analysis and job description of job position, green performance, green recruitment, green rewards, green selection, and green training in 400 Malaysian manufacturing and service organizations.

Furthermore, Bhatia and Jakhar (2021) studied the effect of top management commitment (TMCO) on green product innovation (GPI) in Indian automotive manufacturing companies empirically. Burki et al. (2019) examined the relationship between top management commitment and process innovation in the green supply chain (GSC), in the form of green process innovation and green managerial innovation in selected ISO 14000 certified Turkish exporting firms located in the Izmir region (Turkey). Meanwhile, Lee & Joo (2020) investigated whether support from Top Management can significantly increase the level of environmental collaboration with participating companies in upstream and downstream green supply chains and their impact on environmental work in companies in manufacturing industries in South Korea.

It is necessary to have awareness from its internal parties in implementing environmental conservation activities. The management commitment factor explains organizational commitment from top management to employees in behavior that supports environmental preservation. Therefore, related to this research, the proposed hypothesis is:

H2: Management commitment has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones

2-3-*Financial benefit*

The financial benefits as a driving factor in this study is the potential profits obtained when informal actors carry out environmental conservation activities in the form of collaboration in handling used cell phones. Maheswari, et al. (2020) investigated that finance was one of the informal e-waste business performance measurements using a sustainable reverse logistics scorecard. Financial was one of the dimensions/driving factors that influenced the green supply chain collaboration (Paula et al., 2019) and green manufacturing practice in small medium enterprises (Ghazilla et al., 2015).

Likewise Nordin et al. (2014) identified one of the driving of sustainable manufacturing activity is economic benefit, where the research was conducted in Malaysian manufacturing industries. Aside from the improper disposal, the challenges of the current EoL electrical and electronic equipment recycling program was the home storage and the informal actors. The reason is the lack of economic incentives for the proper return of used electronic equipment, especially for expensive and quickly obsoloete products (Shevchenko et al., 2019).

Henriques & Catarino (2016) conducted a preliminary study on small and medium-sized companies in Portugal to adopt energy efficiency improvements. One of the identified motivators is financial factors that provide benefits in strengthening capacity, providing financing, external parties for financial and technical guidance, access to capital, financial resources to develop bankable projects, and financial support for investment. Then, Kudlak (2017) examined the drivers for implementing environmental management systems in companies in Poland. These drivers include efforts to reduce costs, increase sales, and increase market share. Next, Meath et al. (2016) identify the key factors that motivate and hinder the design process of a voluntary energy efficiency program for SMEs in Queensland. It was identified that factors related to economic profit are one of the motivators, namely financial interests in the form of reducing energy costs, opportunities to obtain funding, and obtaining marketing opportunities due to the promotion of environmental performance achievements.

Testa et al. (2016) examined managers' opinions about motivators in the adoption of proactive corporate environmental strategies. One of the motivators is the internal factor which is cost-saving. While, Wang et al. (2018) stated that one of the reasons companies support green supply chain management activities is the cost driver, where companies can reduce costs while helping environmental sustainability. This research was applied to plants in three

industries: machinery, electronics, and transportation in various countries. It was found that the cost drivers significantly influence internal and external green practices. Referring to the results of previous studies, the hypothesis in this study becomes:

H3: financial benefit has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones

2-4- Government support

As one of the stakeholders in environmental control, the government plays a role in motivating environmental conservation. Government support in this study is explained as the role of the government in supporting informal actors to reduce used cell phone management activities that are not safe for the environment and health. This support can be in the form of regulation, providing incentives, and providing facilities and infrastructure that informal actors can utilize in carrying out their activities.

The previous studies showed the government's role in encouraging companies to carry out environmental conservation activities. As stated by Lee (2008), the involvement of local and central governments in green supply chain (GSC) initiatives, in the form of coordinating the GSC initiatives, increasing funds for the activities, providing information and technical assistance to small and medium-sized firms, popularizing knowledge of environmental management, and build infrastructure for facilitating GSC initiatives. While Tatoglu et al. (2015) examined the relative importance of each dimension of the Corporate Environmental Policies (CEP), one of the dimensions is stakeholder pressure, including government policies and regulations.

Several researches are related to an initial study on the importance of government support in environmental activities, including Ghazilla et al. (2015). They conducted a preliminary study to determine the driving and inhibiting factors for applying green manufacturing practice in Malaysian SMEs. They found that the legislation factor in which there is a financial incentive from the government is one form of government support. Then, Henriques & Catarino (2016) identified the situation in small and medium-sized companies in Portugal adopting energy efficiency improvements. Government policy is considered as a motivator, where government policies include: the obligation of the state and government to develop effective energy programs, the need to design energy efficiency programs, there are government representatives in suppressing energy efficiency, providing fiscal subsidies, and providing grants for technology investment. Next, Moktadir et al. (2018) identified the primary motivators in adopting sustainable manufacturing practices for the Bangladesh leather industry. One of the identified drivers is governmental support and legislation, which the government requires to provide funds to implement these activities smoothly.

Meanwhile, studies examining how government support influences corporate environmental activities include He et al. (2017). They examined government pressure influences corporate environmental behavior, which consists of environmental defensive behavior, environmental accommodative behavior, and proactive environmental behavior. Ye et al. (2013) examined government pressure on the attitude of top managers to implement RL in the form of product returns and product recovery and found that government pressure had a significant effect on managers' attitudes.

From these previous studies, it is clear that government support is one of the drivings of the company's environmental activities. For this reason, the hypotheses developed regarding government support are:

H4: Government support has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones

2-5- Competitor pressure

In addition, according to Dai et al. (2018), Competitive pressure influences a company's response to aggressive environmental strategies. It is the key role in adopting small medium enterprises because it is sensitive to the competition they have (Nugroho, 2015).

The competitor pressure factor means competitor activities such as obeying existing regulations, being committed to environmental activities, and establishing cooperation in environmental conservation will affect informal parties. The influence of competitor pressure related to environmental preservation will encourage informal actors to do the same.

Ghazilla et al. (2015) considered competitor pressure as one of the business environments for implementing green manufacturing practices. Meanwhile, Tatoglu et al. (2015) examined the relative importance of the Corporate Environmental Policies (CEP) dimension, where competitor pressure is part of the stakeholder pressure dimension. Weng et al. (2015) examined the effect of competitor pressure in applying green innovation in manufacturing and service firms in Taiwan. This study found that competitor pressure had a positive and significant impact on the company's green innovation activities. Furthermore, Ye et al. (2013) examined the effect of competitor pressure on the attitude of top managers to carry out RL activities in the form of product returns and product recovery. It was found that competitor pressure had a significant effect on the attitude of managers to the implementation of the RL. From the previous research reviewed, the proposed hypothesis in this study is:

H5: competitor pressure has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones

3- Research Methodology

3-1- Research Object

The objective of this research is to measure the intentions of informal actors who handle used cell phones to collaborate with formal actors. It started from a phenomenon of the rise of informal actors in Indonesia who carry out buying and selling activities, and repairing used cell phones. Consumers who use mobile phones are usually not aware of the sustainable actions they should take with their used phones. Then, informal parties and consumers benefit in the recycling economy.

The driving factors employed in this study are based on the literature review and phenomenon in the real system, namely environmental attitude, management commitment, financial benefits, government support, and competition pressure. Respondents in this study were informal actors in the second hand market in the Special Region of Yogyakarta. There are five regions where this research was carried out, such as:

a. Gunung Kidul region

Gunung Kidul region has the position 007°46'00"-008°09'00" south latitude & 110°21'00"- 110°50'00" east longitude with the borders in the north is Klaten region, the south is Indian Ocean, the west is Bantul region and Sleman region, and the east is Wonogiri region. It is the biggest area compared to other, it is about 1,431 km^2 (Bappeda, n.d.-a) with total population is about 747,161 per 2020 and population growth rate 0.88% (Bappeda, n.d.-b). This region has 18 sub-districts, 144 villages, and 1,431 hamlets. Geographically, Gunung Kidul region is located in the southeastern part of the Special Region of Yogyakarta. Gunungkidul Regency has neither inland nor remote areas. According to geographical conditions, there are 18 coastal villages, 56 villages located on the slopes/ridges of the hills and 70 villages located on the plains. The capital of this region is Wonosari.

b. Bantul region

The position of Bantul region is 14º04'50" - 27º50'50" South Latitude and 110º10'41" - 110º34'40" East Longitude. This region is surrounded by Gunung kidul region in the east, Yogyakarta municipality and Sleman region in the north, Kulon progo region and Indian Ocean are in the west and the south, respectively. The area is about 508.13 km^2 (Bappeda, n.d.-a). Then, in 2020, the population was about 985,770. This region had the highest growth rate compared to other regions, that is 1.14% (Bappeda, n.d.-b). Bantul region has a plain area located in the middle and hilly areas located in the east and west, as well as a coastal area in the south. This region consists of 17 sub-districts divided into 75 villages and 933 hamlets (K. B. Pemerintah, n.d.). The capital of this region is Bantul.

c. Kulonprogo region

The position of Kulonprogo region is 007º 38'42" - 007º 59'3" South Latitude and 110º 01'37" - 110º 16'26" East Longitude. It is surrounded by Bantul region and Sleman region in the west; Magelang, Indian Ocean, and Purworejo are in the north, the south, and the west, respectively. Not much different from Bantul region, the area of Kulonprogo region has 586 km^2 (Bappeda, n.d.-a). In 2020, the population was about 436,395 with the growth rate at about 0.99% (Bappeda, n.d.-b). This region consists of 12 sub-districts and 88 villages (K. K. P. Pemerintah, n.d.). The capital city of this region is Wates.

d. Sleman region

The position of Sleman region is 110° 33′ 00″ and 110° 13′ 00″ East Longitude, 7° 34′ 51″ and 7° 47′ 30″ South Latitude. It is surrounded by Boyolali region and Central Java in the north; Yogyakarta municipality, Bantul region, and Gunung Kidul region in the south; Kulon Progo region and Magelang region in the west; and Klaten region and Central Java in the east. The area of the Sleman region is about 574 km^2 (Bappeda, n.d.-a). Compare to other regions, Sleman region has the highest population which is about 1,125,804 with the growth rate was 1.06% (Bappeda, n.d.-b). It consists of 17 sub-districts, which have 86 villages and 1212 hamlets (K. S. Pemerintah, n.d.). The capital of this region is Sleman.

e. Yogyakarta municipality

The position of Yogyakarta municipality is 110º24'19" to 110º 28'53" East Longitude and 7º15'24" to 7º49'26" South Latitude with an average elevation of 114 m above sea level. The borders are Sleman region and Bantul region in the north and the south, respectively. Then, Bantul region and Sleman region are both in the west and the east. Compared to other regions, Yogyakarta municipality has the smallest area which is about 32.50 km^2 (Bappeda, n.d.-a). Even though the total population was about 373,589 people and the growth rate was 1.06%, this region is the most densely populated in 2020 (Bappeda, n.d.-b). There are fourteen districts and 45 villages (K. Y. Pemerintah, n.d.). The capital of this region is Yogyakarta city.

3-2- Measurement

The measurement of collaboration intention by distributing questionnaires from September to October 2018 with filling out the questionnaire using a Likert scale of 1 to 5. Figure 2 presents the conceptual framework of this research. The driving factors are divided into two parts, internal and external factors. Internal driving factors are environmental attitude, management commitment, and financial benefit. On the other hand, the external driving factors are government support and competitor pressure. Those factors are adapted from previous research, like:

1. Environmental attitude was adapted from (Long et al, 2017) and Testa et.al (2015)
2. Management commitment was adapted from (Ates et al, 2014) and (Ghazilla et al, 2015)
3. Financial benefit was taken from (Meath et al. (2016); Henriques & Catarino, 2016; Wang et al. (2018); Nordin et al. (2014)
4. Government support was adapted from Tatoglu et al, 2015; Henriques & Catarino, 2016)
5. Competitor pressure (Chiou et al. (2011); Ghazilla et al., (2015); Tatoglu et al. (2015); Christmann (2004) dalam Weng et al., 2015)
6. Collaboration intention (3 items adapted from Ajzen, (2006) and 2 items developed in this study)

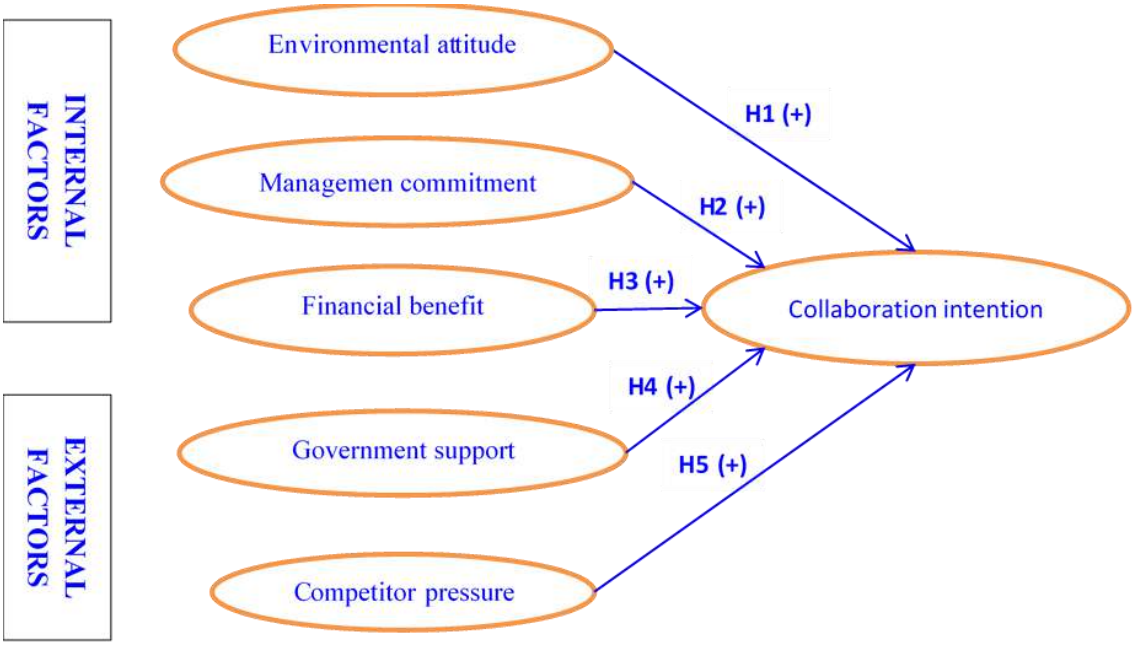


Figure 2. Conceptual model

4- Results and Discussion

4-1- Demographic Characteristic

The questionnaire was distributed to second hand market actors (that includes buying and selling, cell phone service or cannibalization) in Yogyakarta province for 424 respondents from September to October 2018. It consists of several regencies, such as Bantul for 75 respondents, Sleman for 160 respondents, Yogyakarta municipality for 90 respondents, Gunungkidul for 50 respondents, and Kulonprogo for 49 respondents. The respondents' characteristics are age, gender, household member, income, education level, marital status, position at work, and treatment of used components as shown in Figure 3 and 4.

The majority of respondents are male and an average of 71% of respondents around the age of 20-30 years. Interestingly, with the total 92% of respondents who have senior high school and above for education level, almost 55% of respondents have an income of approximately 1-2 million per month.

In addition, as shown in Figure 4, the majority of respondents are unmarried and the position at work as an employee. Then, almost 60% of the respondents save the used components. The reasons are the respondents often reuse those parts for other broken cell phones and repair those parts for resale.

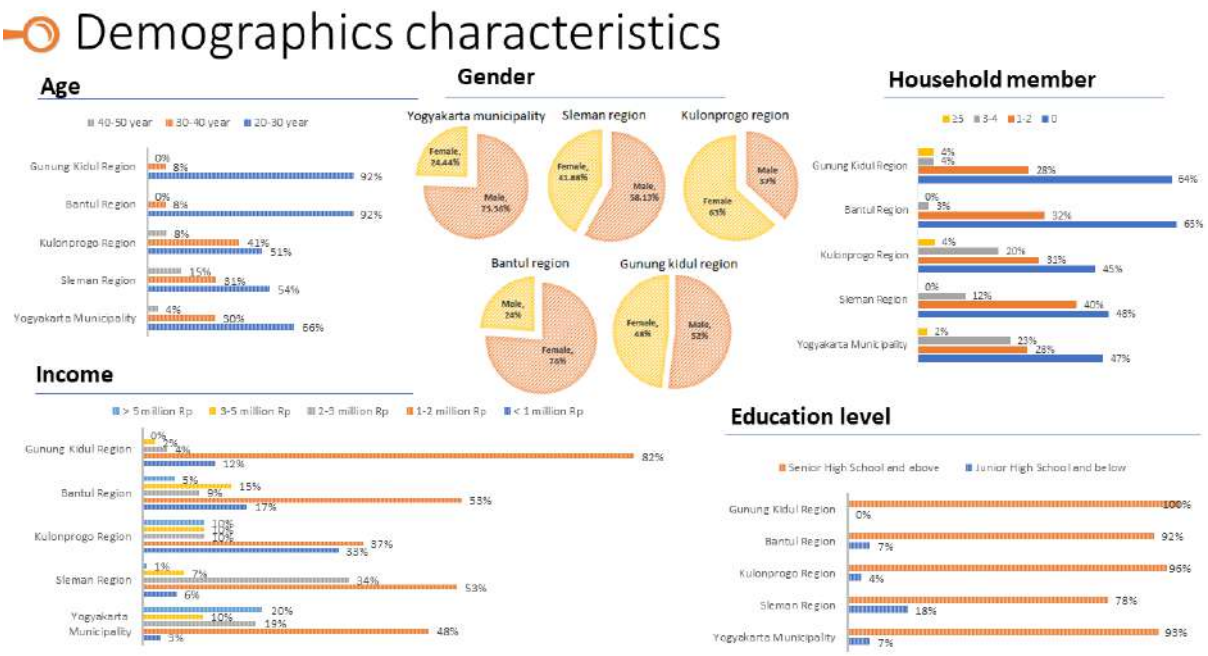


Figure 3. The demographic characteristics: age, gender. household member, income and education level

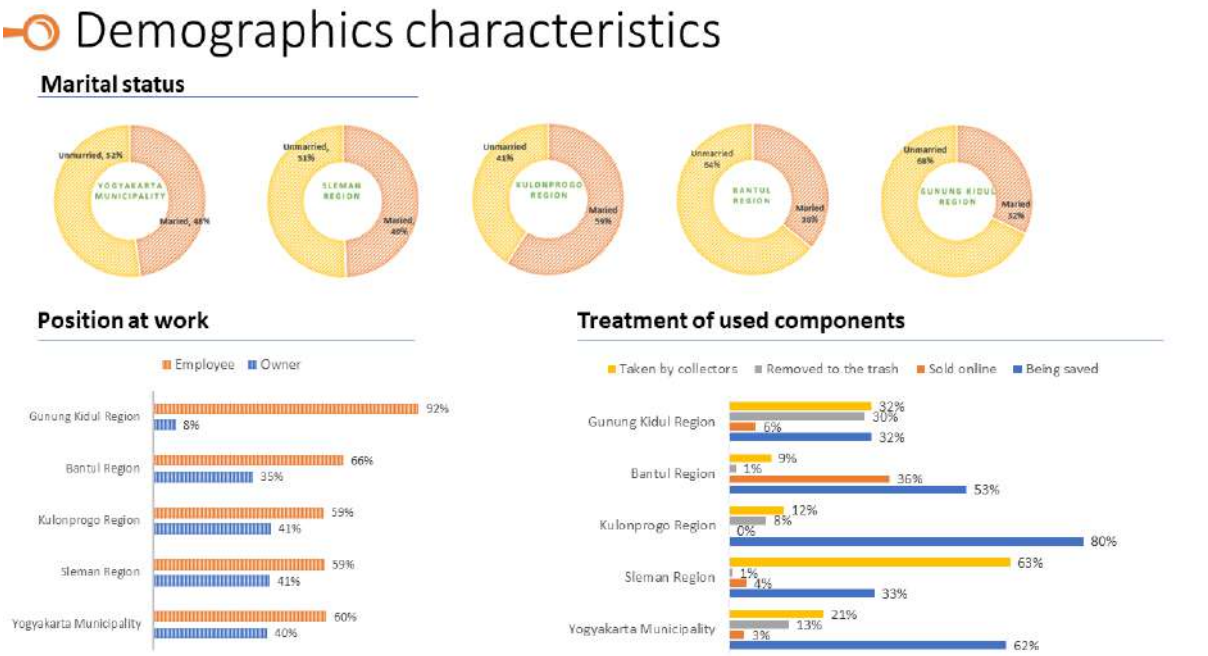
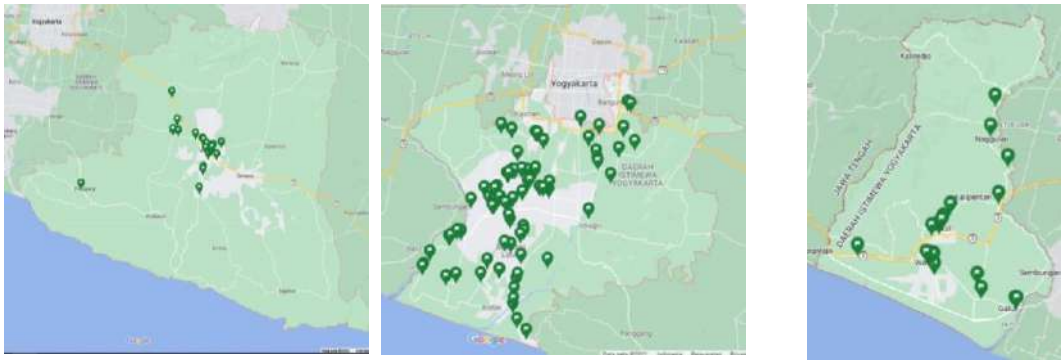
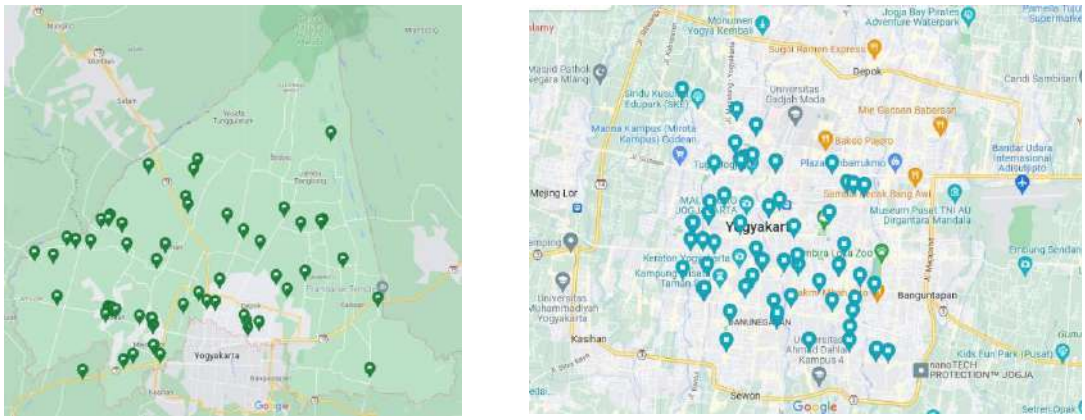


Figure 4. The demographic characteristics: marital status, position at work, and treatments of used components

Furthermore, Figure 5 presents the position of used cell phone second hand market actors based on snowball sampling in some regions of the Special Region of Yogyakarta province.



(a) Gunungkidul region (b) Bantul region (c) Kulonprogo region



(d) Sleman region (e) Yogyakarta municipality

Figure 5. The position of used cell phone second hand market actors in some regions of the Special Region of Yogyakarta province

4-2- Regression Analysis Result

This section discusses the results of collaboration intention and regression analysis of driving factors on handling the collaboration of used cell phones for the second hand market actors. Before the regression analysis was applied, the reliability and validity tests were carried out on the questionnaires distributed in each region. For the city of Yogyakarta, Bantul, Gunungkidul, and Kulonprogo districts using 30 initial respondents' answers, while for Sleman Regency used 40 respondents' answers.

Reliability tests were conducted to measure the consistency of the questionnaire which is an indicator of the variables. A questionnaire is said to be reliable if a respondent's answers to the questions are consistent from time to time. According to Barr and Gilg (2007), the questionnaire is said to be reliable if the value of Cronbach α is more than 0.6. The test results for each region showed that the Cronbach α coefficient of six variables were more than 0.6, which means that all the factors were reliable.

In addition, the validity test was required to show the extent to which the questionnaire items used in a study were able to measure what it wanted to measure. Validity test is used to measure the validity of a questionnaire item. The validity test in this study was carried out by comparing the total Pearson correlation value with the R table value (n= 30, df=28, so the R table value=0.3061 and for n=40, df=38, so the R table value=0.2639). Questionnaire items are declared valid if the Pearson correlation value is greater than the R table value. Tests of reliability and validity are conducted by employing SPSS statistical software. The Appendix 1. represents the results of both tests. It shows that all the data collected were reliable and valid.

a. Gunungkidul region

Respondents in Gunungkidul amounted to 50 informal actors, from the respondents' answers the average value of each factor studied and the value of collaboration intentions was obtained, which is presented in Table 1. The

calculation shows that the collaboration intention of informal actors in the GunungKidul region is 3.46, which means the Informal actors argue that they are neutral and close to agreeing to intend to collaborate.

Table 1. Results of descriptive analysis of respondents' answers in Gunungkidul Regency

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.46	3.00	3.40	3.40	3.70	3.40

Before performing regression analysis, it is necessary to test the classical assumptions. The purpose of classical assumption testing is to provide certainty that the regression equation obtained is accurate in estimation, unbiased, and consistent. This classic assumption test is a prerequisite test that is carried out before carrying out further analysis of the data that has been collected. Classical assumption test in this research consists of normality test, multicollinearity test, and heteroscedasticity test. Classical assumption test results for each region are shown in Appendix 2. It can be seen that for the Gunungkidul area, all classical assumption tests are met. The regression result of driving factors on handling collaboration of used cell phones for second hand market informal actors in Gunungkidul region is presented in Table 2. It can be seen that the government support is the most significant driving factor compared to others.

Table 2. The regression result for Gunung Kidul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.700	0.572		1.328	0.191
Environmental attitude	-0.084	0.120	-0,089	-0.702	0.486
Management commitment	0.212	0.147	0.218	1.436	0.158
Financial benefits	0.071	0.181	0.71	0.390	0.699
Government support	0.376	0.125	0.388	3.018	0.004
Competitor pressure	0.187	0.186	0.191	1.005	0.320

Factors that affect collaboration intentions are seen if the significance value is smaller than 0.05, then these factors affect collaboration intentions in handling used cell phones. In Gunung Kidul region, there is one factor that influences collaboration intentions in handling used cell phones, namely government support with a significance value of 0.004 and it was also found that management commitment had a moderate effect on collaboration intentions with a significance value of 0.158. Based on the results of multiple determination (R^2) of 0.462 (see Table 3), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 46.2% while 53.8% is influenced by other factors outside the model.

Table 3. The R^2 result for the driving factors of collaboration intention for Gunung Kidul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.680	0.462	0.401	0.61640

b. Bantul region

A total of 75 informal actors as respondents in the Bantul area. The average value of each factor and the value of collaboration intentions, based on respondents' answers are presented in Table 4. The results show that the value of collaboration intentions of informal actors in Bantul Regency is 3.87, meaning that informal actors have the intention to collaborate.

Table 4. Results of descriptive analysis of respondents' answers in Bantul region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.87	4	3,8	3,8	4.2	3.8

As in general research uses regression analysis, it is preceded by applying the classical assumption test. The results of the classical assumption test for the Bantul region are presented in Appendix 2. The results of the classical assumption test for the Bantul region show that it is fulfilled for all types of tests.

The regression result of driving factors on handling collaboration of used cell phones for second hand market informal actors in the Bantul region is presented in Table 5. It can be seen that the management commitment is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Bantul region is 3.87.

Table 5. The regression result for Bantul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.756	0.728		1.038	0.303
Environmental attitude	0.195	0.135	0.168	1.441	0.154
Management commitment	0.334	0.125	0.321	2.665	0.010
Financial benefits	0.090	0.120	0.103	0.755	0.453
Government support	0.092	0.130	0.086	0.707	0.482
Competitor pressure	0.080	0.160	0.0802	0.498	0.620

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05), then these factors affect collaboration intentions in handling used cell phones. In the Bantul region, there is one factor that influences collaboration intentions in handling used cell phones, namely management commitment with a significance value of 0.010 and also obtained a factor that has a moderate influence on collaboration intentions, namely environmental attitude with a significance value of 0.154. Based on the results of multiple determination (R^2) of 0.270 (see Table 6), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27% while 73% is influenced by other factors outside the model.

Table 6. The R^2 result for the driving factors of collaboration intention for Bantul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.501	0.270	0.217	0.41717

c. Kulonprogo region

In the Kulonprogo area, there are 49 informal actors who act as respondents. Table 7 shows the average value of respondents' answers for each factor and collaboration intention. The value of collaboration intention is 3.783, meaning that informal actors in Kulonprogo Regency intend to collaborate in handling used cell phones with formal actors.

Table 7. Results of descriptive analysis of respondents' answers in Kulonprogo region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.783	4.097	3.963	4.021	4.438	3.982

Classical assumption test needs to be done before performing regression analysis. The complete results of the classical assumption test are shown in Appendix 2. It appears that for the Kulonprogo area, all classical assumption tests can be met.

The regression result of driving factors on handling collaboration of used cell phones for second hand market informal actors in the Kulonprogo region is presented in Table 8. It can be seen that the competitor's pressure is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Kulonprogo region is 3.783.

Table 8. The regression result for Kulonprogo region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.154	0.811		0.190	0.851
Environmental attitude	0.102	0.161	0.092	0.632	0.531
Management commitment	-0.122	0.150	-0.129	-0.814	0.420
Financial benefits	0.092	0.148	0.091	0.626	0.535
Government support	0.384	0.152	0.326	2.533	0.015
Competitor's pressure	0.414	0.160	0.413	2.593	0.013

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05), then these factors affect collaboration intentions in handling used cell phones. In Kulonprogo region, there is one factor that influences collaboration intentions in handling used cell phones, namely competitor pressure with a significance value of 0.013 and government support in significance of 0.015. Based on the results of multiple determination (R^2) of 0.364 (see Table 9), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 36.4% while 63.6% is influenced by other factors outside the model.

Table 9. The R^2 result for the driving factors of collaboration intention for Kulonprogo region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.603	0.364	0.290	0.46400

d. Sleman region

Respondents in Sleman Regency were 160 informal actors. In summary, the average value of the respondents' answers about the five factors studied and the average value of collaboration intentions are presented in Table 10. It can be seen from the table that the value of collaboration intentions of informal actors in Sleman is 4,008. This value is the highest intention value compared to other regions. That means they really intend to collaborate.

Table 10. Results of descriptive analysis of respondents' answers in Sleman region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	4.008	3.904	3.979	3.983	4.019	4.009

Before performing regression analysis, it is necessary to test the classical assumptions. The results of this test are shown in Appendix 2. The results of the classical assumption test for the Sleman region show that it is fulfilled for all types of tests.

The regression result of driving factors on handling collaboration of used cell phones for second hand market informal actors in the Sleman region is presented in Table 11. It can be seen that the government support is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Sleman region is 4.008.

Table 11. The regression result for Sleman region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	2.408	0.406		5.938	0.000
Environmental attitude	0.029	0.048	0.049	0.603	0.547
Management commitment	0.142	0.069	0.163	2.066	0.040
Financial benefits	0.137	0.071	0.161	1.926	0.056
Government support	0.218	0.069	0.254	3.160	0.002
Competitor pressure	-0.125	0.085	-0.128	-1.466	0.145

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05), then these factors affect collaboration intentions in handling used cell phones. In the Sleman region, there is one factor that influences collaboration intentions in handling used cell phones, namely government support with a significance value of 0.002, then management commitment and financial benefit with successive levels of significance 0.040 and 0.056. Based on the results of multiple determination (R^2) of 0.141 (see Table 12), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 14.1% while 85.9% is influenced by other factors outside the model.

Table 12. The R^2 result for the driving factors of collaboration intention for Sleman region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.375	0.141	0.113	0.34253

e. Yogyakarta municipality

For the Yogyakarta city area, there are 90 informal actors as respondents. Table 13 presents the average value of each factor and the value of collaboration intention, which was obtained from the answers of the respondents. It can be seen that the value of collaboration intention is 3.60. This means that the level of collaboration intention of informal actors in the city of Yogyakarta is neutral and close to agreeing to collaborate.

Table 13. Results of descriptive analysis of respondents' answers in Yogyakarta municipality

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.60	4,00	3.75	3.70	4.21	3.86

The classical assumption test that was carried out before the regression analysis shown in Appendix 2. It shows that all types of tests are met for the Yogyakarta city area, so it can be continued with regression analysis.

The regression result of driving factors on handling collaboration of used cell phones for second hand market informal actors in the Yogyakarta municipality is presented in Table 14. It can be seen that the environmental attitude is the most

significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Yogyakarta municipality is 3.60.

Table 14. The regression result for Yogyakarta municipality

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0,866	0,618		1,403	0.164
Environmental attitude	0,396	0,118	0,343	3,372	0.001
Management commitment	-0,011	0,143	-0,009	-0,075	0.940
Financial benefit	0,292	0,121	0,282	2,408	0,081
Government support	0,014	0,106	0,014	0,135	0,839
Competitor pressure	0.010	0,115	0,010	0,089	0,929

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05), then these factors affect collaboration intentions in handling used cell phones. In the Yogyakarta municipality, there is one factor that influences collaboration intentions in handling used cell phones, namely environmental attitude with a significance value of 0.002 and financial benefit have a moderate impact with a significance level of 0.081. Based on the results of multiple determination (R^2) of 0.274 (see Table 15), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27.4% while 72.6% is influenced by other factors outside the model.

Table 15. The R^2 result for the driving factors of collaboration intention for Yogyakarta municipality

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.524	0.274	0.232	0.57013

In summary, the most influential factors on the intention to collaborate in each region are presented in Figure 6. From the figure, it can also be seen the position of one region with another in the Special Region of Yogyakarta Province.

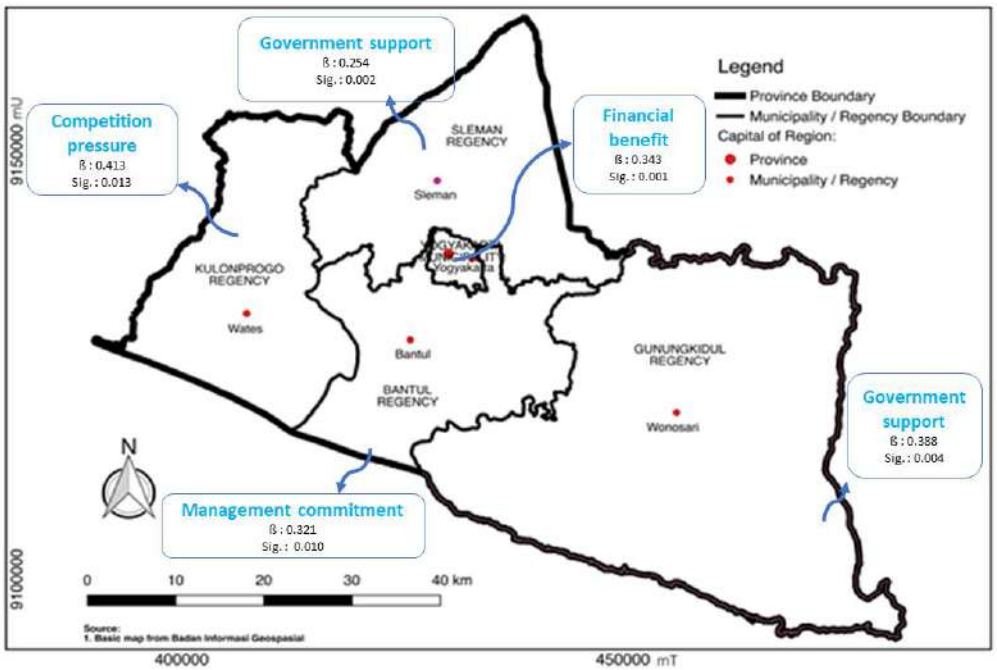


Figure 6. The most significant driving factors in each region in The Special Region of Yogyakarta Province, Indonesia

f. The Special Region of Yogyakarta Province

The results for the Special Region of Yogyakarta Province were obtained by processing the data from five regions, which is the total 424 respondents. The value of this collaboration intention for all actors was 3.744. It means that generally the respondents had the collaboration intention in handling used cell phones with formal actors. The values for each factor at the provincial level, which are obtained from the average values of the five regions are shown in Table 16.

Table 16. Results of descriptive analysis of respondents' answers in Special Region of Yogyakarta Province

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure

Average value	3,744	3,800	3,778	3,781	4,113	3,810

Next, to obtain the factors that influence the collaboration intentions of all actors at the province level, the Structural Equation Modelling (SEM) approach is used. Before the structural model was formed, the CFA (Confirmatory Factor Analysis) was conducted on exogenous variables. For endogenous variables, CFA is not necessary, because there is only one variable. CFA is intended to check whether all questionnaire items can be used. There is no general rule in determining the cut-off value for loading factor (Doll et al., 1995). This paper specified the loading factor as more than 0.5. In the exogenous CFA, the fit model was achieved with the p-value=0.665, $\chi 2$=210.536, GFI=0.960, AGFI=0.931, and RMSEA=0.000. Based on the value of the loading factor, there were two items deleted, namely the first item on the government support factor and the sixth item on competitor pressure.

The structural model result is shown in Table 17. The structural fit model was obtained with p-value=0.051, $\chi 2$=343.389, GFI=0.945, AGFI=0.915, and RMSEA=0.019. It shows the most significant driving factors in the Special Region of Yogyakarta Province is financial benefit and government support with the influence values are 0.231 dan 0.150, respectively and the significance levels are 0.014 and 0.041, respectively.

Table 17. Structural model result

			Estimate	S.E.	C.R.	P	Label
Collaboration intention	<---	Environmental attitude	-.049	.033	-1.491	.136	par_20
Collaboration intention	<--	Management commitment	.148	.141	1.050	.294	par_21
Collaboration intention	<--	Financial benefit	.231	.094	2.463	.014	par_22
Collaboration intention	<--	Government support	.150	.073	2.048	.041	par_23
Collaboration intention	<--	Competitor pressure	.113	.093	1.216	.224	par_24

Hasil perhitungan koefisien determinasi sebesar 0.284 ditampilkan pada Tabel 18, artinya kelima faktor yang dipertimbangkan dalam penelitian ini, menggambarkan niat kolaborasi sebesar 28.4% berarti 71,6% niat kolaborasi dibentuk oleh faktor lain.

Table 18. Squared Multiple Correlations

			Estimate
Collaboration intention			.284

4-3- Discussion

In this discussion section, the results of each factor influencing collaboration intentions and their managerial implications will be discussed as follows.

a. Environmental attitude

The environmental attitude factor is as the dominant factor influencing the intention to collaborate with informal actors in the Yogyakarta municipality and as a moderate driving for informal actors in the Bantul Region. This factor is related to the attitude of informal actors towards the environment. It means that informal actors with high environmental attitudes will also show high collaboration intentions.

The result shows that the average environmental attitude of informal actors in both Yogyakarta municipality and Bantul Region is 4, which means that the perpetrators have a high environmental attitude. Furthermore, when viewed from the level of education, informal actors in Yogyakarta have a minimum of high school education of 93.3%, while in Bantul it is 92%. According to Latif et al. (2012) education level had a significant impact in pro-environmental intention and behavior, as did Wenshun et al. (2011) demonstrated the difference in the education level correlates with environmental behavior. Yin et al. (2014) stated that the differences in the education level will make a difference in the desire to carry out environmentally friendly behavior. Thus, the higher a person's education level, the higher his concern for the environment.

The results of this study are in line with Arshad et al. (2022), where environmental concern significantly affects the ecological behavior of employees in small and medium hotels in Pakistan. Also, according to Chan et al. (2017), environmental concern was positively related to ecological behavior of international tourist hotel employees in Hong Kong. Likewise, He et al. (2017) showed that employee and top management environmental awareness could affect corporate environmental behavior. In addition, Long et al. (2017) demonstrated the positive and significant impact of the attitude toward environment factors on the environment. Still related to the influence of environmental attitude, the results of Okumus et al. (2019) showed that the environmental concern of hotel employees in Turkey is the best predictor

of ecological behavior. Then, Tesla et al. (2016) showed that environmental awareness has a positive and significant effect on proactive environmental strategy. Next is also in line with Zientara & Zamojska (2018) research where environmental values were positively related to organizational citizenship behavior for the environment (OCBE).

The managerial implication of this study's results is that to maintain environmental attitudes, informal groups of actors should often hold discussions on environmental issues so that the understanding of the environment becomes even and equal among the actors. Through the Department of Trade and Cooperatives, the government can also contribute to providing information about the environment and its relation to used cell phones. In addition, the formal actors should conduct their social responsibility, such as coaching informal actors to understand how to handle the used cell phones that are safe for the environment and human beings.

b. Management commitment

Management commitment in this study means the commitment of owners and employees in carrying out pro-environmental activities, in this case, collaborating with formal parties in managing used cellphones. The results showed that the management commitment factor strongly influences the intention to collaborate on informal actors in the Bantul and Sleman regions. As for the Gunung Kidul Region actors, this factor has a moderate influence. The value of management commitment in the three regions is 3.8; 3.979; and 3.4 for Bantul, Sleman, and Gunung Kidul, respectively. It can be seen that the management commitment of the informal actors in the Bantul and Sleman Regions is higher than that of the informal actors in Gunung Kidul, so it can be said that it is in line with the level of influence.

The strong influence of management commitment is in line with the research of Ates et al. (2012), which showed that organizational commitment has a positive impact on the adoption of a proactive environmental strategy. It is also n line with the research of He et al. (2017) which stated that one of the internal pressures in the form of commitment management affects corporate environmental behavior. Subsequent results by Tarik et al. (2020) found that a manager's environmental commitment strengthens the relationship between employees' environmental attitude and employees' ecological behavior. Yen & Yen (2012) show a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities. In addition, Yusliza et al. (2019) found that top management commitment positively and significantly affects various green human resource management (GHRM) activities. Lee & Joo (2020) show that top management is an essential factor to influence the level of collaboration between suppliers and customers in a green supply chain.

Meanwhile, Burki et al (2019) found that top management commitment has a positive and significant effect on green process innovation, while its influence on green managerial innovation is moderate. In contrast, the results of Bhatia & Jakhar (2021) are not in line with this study, where top management commitment (TMCO) has no significant effect on green product innovation (GPI).

With the results found in Bantul, Sleman, and Gunung Kidul Region, the managerial implication that can be emphasized is that informal actors with a high level of management commitment need to be maintained. So that owners and employees of informal actors are always committed to carrying out activities that support environmental conservation.

This commitment can be transmitted to other informal actors through meetings held in informal actors associations in several areas so that owners and employees will even understand the importance of being committed to environmental conservation. Local and central governments and formal actors can also contribute to fostering and enhancing this management commitment factor by providing additional information and education related to environmental problems and their handling.

c. Financial benefit

The strong influence of financial benefits on the collaboration intention occurred in informal actors in the Sleman Region and studies at the provincial level. It means that informal actors will intend to collaborate in managing used cellphones if they feel there are economic benefits for them. The effect of moderate financial benefits was found in actors in the Yogyakarta municipality area.

The average value of respondents' answers regarding the financial benefit factor was 3.983 for actors in Sleman Regency, and for all provinces, 3.781 were obtained, which is the average value of financial benefits in all regions. The value of financial benefits to actors in the Yogyakarta municipality area is 3.7. The value of financial benefits that have a strong impact is more significant than those with a moderate influence.

The results of this study are in line with the results of Wang et al. (2018) found that cost drivings significantly influence internal and external green practices. In addition, the used cell phones are usually sold through the informal sector for cashback (Shevchenko et al., 2019).

For managerial insight, the financial benefits for informal actors are one of the most important reasons for running their business. However, the role of these informal actors is less attention. Therefore, the formal actors should support the informal ones to collaborate in handling used cell phones.

d. Government support

There are three regions and a study at the provincial level. It was found that the government support factor had a strong influence on the intention to collaborate, namely in Kulon Progo, Sleman, and the Gunung Kidul Region. Meanwhile, there was no moderate influence of the government support factor for actors in any region. The value of the

government support factor in each regions is 4.438, 4.019; and 3.7 for Kulon Progo, Sleman, and Gunung Kidul, respectively. Meanwhile, the value of government support for actors in all provinces is 4.113.

From the government support questionnaire items, it means that the actors expect the government to support the implementation of pro-environment activities. It will encourage the perpetrators to intend to collaborate in handling used cellphones with formal parties. Therefore, by looking again at the value of government support from the Kulon Progo and Sleman regions, as well as at the provincial level, it seems that this value is very high, so it can be interpreted that these actors expect the government to condition, provide information and technical assistance, popularize environmental management, and provide infrastructure for facilitating environmental activities.

The result of the study is that government support significantly encourages collaboration intention, that is in line with studies by Lee (2008) in which government involvement plays an important role in the willingness of suppliers to participate in the green supply chain. Also, in the research of He et al. (2017), government pressure influenced corporate environmental behavior. Ye et al. (2013) showed that government pressure has a significant effect on managers' attitudes to RL implementation. Next, Nguyen et al. (2018) investigated that laws and regulations play the most significant impacts on recycling behavioral intention, compared to environmental awareness and attitude toward recycling, social pressure, cost of recycling, and inconvenience of recycling.

Furthermore, the management implication of this result is that the government is authorized to provide support in collaboration between formal and informal actors. This support can be in the form of rules, policies, facilities, resources, and information. So far, regulations related to e-waste in Indonesia can be seen in Maheswari (2019). However, these regulations, namely Government Regulation no. 101 of 2014, do not explicitly mention e-waste, but the waste in question is hazardous and toxic material waste in general. Thus, there are no specific regulations regarding e waste management in Indonesia.

e. Competitor pressure

The results show that the competitor pressure factor strongly influences informal actors in the Kulon Progo Region only and is also not seen as a moderate driving. It means the informal actors in Kulon Progo will be encouraged to do collaborative activities in handling used cellphones when their competitors carry out activities related to the environment.

The value of competitor pressure for informal actors in the Kulon Progo Region is 3.982, which means this value is relatively high and higher than the value of competitor pressure in all provinces. If it is seen from the number of informal actors in Kulon Progo, there are fewer than in other regions, and the positions are not too spread throughout the region, so there is a possibility that the level of competition between informal actors will be high.

The results of research related to competitor pressure are in line with the study of Weng et al. (2015), which found that competitor pressure had a positive and significant effect on the company's green innovation activities. Also in line with Ye et al. (2013), where competitor pressure significantly affects managers' attitudes to RL implementation. This finding was supported by previous research conducted by Riva and Gani (2020) that competitor pressure also positively affects the environmental performance of upscale hotels. Competitor initiatives and strategies guide the hotels to adopt green marketing practices. The managerial implication of the results of this research is the need for the role of government and formal actors to provide counselling and training for upgrading knowledge and skills to informal actors.

Generally, the results of this study can be a basis for consideration for stakeholders who may be involved in handling e-waste, mainly used cellphones in Indonesia. For the government as part of the policymakers, these results can be used as input for setting rules, providing information, providing assistance, funding assistance, etc., for the safe management of used cell phones. For formal actors such as mobile phone manufacturers, the results of this study can be used to redesign and promote a program to take back used cell phones from the hands of consumers as a form of corporate social responsibility. In the end, informal actors' handling used cellphones will not harm health and the environment but still provide economic benefits for informal actors.

Seeing the results of the coefficient of determination in each region and the study at the provincial level, which is below 50%, it is still necessary to explore other factors that can motivate second-hand cellphone market players to collaborate in cell phone management. Furthermore, it is also essential to study the factors that can hinder informal actors from collaborating in handling used cellphones with formal actors. Knowing the factors driving and inhibiting collaboration intentions among informal actors will make it easier to develop policy-making and design appropriate forms of collaboration.

5- Conclusion

The results show that generally, informal actors intend to collaborate with formal actors in the management of used cell phones. The driving factors, including environmental attitude, management commitment, financial benefits, government support, and competitor pressure, emerged as the driving force for collaboration intentions in various areas.

The environmental attitude factor is the strongest driving factor for informal actors in Yogyakarta Municipality and is moderately influential in the Bantul Region. The management commitment factor has a strong impact in two areas, namely Bantul and Sleman Region, while for informal actors in Gunung Kidul, the management commitment factor has a moderate effect. Furthermore, it was found that the financial benefit factor strongly influenced the secondhand market players in the Sleman Region, while the actors in the Yogyakarta municipality were only moderately influenced.

Meanwhile, in Sleman, Kulon Progo, and the Gunung Kidul Region, the government support factor strongly encouraged collaboration among informal actors. The competitor pressure factor only appears as a positive and significant encouraging factor for informal actors in the Kulon Progo Region.

While the study for the provincial level, it was found that two main factors that encourage all informal actors are financial benefits and government support factors. Of all the districts/cities and provincial levels, the driving factors for government support most emerged as predictors that influenced the collaboration intentions of informal actors for the management of used cell phones.

The results of this study can be used as a consideration for policymakers to handle e-waste, mainly used cell phones. Formal actors can also use the results of this study in promoting the program to take back used cellphones from the hands of consumers as a form of corporate social responsibility through collaboration with informal actors.

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Appendix 1
The results of the reliability and validity test of the research questionnaire

		Yogyakarta municipality[1]	Sleman Region[2]	Bantul Region[1]	Gunungkidul Region[1]	Kulonprogo Region[1]
Collaboration intention		Cronbach α 0.931	Cronbach α 0.852	Cronbach α 0.852	Cronbach α 0.941	Cronbach α 0.851
		Correlated item –Total Correlation				
1	You intend to take part in the collaborative activity	0.838	0.379	0.808	0.788	0.730
2	You will try to participate in the collaborative activity	0.871	0.489	0.571	0.825	0.662
3	You plan to take part in the collaborative activity	0.906	0.569	0.678	0.880	0.778
4	You are willing to participate in the collaborative activity	0.922	0.434	0.813	0.916	0.676
5	You wish to participate in the collaborative activity	0.913	0.471	0.660	0.789	0.444
Environmental Attitude		Cronbach α 0.721	Cronbach α 0.711	Cronbach α 0.711	Cronbach α 0.797	Cronbach α 0.782
		Correlated item –Total Correlation				
1	Environmental issues need to be a priority in business management.	0.598	0.466	0.408	0.591	0.561
2	Environmentally friendly behavior by the company can provide significant cost reductions.	0.7	0.584	0.375	0.431	0.615
3	The company's environmentally friendly behavior can help companies enter new markets.	0.876	0.401	0.559	0.711	0.459
4	Environmentally friendly behavior carried out by the company can lead the company to become a leader in the market.	0.75	0.683	0.572	0.601	0.822
5	Environmentally friendly behavior by the company can improve the company's image.	0.624	0.348	0.419	0.577	0.389
Commitment Management		Cronbach α 0.844	Cronbach α 0.741	Cronbach α 0.741	Cronbach α 0.905	Cronbach α 0.784
		Correlated item –Total Correlation				
1	All members of the organization/company (owner, manager, and employee) are committed to environmental management and policies.	0.8	0.349	0.408	0.723	0.483
2	Organizational/company culture supports environmental conservation activities	0.687	0.654	0.568	0.895	0.697
3	The organization/company directs and facilitates the implementation of environmental conservation activities	0.867	0.548	0.589	0.790	0.457
4	There are ongoing efforts to support environmental conservation activities	0.802	0.751	0.671	0.807	0.707
5	There is environmental related training for employees	0.796	0.507	0.312	0.611	0.425
Financial Benefits		Cronbach α 0.899	Cronbach α 0.710	Cronbach α 0.710	Cronbach α 0.793	Cronbach α 0.892
		Correlated item –Total Correlation				
1	Potential for financial assistance	0.898	0.664	0.466	0.463	0.774
2	Gaining economic benefits in the	0.903	0.608	0.308	0.406	0.806

	form of reducing costs while helping to protect the environment					
3	Be more competitive by promoting achievements in the environmental field	0.791	0.516	0.596	0.683	0.578
4	Can survive in the market in the long term	0.76	0.343	0.542	0.589	0.757
5	Potential to get financial and technical management guidance	0.888	0.451	0.471	0.744	0.776
Government Support		Cronbach α 0.959	Cronbach α 0.773	Cronbach α 0.773	Cronbach α 0.941	Cronbach α 0.852
		Correlated item –Total Correlation				
1	The government needs to coordinate environmental conservation initiatives	0.866	0.682	0.728	0.826	0.696
2	Government needs to increase funding for environmental conservation initiatives	0.928	0.616	0.316	0.903	0.707
3	The government needs to provide information and technical assistance to small and medium-sized enterprises related to environmental conservation.	0.948	0.707	0.503	0.837	0.469
4	The government needs to popularize knowledge about environmental management.	0.953	0.509	0.644	0.828	0.794
5	The government needs to build infrastructure to facilitate environmental conservation initiatives	0.944	0.782	0.613	0.802	0.667
Competition Pressure		Cronbach α 0.944	Cronbach α 0.808	Cronbach α 0.808	Cronbach α 0.909	Cronbach α 0.887
		Correlated item –Total Correlation				
1	Competitors comply with environmental regulations	0.883	0.728	0.671	0.767	0.716
2	Competitors carry out environmental conservation activities	0.926	0.769	0.576	0.804	0.740
3	Competitors are committed to various stakeholders in environmental conservation activities	0.842	0.764	0.626	0.716	0.768
4	Competitors collaborate with professionals to support environmental conservation	0.907	0.564	0.520	0.694	0.697
5	Competitors set environmental standards for their products and operations	0.798	0.621	0.357	0.787	0.776
6	Competitors get new business opportunities when carrying out environmental conservation	0.812	0.574	0.331	0.637	0.474
7	Competitors promote successful implementation of environmental conservation	0.929	0.578	0.742	0.673	0.613

Note:

1. Validity test for the area of Yogyakarta City, Bantul Regency, Gunungkidul Regency, and Kulonprogo Regency using answers from 30 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 30-2=28. Based on the level of confidence and degrees of freedom, the R table value is 0.3061, so the questionnaire item is said to be valid if the calculated r value is greater than r table and is positive.

2. The validity test for the Sleman Regency area uses answers from 40 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 40-2=38. Based on the level of confidence and degrees of freedom, the R table value is 0.2638, so the questionnaire item is said to be valid if the calculated r value is more than r table and is positive.

Appendix 2.

Classical assumption test results

1. Normality test results

The results of the normality test are displayed in the form of a plot of residual data, which is shown in Figure A.1 and the results of the Kolmogorov-Smirnov test in Figure A.2. From Figure A.1 it can be seen that the data plot is spread around the diagonal line, which means the model fulfill the assumption of normality. Moreover, from Figure A.2 it is shown that the value of the Kolmogorov-Smirnov statistical test in the five research areas has a significance level greater than 0.05, so that the regression model in all regions meets the normality test.

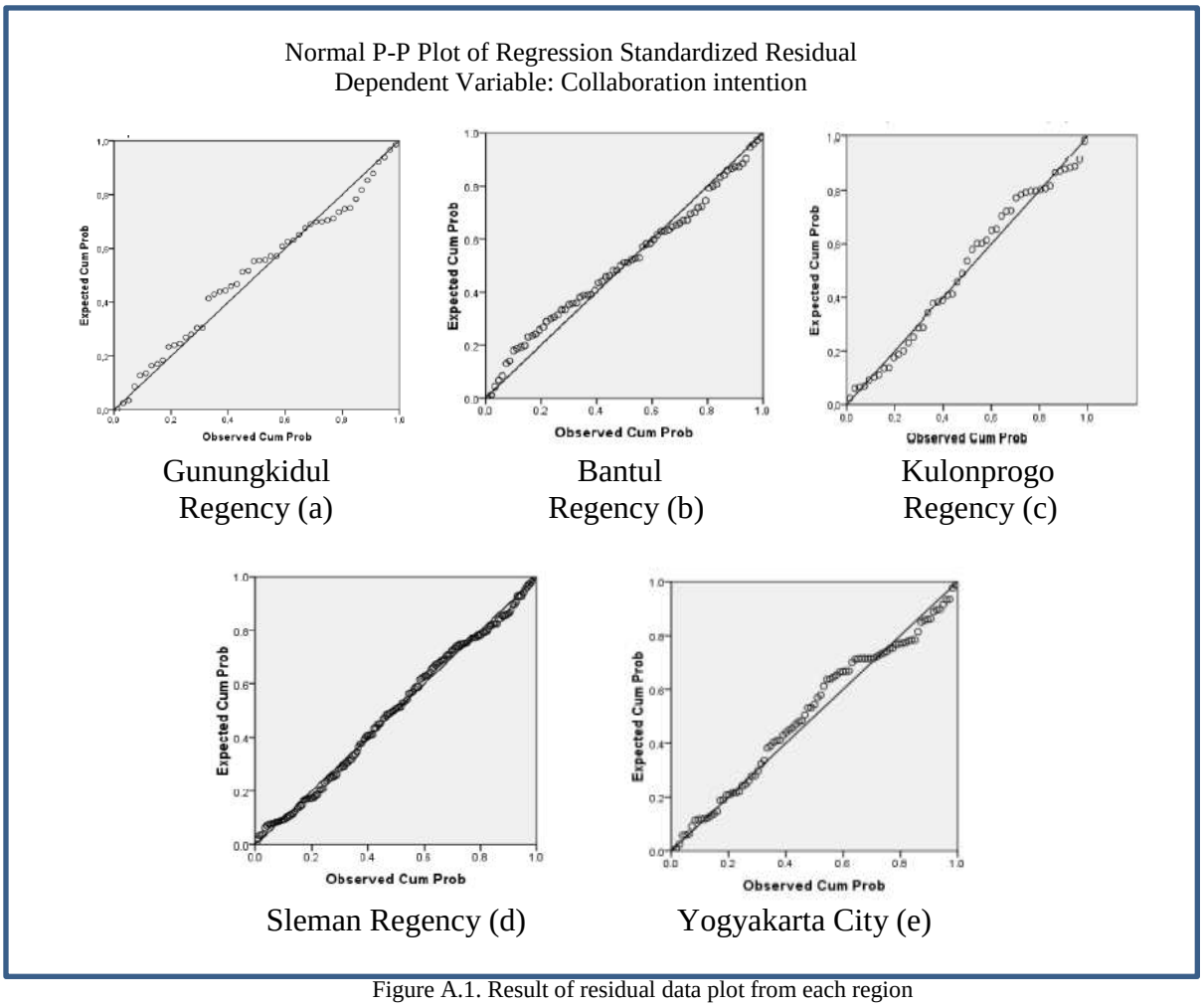

Figure A.1. Result of residual data plot from each region

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.631
Asymp. Sig. (2-tailed)	.820

a. Test distribution is Normal.
b. Calculated from data.

Gunungkidul Regency (a)

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.678
Asymp. Sig. (2-tailed)	.748

a. Test distribution is Normal.
b. Calculated from data.

Bantul Regency (b)

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.636
Asymp. Sig. (2-tailed)	.813

a. Test distribution is Normal.
b. Calculated from data.

Kulonprogo Regency (c)

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.668
Asymp. Sig. (2-tailed)	.764

a. Test distribution is Normal.
b. Calculated from data.

Sleman Regency (d)

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.975
Asymp. Sig. (2-tailed)	.298

a. Test distribution is Normal.
b. Calculated from data.

Yogyakarta City (e)

Figure A.2. Result of Kolmogorov-Smirnov test

2. Multicollinearity test results

The results of the multicollinearity test are presented in Figure A.3. From the figure, it can be seen that the tolerance value for all variables is greater than 0.1 and the Variance Inflation Factor (VIF) value for all variables is less than 10, in all research areas. Thus, it can be concluded that there is no multicollinearity between the independent variables.

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.766	1.306
Management commitment	.530	1.887
Financial benefit	.368	2.714
Government support	.740	1.352
Competitor pressure	.337	2.967

Gunungkidul Regency (a)

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.776	1.289
Management commitment	.727	1.375
Financial benefit	.564	1.772
Government support	.723	1.383
Competitor pressure	.413	2.422

Bantul Regency (b)

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.700	1.428
Management commitment	.588	1.699
Financial benefit	.694	1.442
Government support	.893	1.119
Competitor pressure	.583	1.717

Kulonprogo Regency (c)

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.851	1.175
Management commitment	.900	1.111
Financial benefit	.800	1.250
Government support	.866	1.155
Competitor pressure	.733	1.364

Sleman Regency (d)

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.826	1.211
Management commitment	.640	1.562
Financial benefit	.622	1.608
Government support	.757	1.322
Competitor pressure	.686	1.458

Yogyakarta City (e)

Figure A.3. Result of multicollinearity test

3. Heteroscedasticity test results

In this study, the heteroscedasticity test was carried out using the Park test. The results of the heteroscedasticity test are displayed in the form of a scatterplot which is presented in Figure A.4. From the figure, it can be seen that the points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern. This means that there is no heteroscedasticity in the regression model.

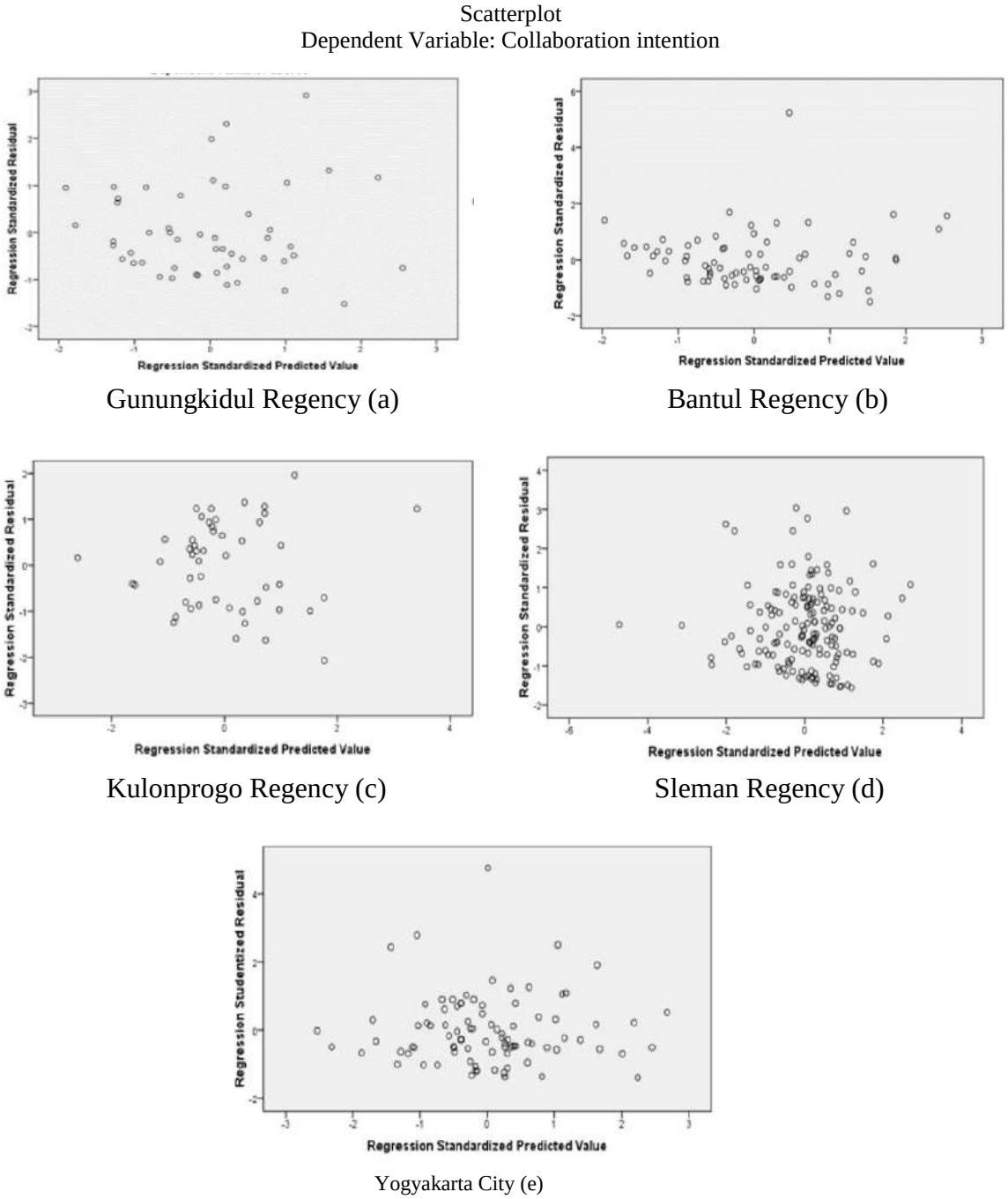

Figure A.4. Result of heteroscedasticity test

4. Terima email review artikel dan saran untuk mengubah judul serta memindahkan publikasi ke Civil engineering Journal, pada **14 September 2022**. Berikut tampilan email:

UNIVERSITAS
AHMAD DAHLAN

Siti Mahsanah Budijati <smbudijati@ie.uad.ac.id>

[ESJ] Editor Decision (Article #2022-1282) - Suggested to Transfer

1 message

Office ESJ <office@ijournalse.org> Wed, Sep 14, 2022 at 12:43 PM
To: Siti Mahsanah Budijati <smbudijati@ie.uad.ac.id>
Cc: I Nyoman Pujawan <pujawan@gmail.com>, Hayati Mukti Asih <hayati.asih@ie.uad.ac.id>

Dear Dr. Siti Mahsanah Budijati:

We have reached a decision regarding your submission to Emerging Science Journal, "The analysis of driving factors for collaboration in handling used cell phone for second hand market actors at Special Region of Yogyakarta, Indonesia".

Our decision is to: Moderate Revision Required - Suggested to Transfer

Due to publication restrictions in the Emerging Science Journal and possible delays in publication, it is suggested to publish your article in Civil Engineering Journal, which is indexed by Scopus (CiteScore = 5.3 - Q1) and WoS (ESCI). You can revise your article base on the following comments,

Journal name: Civil Engineering Journal
Website: https://civilejournal.org

** If you have agreed with this decision, please upload the revised version to your user home> Review tab> Author Version.

Please consider reviewer's comments, and revise that as soon as possible. If you do not submit the revision file, the article will be withdrawn within 20 days.

When you revise your manuscript please highlight the changes you make in the manuscript by using the track changes mode in MS Word or by using bold or colored text.

Regards,
Editor: Dr. Omid A. Yamini
Editor@ijournalse.org

Reviewers' Comments:

Reviewer #1:

The topic is interesting and important. However, there are several key areas that need more work prior to publication. I have summarized the required changes in the hope that the feedback will be useful to you as you update the paper.

1- The manuscript needs language, grammar and syntactic editing. The English language usage should be checked by a fluent English speaker.
2- More suitable and general title should be selected for the article. “at Special Region of Yogyakarta, Indonesia” should be deleted from the title. Title should contain 10-12 words. In my idea, authors should use “waste management” in title.
3- Abstract to modify: the abstract should contain Objectives, Methods/Analysis, Findings, and Novelty /Improvement. It is suggested to

present the abstract in one 200 words paragraph.
4- The original (editable) source of the figures 1 and 2 should be used in the manuscript.
5- The exact location of the study area should be presented in a map. It is suggested to show the general view of the study area to detail (Country, city ...).
6- It is better to transfer Appendix 2 to the main text of the article and type all its tables.
7- The citation of references in the text doesn't follow the format request by the Journal. References must be numbered in order.
8- It is important to add "Funding", "Author Contributions", "Data Availability" and "Conflict of Interest" statements at the end of the article.

Reviewer #4:

- At this stage, the manuscript English language must not bear any error.
- The abstract could become much better if re-written to state clearly the contribution of this study to the field as well as the gap this study intends to address in the field.
- Methods section determines the results. Kindly focus on three basic elements of the methods section.
a. How the study was designed?
b. How the study was carried out?
c. How the data were analyzed?
- Some key parameters are not mentioned. The rationale on the choice of the particular set of parameters should be explained with more details. Have the authors experimented with other sets of values? What are the sensitivities of these parameters on the results?
- Conclusion:
•The conclusion section is currently a repeat or rehash of the preceding sections, and needs to be re-written to improve it, keeping in mind the following suggestions.
•Update the conclusion to include the newly formulated theoretical contributions
•Summarize the key results in a compact form and re-emphasize their significance.
•Summarize how the article contributes to new knowledge in the domain.
•This conclusion could be worded in a manner as to emphatically motivate the academic community to get down to actionable, practical engaged scholarship.

Technical Editor Comments:

- If one of the referees has suggested that your manuscript should undergo English revisions, please address this issue during revision. We propose that you use one of the editing services listed at https://www.euhera.org/language-editing-services/ or have your manuscript checked by a native English-speaking colleague.

Emerging Science Journal
http://ijournalse.org/index.php/ESJ

5. Tampilan artikel versi kedua setelah melakukan revisi dan perubahan judul

Artikel setelah melakukan revisi dan perubahan judul (hasil perbaikan setelah direview)

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An Analysis of Driving Factors of Collaboration in Handling Used Cell Phones as a Waste Management Practice

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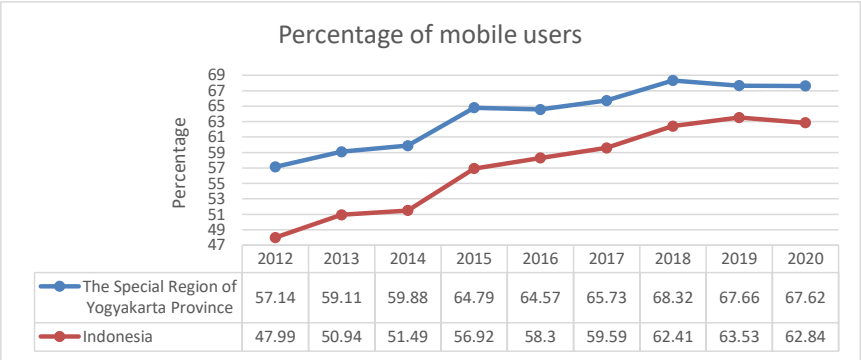
Abstract

The handling of used cell phones in Indonesia is mostly carried out by informal actors starting from second-hand market actors. However, the activities of ~~on~~ the informal actors ~~parties~~ often ~~have an impact that~~ endanger the environment and human health. To reduce the ~~this~~ impact, ~~it is better to transfer~~ some of the activities should be transferred to formal parties. This requires collaboration of ~~from~~ both parties as a form of waste management, which previously has never been established~~formed~~. The objective~~s~~ of this study is to explore the driving factors of ~~for~~ collaboration intention of informal actors in ~~for~~ handling used cell phones with the formal one~~s~~. Data were collected using ~~based on~~ questionnaires distributed to second hand market actors in five districts in the Special Region of Yogyakarta Province. In this study, three internal driving factors are considered, which are~~namely:~~ environmental attitude, management commitment, and financial benefits, as well as two external driving factors, which are ~~namely~~ government support and competitor pressure. The regression analysis in each region revealed ~~found~~ that the most significant driving factors vary across different regions, such as~~ are~~ government support in Gunungkidul, management commitment in Bantul, competitive pressure and government support in Kulonprogo, government support, management commitment, and financial benefit in Sleman, as well as environmental attitude and financial benefit in Yogyakarta City. From ~~In addition, based on~~ the structural equation ~~modeling~~modelling ~~for the analysis~~ at the provincial level, it was found that financial benefit and government support were the most significant factors influencing collaboration intentions of ~~for~~ all informal actors. The results of this study can be used as a reference.

Keywords: Collaboration intention, driving factors, used cell phone, waste management

1. Introduction

The number of ~~M~~mobile phone users in Indonesia, especially in the Special Region of Yogyakarta Province (DIY Province), are increasing ~~yearly~~. Data from the Central Bureau of Statistics (BPS) generally show~~s~~ that the percentage of the population using mobile phones has increased from 2012 to 2019. However, there has been a slight decline in 2020, possibly due to the COVID-19 pandemic. The increase in mobile phone users is shown in Figure 1.



	2012	2013	2014	2015	2016	2017	2018	2019	2020
The Special Region of Yogyakarta Province	57.14	59.11	59.88	64.79	64.57	65.73	68.32	67.66	67.62
Indonesia	47.99	50.94	51.49	56.92	58.3	59.59	62.41	63.53	62.84

Figure 1. Data on the percentage of mobile phone users in the Special Region of Yogyakarta Province (DIY Province) and Indonesia in 2012-2020

(Source: Data of the year 2012-2018 were obtained ~~was taken~~ from: (*Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah, 2012-2018*, 2020)

Data of the year 2018-2020 were obtained ~~was taken from~~: (*Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah 2018-2020*, 2020)

The increase in the number of cell phone usage indicates ~~means~~ that there is also an increase in cell phone waste, which is e-waste. The development of technology is followed by an increase in the amount and complexity of the~~se~~ waste~~s~~. Since the~~se~~ waste~~s~~ contains ~~have~~ toxic materials which might have ~~features that have~~ a negative ~~severe~~ impact on both human and environmental health, waste management ~~managing them~~ requires accurate identification and a~~n~~ ~~thorough~~ awareness of the risks involved [1]. ~~The content of h~~Hazardous metals in e-waste are ~~such as~~ lead, cadmium, mercury, hexavalent chromium, and refractory materials [2]–[6]. In the long term, t~~T~~hese hazardous metals ~~in the long term~~ can have an impact on human health and environmental ~~damage~~. According to ~~, such as mentioned in~~ Robinson (2009) [7], ~~that for~~ in every 1 kg of e-waste, there is 180 mg of cadmium and 0.8 mg of mercury, especially in ~~the~~ battery component~~s~~. Furthermore, the BBC (2002) in Polak and ~~&~~ Drápalová (2012) [8] described ~~states~~ that cadmium from a cell phone battery can contaminate 600,000 ~~liters~~litres of water. ~~From r~~Research conducted by Robinson (2009) [7] in Guiyu City, Guangdong region, China, which is the largest e-waste recycling area in the world, ~~it was~~ found that dioxin contamination in Guiyu air resulted in the level of exposure to humans reaching 15–56 times the maximum standard recommended by WHO. Elevated levels of dioxins are found in breast milk, placenta, and hair, indicating that dioxins are acquired by humans from the air, water, or foodstuffs, at levels which ~~sufficient to~~ pose a serious health risk. Children in Guiyu had significantly higher blood lead and cadmium levels than normal children. It was also reported that e-waste recycling workers from villages in the Jinghai region had chromosomal aberrations ~~at about~~ 20 times ~~fold~~ higher than villagers who were not exposed to e-waste. For this reason, it can be said that e-waste is a potential source of genetic mutations and can cause cytogenetic damage in the general population exposed to e-waste pollution. Furthermore, ~~as it was conveyed by~~ Orlins and ~~&~~ Guan (2016) [9] described, ~~that~~ during the process of e-waste dismantling ~~e-waste~~ without adequate technology, the content of hazardous materials in e-waste will remain in the environment for a long time.

Waste is generally defined as something that is no longer used and thrown away by its owner. Furthermore, Dadzie et al. (2020) [10] explain various definitions of waste. It is understood that all forms of waste must be managed and handled correctly not to burden the environment and disturb public health.

E-waste is waste from various electronic and electrical products. The definition and classification of e-waste depend on the regulation or standards that apply in each country. Gollakota et al. (2020) [11] present a detailed classification of e-waste based on several standards. Likewise, Shittu et al. (2020~~0~~1) [12] explained the definition of e-waste and its classification. In contrast to developed countries that explicitly define and classify e-waste and have standardized rules for its management, Indonesia has no specific rules regarding e-waste management. Generally, e-waste is classified as toxic and hazardous material regulated in Minister of Environment and Forestry Regulation No. 6 of 2021 concerning procedures and requirements for managing hazardous and toxic waste.

One of the activities that can be used to manage End of Life (EoL) or End of Use (EoU) products such as used cell phones is waste management. Waste management is a step or various strategies for managing and disposing waste. It can be done by disposing ~~of~~, destroying, processing, recycling, reusing, or controlling waste. Waste management ~~The strategy~~ aims to reduce unusable materials while preventing potential environmental damage and threats to human health. ~~Furthermore, specifically, t~~The management of used cell phones as electronic waste is known as e-waste management.

Several authors described effective e-waste management, including Isernia et al. (2019) [13] stated that the collection point is the key to e-waste management. The effectiveness of the collection process is influenced by the distribution of

collection points in an area. Rautela et al. (2021) [14] stated that for effective implementation of sustainable e-waste management, government supervision is needed in the reciprocal relationship between manufacturers, producers, wholesalers, traders, consumers, and recyclers. Furthermore, Shittu et al. (2021~~0~~) [12] suggested that one part that needs attention in effective e-waste management is to apply and enforce e-waste management rules for informal actors. As for e-waste management in developing countries, Ilankoon et al. (2018) [15] mentioned that it is necessary to apply a strict legislative framework to realize an e-waste management strategy. These regulations can be developed through modification of the EPR scheme, which provides an e-waste management system that is easy to adopt, provides benefits to all stakeholders, and is adapted to the local economy.

Several obstacles caused the implementation of e-waste management not to run optimally. Gollakota et al. (2020) [11] explained that effective e-waste management is not yet available in most developing countries, and the focal point of successful e-waste management is debatable. One of the shortcomings of e-waste management in developing countries is that the integration of the formal and informal sectors has not been integrated. In addition, there are several other factors, such as the unavailability of special rules for e-waste, the influence of socio-cultural aspects, and the lack of responsibility of producers and consumers. Meanwhile, Rautela et al. (2021) [14] stated that e-waste management in developing countries does not effectively run because e-waste is treated and managed informally in an illegitimate way. Moreover, the unavailability of policies, rules, and regulations, lack of law enforcement, and the implementation of the legal framework for EPR have not yet been maximized.

In Indonesia, mobile phone waste is mostly managed by informal actors, through the starting point of the ~~second hand~~second-hand market. Informal actors will obtain ~~get~~ economic benefits from the activities of managing used cell phones. However, if used cell phone management activities are carried out without safe technology, the impact can affect ~~disrupt~~ the health of informal actors and damage the environment. Several researchers ~~authors~~ such as Chatterjee and~~&~~ Kumar (2009) [2], Chi et al. (2011) [3], Joseph (2007) [4], Li et al. (2011) [16], Kyere et al. (2018) [17], and Robinson (2009) [7] have elaborated the contamination of the environment due to e-waste management activities by informal parties. As Wilson (2007) [18] stated, one of the drivers of waste management is the remaining value of waste, which encourages people to use it as a source of income, especially in developing countries.

On the other hand, Original Equipment Manufacturers (OEMs) as formal actors have ~~the~~ technological capabilities to handle used cell phones. However, the offer of a used cell phone return program in Indonesia is not carried out routinely and according to Budijati et al. (2015) [19], the ~~that~~ program is not well known by the public, so that ~~consumer behavior~~ after cell phone usage, consumers ~~consumption is identified in the form of~~ sell the used mobile phones in ~~ing to~~ the second~~-~~hand market, dispose~~throwing away,~~, store, or~~storing, and~~ give ~~donat~~them ~~ing~~ to other people.

To reduce or eliminate the negative impact of the management of used cell phones by informal parties and ~~, but~~ still provide economic benefits for them, it is necessary establish ~~to~~ collaboration~~e~~ in the management of used cell phones involving ~~between~~ informal and formal parties. This collaboration aims to regulate the distribution of ~~the~~ stages in the management of ~~of managing~~ used cell phones to the disposal process that is safe for the environment and health.

Several authors have provided the ~~a~~ definition of collaboration within the supply chain framework~~, , including~~ Simatupang and ~~&~~ Sridharan (2002) [20] ~~who~~ define collaboration as two or more independent companies that work together to plan and implement supply chain operations in order to get a better success rate ~~than if they were done alone~~. ~~Next,~~ Dung (2015) [21], Hudnurkar et al. (2014) [22], Soita (2015) [23], and Wu and~~&~~ Chiu (2018) [24] elaborated the definition of collaboration based on the definitions of~~writings of previous~~ other researchers ~~authors~~. ~~On the other hand, Then,~~ Maheswari (2019) [25] proposed an engagement model involving ~~between~~ the government and intermediary businesses in handling e-waste problems in Indonesia that included empowerment, collaboration, and participation.

The potential or possibility of collaboration between informal and formal actors was conveyed by [26] ~~Ezeah et al. (2013)~~. They reviewed the situation in several countries and proposed the integration of ISR (Informal Sector Recycling) into the formal sector by taking into account contexts and local conditions. Furthermore, Sasaki et al. (2014) [27] investigated the possibility of integrating the informal sector into formal waste management in Indonesia. Meanwhile, based on an analysis of the situation in four countries regarding informal sector business processes, Wilson et al. (2009) [28] stated that there was a clear potential for mutually beneficial cooperation between the formal and informal sectors. Furthermore, Li and~~&~~ Tee (2012) [29] suggested that to minimize the negative impact of informal channel activities, RL activities and the integration of IWS (Informal Waste Sector) into the formal sector are required.

To the best of the researchers' ~~authors'~~ knowledge, no formal and informal forms of cooperation have been found in Indonesia in the handling of used cell phones. However, there are ~~is~~ ~~'s a~~ communities~~y~~ of second~~-~~hand market actors in some regions. This community has regular meetings to strengthen their relationship.

This study aims to explore the intention for collaboration of informal parties in managing used cell phones with the formal one~~s~~ and the driving factors of the collaboration intentions. ~~For this reason, the~~ The intention of collaboration in this study is the intention to carry out management activities for used cell phones so that used cell phones can be returned to their origin~~al~~ point for the handling process or if the disposal is required ~~to do~~, it does not damage the environment or endanger human health.

Meanwhile, the fFactors driving collaboration intentions are based on factors that can encourage informal actors to carry out activities that lead to the prevention of environmental damage or environmental behaviorsbehaviours in general. Several researchers authors who explain the environmental behaviorbehaviour of managers include Leszczynska (2010) [30], who examines the environmental awareness of managers and sees further investigates whether this awareness is related to socio-economic development. This study involved managers in three countries, namely 200 managers in Australia and Ukraine and 250 managers in Poland. Lopez-Gamero et al. (2011) [31] examined the environmental attitudes of hotel managers in Spain in the form of perceptions of the natural environment which are influenced by internal and external factors of the company. Next, Nambiar and & Chitty (2014) [32] examineds the views of business managers in India on the relationship between sustainability and the environment. Ye et al. (2013) [33] examined the attitudes of top managers in 209 companies in China regarding the implementation of reverse logistics in companies in the form of product returns and product recovery. Therefore, the research objectives in this study are:

- to Eexplore the collaboration intention of informal actors to manage used cell phones with formal actors so that cell phone waste remains safe for the environment and human health;
- to identifyfFind out the driving factors of the collaboration intention of informal actors in handling used cell phones;
- to Eexamine the influence of the driving factors on the collaboration intention of informal actors in handling used cellphones.

2. Literature Review and HypotheseHypotheses Development

This sub-section discusses , the driving factors that can influence collaboration intentions for informal actors will be described. This collaboration intention refers to means the intention to behave in the environment. The driving factors for environmental behaviorbehaviour comes from the internal or external. Internal driving factors are factors that come from individuals as part of the company or factors that describe the company's internal conditions. On the other hand, the The external driving factors are factors that come from outside the company. The factors are , outside the company's control but are able to affect the company's performance.

Fraj-Andrés et al. (2008) [34] stated that the environmental behaviorbehaviour of firms depends on some internal and some external forces. , where it It is mentioned that one example of an external force is the new environmental law. He et al. (20178) [35] also proposed the existence of internal and external pressures on corporate environmental behaviorbehaviour in their study of 702 paper-making companies in China. Testa et al. (20165) [36] conducted a study to determine the effect of external pressure, internal factors, and environmental attitudes of entrepreneurs on a small and micro-scale of the company's proactive environmental strategy. Yen and& Yen (2012) [37] explored stated internal and external motivations for green purchasing activities in electronic companies in Taiwan.

TheFurthermore, the factors considered in this research include internal and external factors, which consist of three internal factors (environmental attitude, management commitment, and financial benefits) and two external factors (government support and competitor pressure). These factors were determined based on a literature review of the factors that can motivate environmental intentions and behaviorbehaviour in a company and adjustments of to the case studies in this research were done through field validation by asking several initial respondents in each research area whether the conditions of informal actors have felt these factors involved.

The driving factors considered in this study are explained as follows.

2.1. *Environmental attitude*

The eEnvironmental attitude in this study refers to is intended as a the positive attitude of informal actors (second hand cellphone actors) towards the environment, commonly referred to as an environmentally friendly attitude. In line with Janmaimool and Khajohnmanee (2019) [38] , they define environmental attitude as a person's belief in the relationship between humans and the environment. This belief also includes understanding the consequences when environmental damage occurs. Meanwhile, Chan et al., (2017) [39] stated that environmental attitude is often equated or interchanged with environmental concern. Arshad et al. (2022) [40] and Okumus et al. (2019) [41] explored environmental attitudes in environmental knowledge, awareness, and concern.

He et al. (20178) [35] showed that internal pressure could affect corporate environmental behaviorbehaviour, where employees' and top management's environmental awareness are part of internal pressures. Then, Okumus et al. (2019) [41] proposed presented that the environmental attitude (in terms of environment concern) of hotel employees in Turkey is the best predictor of ecological behaviorbehaviour. Furthermore, Arshad et al. (2022) [40] stated that employees with an excellent environmental attitude would encourage organizations to implement environmental management system policies. Moreover, Long et al. (2017) [42] examined the impact of attitude toward environmental behaviorbehaviour on environmental innovation intention in 182 companies of various types in China. Then, Drag Tariq et al. (2020) [43]examined the relationship between employees'' environmental attitudes and employees'' ecological behavior of in employees in of 65 small and medium-sized hotels operating in Pakistan's tourist areas. Next, Testa et al. (2016) [36] conducted a study to determine the effect of environmental awareness of managers to adopt a proactive corporate environmental strategy in 355 small and micro-scale businesses in Liguria, a region in central Italy. Then, Zientara and Zamojska (2018) [44] examined the relationship between environmental values or beliefs held by hotel employees in Poland with organizational citizenship behaviorbehaviour for the environment (OCBE), and the results showed a

positive relationship. From the previous studies ~~research~~ reviewed, it is expected that someone with a high environmental attitude will ~~also~~ show positive environmental ~~behavior~~behaviour. Therefore, the hypothesis of this research is as follows.

H1: Environmental attitude has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.2. *Management commitment*

Management commitment ~~referred to in this study~~ is a form of responsibility and commitment from the owners and employees of the second-hand cell phone market to carry out activities that support the environment. In this case, it can be realized through collaboration ~~by collaborating~~ in the management of used cell phones among formal parties so that the activities of handling used cell phones do not damage the environment or endanger workers' health.

In general, as stated by ~~in~~ El-Kassar and~~&~~ Singh (2019) [45], management commitment is the encouragement given by a ~~the~~ company to carry out environmentally friendly activities and to incorporate ~~the response to the~~se ideas ~~to be incorporated~~ into the corporate culture. Yusliza et al. (2019) [46] argued ~~presented~~ that to achieve the goal of successful implementation of green activities, top management must provide a high commitment so that the implementation of green activities can offer a competitive advantage for the company. In addition, Ates et al. (2012) [47] stated that organizational capability plays an important role in facilitating the implementation of the company's environmental strategy and impacts environmental performance, where one source of organizational capability is organizational commitment.

Ates et al. (2012) [47] demonstrated that organizational commitment positively impacts the extent to which firms adopt a proactive environmental strategy in manufacturing firms in Turkey. Ghazilla et al., (2015) [48] stated that management commitment is one of the drivers for implementing green manufacturing practices of ~~in~~ SMEs in Malaysia. Likewise, Nordin et al. (2014) [49] showed that top management commitment is one of the main driving factors of sustainable manufacturing ~~implementation~~ in manufacturing companies in Malaysia, involving respondents from operation managers, manufacturing managers, and the environmental, safety and health managers. In addition, He et al. (2018~~7~~) [35] stated that internal and external pressure affects corporate environmental ~~behavior~~behaviour, where one form of internal pressure is commitment management. ~~Drag~~ Tariq et al. (2020) [43] found that ~~M~~managers's environmental commitment strengthens the relationship between employees' environmental attitudes and their ~~employees'~~ ecological behavior. Yen and~~&~~ Yen (2012) [37] show a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities in the electronics industry in Taiwan. Yusliza et al. (2019) [46] found that top management commitment influences various green human resource management (GHRM) activities, which include green analysis and job description of job position, green performance, green recruitment, green rewards, green selection, and green training in 400 Malaysian manufacturing and service organizations.

Furthermore, Bhatia and Jakhar (2021) [50] studied the effect of top management commitment (TMCO) on green product innovation (GPI) in Indian automotive manufacturing companies empirically. Burki et al. (2019) [51] examined the relationship between top management commitment and process innovation in the green supply chain (GSC), in the form of green process innovation and green managerial innovation in selected ISO 14000 certified Turkish exporting firms located in the Izmir region (Turkey). Meanwhile, Lee and~~&~~ Joo (2020) [52] investigated whether support from ~~T~~top ~~M~~management can significantly increase the level of environmental collaboration with participating companies in upstream and downstream green supply chains and their impact on environmental work in companies in manufacturing industries in South Korea.

It is necessary to have awareness from ~~its~~ the internal parties in implementing environmental conservation activities. The management commitment factor explains organizational commitment from top management to employees in ~~behavior~~behaviour that supports environmental preservation. Therefore, related to this research, the proposed hypothesis is as follows:

H2: Management commitment has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones

2.3. ~~*Finansial*~~*Financial benefit*

The financial benefit~~s~~ as a driving factor in this study is the potential benefits obtained when informal actors carry out environmental conservation activities in the form of collaboration in handling used cell phones. Maheswari, et al. (2020) [53] investigated that finance was one of the informal e-waste business performance measurements using a sustainable reverse logistics scorecard. Financial was one of the dimensions/driving factors that influenced the green supply chain collaboration [54] ~~(Paula et al., 2019)~~ and green manufacturing practice in small medium enterprises [48]~~(Ghazilla et al., 2015)~~.

Likewise, Nordin et al. (2014) [49] identified that one of the driving factors of sustainable manufacturing activity is

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economic benefit; , where the research was conducted in Malaysian manufacturing industries. Aside from the improper disposal, the challenges of the current EoL electrical and electronic equipment recycling program were was the home storage and the informal actors. The reason is the lack of economic incentives for the proper return of used electronic equipment, especially for expensive and quickly obsoleteobsolete products [55] (Shevchenko et al., 2019).

Henriques and& Catarino (2016) [56] conducted a preliminary study on small and medium-sized companies in Portugal to adopting energy efficiency improvements. One of the identified motivators is financial factor, that provide benefits in strengthening capacity, providing financing, external parties for financial and technical guidance, access to capital, financial resources to develop bankable projects, and financial support for investment. Then, Kudlak (2017) [57] examined the drivers for implementing environmental management systems in companies in Poland. These drivers include efforts to reduce costs, increase sales, and increase market share. Next, Meath et al. (2016) [58] identifiedy the key factors that motivate and hinder the design process of a voluntary energy efficiency program for SMEs in Queensland. It was identified that fFactors related to economic profit are one of the motivators, namely financial interests in the form of reducing energy costs, opportunities to obtain funding, and obtaining marketing opportunities due to the promotion of environmental performance achievements.

Testa et al. (2016) [36] examined managers' opinions about motivators in the adoption of proactive corporate environmental strategies. One of the motivators is the internal factor which is cost-saving. MeanwhileWhile, Wang et al. (2018) [59] stated that one of the reasons companies support green supply chain management activities is the cost driver, where companies can reduce costs while helping environmental sustainability. This research was applied to plants in three industries: machinery, electronics, and transportation in various countries. It was found that the cost drivers significantly influence internal and external green practices. Referring to the results of previous studies, the hypothesis in this study is as followsbecomes:

H3: fFinancial benefit has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones

2.4. *Government support*

As one of the stakeholders in environmental control, the government plays a role in motivating environmental conservation. Government support in this study is explained as the role of the government in supporting informal actors to reduce used cell phone management activities that are not safe for the environment and health. This support can be in the form of regulation, providing incentives provided, and providing facilities and infrastructure that informal actors can utilize in carrying out their activities.

The previous studies showed the government's role in encouraging companies to carry out environmental conservation activities. As stated by Lee (2008) [60], the involvement of local and central governments in green supply chain (GSC) initiatives is , in the forms of coordinating the GSC initiatives, increasing funds for the activities, providing information and technical assistance to small and medium-sized firms, popularizing knowledge of environmental management, and build infrastructure for facilitating GSC initiatives. MeanwhileWhile, Tatoglu et al. (2015) [61] examined the relative importance of each dimension of the Corporate Environmental Policies (CEP). One , one of the dimensions is stakeholder pressure, including government policies and regulations.

Several researches studies are related to an initial study on the importance of government support in environmental activities, including [48]Ghazilla et al. (2015). They conducted a preliminary study to determine the driving and inhibiting factors for applying green manufacturing practice in Malaysian SMEs. They found that the legislation factor in which there is a financial incentive from the government is one form of government support. Then, Henriques and& Catarino (2016) [56] identified the situation in small and medium-sized companies in Portugal adopting energy efficiency improvements. Government policy is considered as a motivator, where government policies include: the obligation of the state and government to develop effective energy programs and, the need to design energy efficiency programs. , tThere are government representatives in suppressing energy efficiency, providing fiscal subsidies, and providing grants for technology investment. Next, Moktadir et al. (2018) [62] identified the primary motivators in adopting sustainable manufacturing practices for the Bangladesh leather industry. One of the identified drivers is governmental support and legislation, which the government requires to provide funds to implement these activities smoothly.

Meanwhile, studies examining how government support influences corporate environmental activities include [35]He et al. (2017). They examined government pressure which influenceds corporate environmental behaviorbehaviour, which consists of environmental defensive behaviorbehaviour, environmental accommodative behaviorbehaviour, and proactive environmental behaviorbehaviour. Ye et al. (2013) [33] examined government pressure on the attitude of top managers to implement RL in the form of product returns and product recovery and found that government pressure had a significant effect on managers' attitudes.

From these previous studies, it is clear that government support is one of the driving factorss of the company's environmental activities. For this reason, the hypothesies developed regarding government support is as followsare:

H4: Government support has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.5. *Competitor pressure*

~~In addition, a~~According to Dai et al. (2018) [63], ~~C~~competitive pressure influences a company's response to aggressive environmental strategies. It is the key role in adopting small medium enterprises because it is sensitive to the competition they have [64] ~~(Nugroho, 2015)~~.

The competitor pressure factor means competitor activities such as obeying existing regulations, being committed to environmental activities, and establishing cooperation in environmental conservation which will affect informal parties. The influence of competitor pressure related to environmental preservation will encourage informal actors to do the same.

Ghazilla et al. (2015) [48] considered competitor pressure as one of the business environments for implementing green manufacturing practices. Meanwhile, Tatoglu et al. (2015) [61] examined the relative importance of the Corporate Environmental Policies (CEP) dimension, where competitor pressure is part of the stakeholder pressure dimension. Weng et al. (2015) [65] examined the effect of competitor pressure in applying green innovation in manufacturing and service firms in Taiwan. This study found that competitor pressure had a positive and significant impact on the company's green innovation activities. Furthermore, Ye et al. (2013) [33] examined the effect of competitor pressure on the attitude of top managers to carry out RL activities in the form of product returns and product recovery. It was found that competitor pressure had a significant effect on the attitude of managers toward the implementation of the RL. From the previous research reviewed, the proposed hypothesis in this study is as follows:

H5: ~~c~~Competitor pressure has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones

Based on the explanation of the factors that influence the intention of second-hand market actors to collaborate in handling used cell phones, the research model proposed in this study is shown in Figure 2.

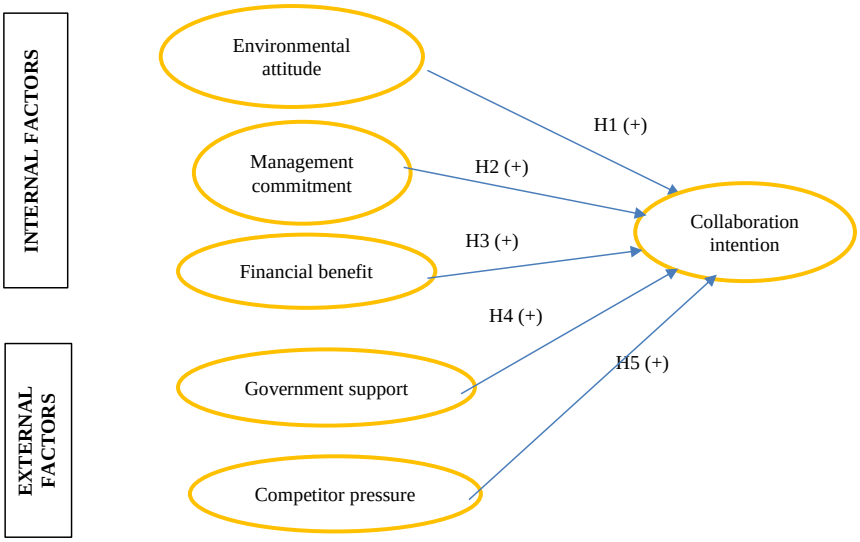

Figure 2. Conceptual model

3. Research Methodology

3.1. ~~*Researchl*~~*Research object*

The research object is the second-hand mobile phone market actors who are the initial players in the informal channel of handling used cell phones. This research started from the phenomenon of the rise of second-hand cell phone market actors in Indonesia who carry out selling, buying, and repairing used cell phones. It is because Indonesia has not obliged cell phones manufacturers to take back used cell phones that consumers no longer use. This condition is an opportunity for the informal sector to buy and sell used mobile phones that can provide economic benefits.

On the other hand, the activities of informal actors in handling used cell phones, such as burning, throwing the

remaining components into the trash, and taking precious metals by chemical processes, can pollute the environment and endanger their health. To reduce the danger level due to informal actors' activities, it is necessary to propose management of mobile phone waste involving informal and formal actors.

Based on these reasons, this research was conducted to identify the intentions of informal actors to collaborate in handling cell phones with formal actors.

The research respondents were market actors for second-hand mobile phones in five regencies/cities in the Special Region of Yogyakarta Province (DIY Province), consisting of the Regencies of Gunungkidul, Bantul, Kulonprogo, Sleman, and the City of Yogyakarta

3.2. *Measurement*

The measurement of collaboration intention was conducted using questionnaire with a Likert scale of 1 to 5. The initial questionnaire consisted of 32 items. Those factors are adapted from the following previous studies~~research, like~~:

- Environmental attitude was adapted from [36], [42]. ~~Long et al. (2017) and Testa et al. (2015).~~
- Management commitment was adapted from [47], [48]. ~~Ates et al. (2014) and Ghazilla et al (2015).~~
- Financial benefit was taken from [49], [56], [58], [59]. ~~Meath et al. (2016); Henriques and& Catarino (2016); Wang et al. (2018); and Nordin et al. (2014).~~
- Government support was adapted from [56], [61]. ~~Tatoglu et al. (2015) and Henriques and& Catarino (2016).~~
- Competitor pressure was adapted from [48], [61], [66], [65]. ~~Chiou et al. (2011);~~ ~~Ghazilla et al. (2015); Tatoglu et al. (2015); Christmann (2004) in Weng et al. (2015).~~
- Collaboration intention 3 items adapted from Ajzen (200~~2~~6) [67] and 2 items developed in this study.

The complete questionnaire items are shown in Appendix 1.

3.3. *Research stages*

The ~~S~~stages of the research included:

- Distribution of the initial questionnaire to the respondents
- The validity and reliability test of the initial questionnaire using the SPSS software version 16
- Distribution of the formal questionnaire to the respondents
- Conducting ~~Perform~~ a classic assumption test for data in each district/city using the SPSS software version 16
- Performing regression analysis for data in each district/city using the SPSS software version 16
- ~~Perform~~ Conducting confirmatory factor analysis (CFA) using AMOS 25 for data in all areas of DIY Province
- Developing structural equation ~~modeling~~modelling (SEM) development using AMOS 25 software for data in all areas of DIY Province; confirmatory factor analysis (CFA) used AMOS 25

4. Result and ~~Discusstion~~Discussion

4.1. *Demographic characteristic*

The questionnaire was distributed to second hand market actors (that includes buying and selling, cell phone service or cannibalization) in Yogyakarta province ~~for~~ (424 respondents from September to October 2018). It consists of several regencies, such as Bantul with ~~for~~ 75 respondents, Sleman with ~~for~~ 160 respondents, Yogyakarta municipality with ~~for~~ 90 respondents, Gunungkidul with ~~for~~ 50 respondents, and Kulonprogo with ~~for~~ 49 respondents. The respondents' characteristics are age, gender, household member, income, education level, marital status, position at work, and treatment of used components as shown in Figure 3 and 4.

The majority of respondents are male and ~~an average of~~ 71% of the respondents is between ~~around the age of~~ 20 and ~~-~~30 years old. Interestingly, ~~with the total~~ 92% of respondents ~~who~~ have senior high school background and above for education level; ~~,~~ almost 55% of the respondents have an income of approximately 1-2 million per month.

In addition, as shown in Figure 4, the majority of the respondents are unmarried and the position at work is ~~as~~ an employee. ~~Then, a~~ Almost 60% of the respondents save the used components. The reason is ~~s are~~ that the respondents often reuse those parts for other broken cell phones and repair those parts for resale.

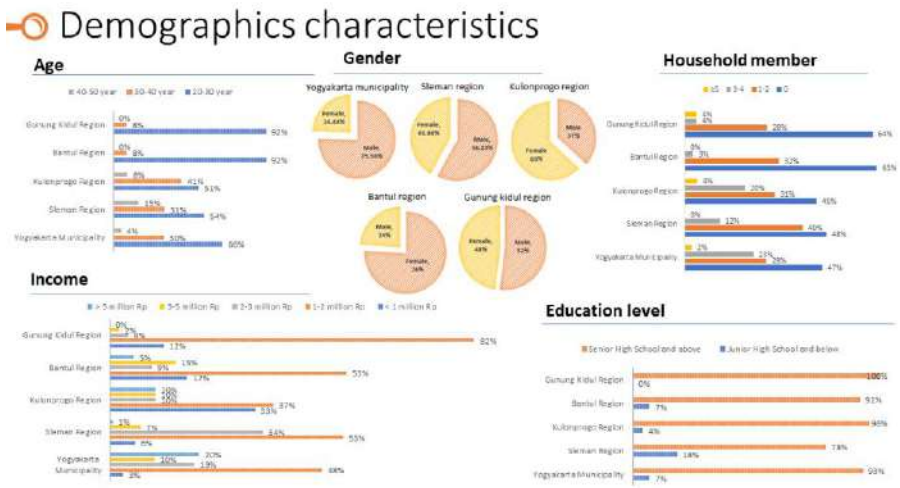

Figure 3. The demographic characteristics: age, gender. household member, income and education level

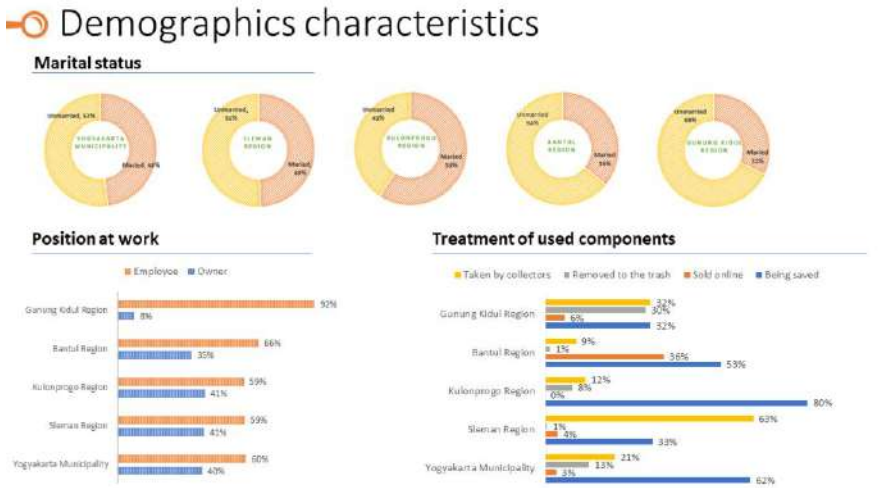

Figure 4. The demographic characteristics: marital status, position at work, and treatments of used components

4.2. *The location of second-hand market actors*

Second-hand market actors as research objects are spread across five regencies/ cities within the DIY Province. DIY Province is one of the provinces in Indonesia, located on the ~~South Central~~South-Central side of Java Island. It is known as ~~a the~~ Special Region because it is the territory of the Yogyakarta Palace. The location of the DIY Province is between 7.33-8.12 South Latitude and 110.00- 110.50 East Longitude, with an area of 3185.80 km^2 or 0.17% of the total area of Indonesia.

~~The description of each regencies/ cities will be explained in this subsection.~~ Figure 5-9 presents the position of used cell phone second hand market actors based on snowball sampling in some regions of the Special Region of Yogyakarta Province.

Gunungkidul region has the position 007°46'00"-008°09'00" south latitude & 110°21'00"- 110°50'00" east longitude; ~~with~~ the border on ~~s in~~ the north is Klaten region, the south is Indian Ocean, the west is Bantul region and Sleman region, and the east is Wonogiri region. It is the biggest area compared to other areas; ~~,~~ it is about 1,431 km^2 [68]~~(Bappeda, n.d.~~

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a). Then, with a total population is about 747,161 per 2020 and population growth rate of 0.88% [69] (Bappeda, n.d.-b). This region has 18 sub-districts, 144 villages, and 1,431 hamlets. Geographically, Gunungkidul region is located in the southeastern part of the Special Region of Yogyakarta. Gunungkidul Regency has neither inland nor remote areas. According to the geographical conditions, there are 18 coastal villages, 56 villages located on the slopes/ridges of the hills and 70 villages located on the plains. The capital of this region is Wonosari.

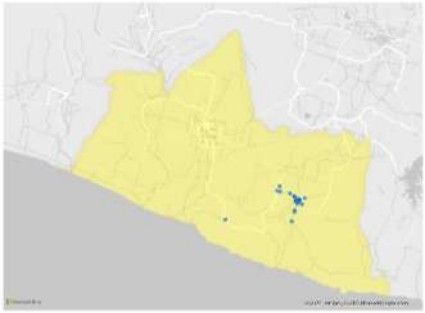

Figure 5. The position of used cell phone second-hand market actors in Gunungkidul Region

The position of Bantul region is 14º04'50" - 27º50'50" South Latitude and 110º10'41" - 110º34'40" East Longitude. This region is surrounded by Gunungkidul region on in the east, Yogyakarta municipality and Sleman region onin the north, Kulonprogo region and Indian Ocean are onin the west and the south, respectively. The area is about 508.13 km^2 [68] (Bappeda, n.d. a). Then, in 2020, the population was about 985,770. This region had the highest growth rate compared to other regions, that is 1.14% [69] (Bappeda, n.d. b). Bantul region has a plain area located in the middle and hilly areas located in the east and west, as well as a coastal area in the south. This region consists of 17 sub-districts divided into 75 villages and 933 hamlets [70]. (K. B. Pemerintah, n.d.). The capital of this region is Bantul.

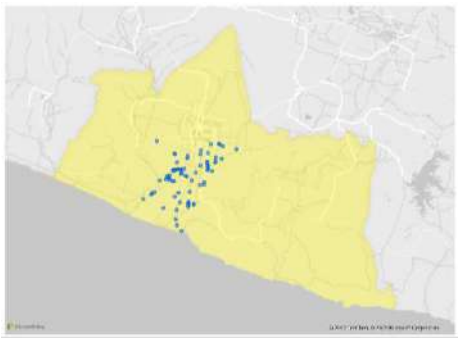

Figure 6. The position of used cell phone second hand market actors in Bantul Region

The position of Kulonprogo region is 007o 38'42" - 007o 59'3" South Latitude and 110o 01'37" - 110o 16'26" East Longitude. It is surrounded by Bantul region and Sleman region onin the west; Magelang, Indian Ocean, and Purworejo are onin the north, the south, and the west, respectively. Not much different from Bantul region, the area of Kulonprogo region is has 586 km^2 [68](Bappeda, n.d. a). In 2020, the population was about 436,395 with the growth rate at about 0.99% [69](Bappeda, n.d. b). This region consists of 12 sub-districts and 88 villages [71] (K. K. P. Pemerintah, n.d.). The capital city of this region is Wates.

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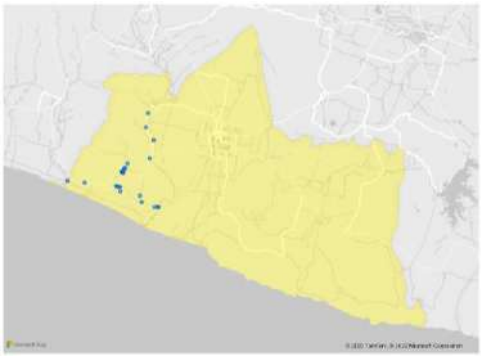

Figure 7. The position of used cell phone second hand market actors in Kulonprogo Region

The position of Sleman region is 110° 33′ 00″ and 110° 13′ 00″ East Longitude, 7° 34′ 51″ and 7° 47′ 30″ South Latitude. It is surrounded by Boyolali region and Central Java on~~in~~ the north; Yogyakarta municipality, Bantul region, and Gunungkidul region on~~in~~ the south; Kulonprogo region and Magelang region on~~in~~ the west; and Klaten region and Central Java on~~in~~ the east. The area of the Sleman region is about 574 km^2 [68]~~(Bappeda, n.d. a)~~. Compared to other regions, Sleman region has the highest population which is about 1,125,804 with the growth rate of~~was~~ 1.06% [69]~~(Bappeda, n.d. b)~~. It consists of 17 sub-districts with ~~, which have~~ 86 villages and 1212 hamlets [72] ~~(K. S. Pemerintah, n.d.)~~. The capital of this region is Sleman.

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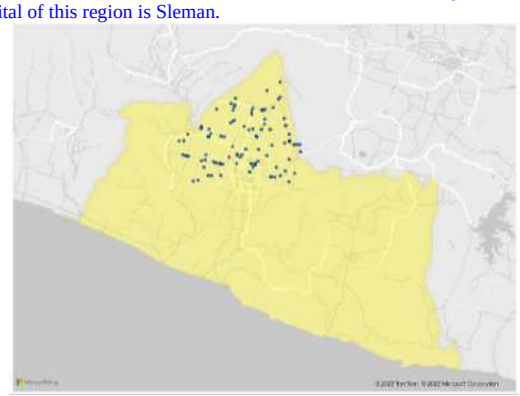

Figure 8. The position of used cell phone second hand market actors in Sleman Region

The position of Yogyakarta municipality is 110º24'19" to 110º 28'53" East Longitude and 7º15'24" to 7º49'26" South Latitude with an average elevation of 114 m above sea level. The borders are Sleman region and Bantul region on~~in~~ the north and the south, respectively. Then, Bantul region and Sleman region are both on~~in~~ the west and the east. Compared to other regions, Yogyakarta municipality has the smallest area which is about 32.50 km^2 [68]~~(Bappeda, n.d. a)~~. Even though the total population was about 373,589 people and the growth rate was 1.06%, this region is the most densely populated area ~~in 2020~~ [69]~~(Bappeda, n.d. b)~~. There are fourteen districts and 45 villages [73] ~~(K. Y. Pemerintah, n.d.)~~. The capital of this region is Yogyakarta city.

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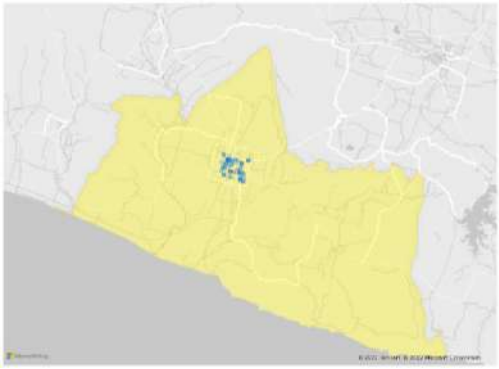

Figure 9. The position of used cell phone second hand market actors in Yogyakarta Municipality

4.3. *Regression analysis result*

This section discusses the results of collaboration intention and regression analysis of driving factors on handling the collaboration of used cell phones for the ~~second hand~~second-hand market actors. Before the regression analysis was applied, the reliability and validity tests were carried out on the questionnaires distributed in each region. The tests for ~~For~~ the city of Yogyakarta, Bantul, Gunungkidul, and Kulonprogo districts ~~using~~ used 30 initial respondents' answers, while for Sleman Regency used 40 respondents' answers.

Reliability tests were conducted to measure the consistency of the questionnaire which is an indicator of the variables. A questionnaire is said to be reliable if a respondent's answers to the questions are consistent from time to time. According to Barr and Gilg (2007) [74], the questionnaire is said to be reliable if the value of Cronbach α is more than 0.6. The test results for each region showed that the Cronbach α coefficient of six variables was~~were~~ more than 0.6, which means that all the factors were reliable.

In addition, the validity test was required to show the extent to which the questionnaire items used in a study were able to measure what it aimed ~~wanted~~ to measure. Validity test was~~is~~ used to measure the validity of ~~a~~ questionnaire items. The validity test in this study was carried out by comparing the total Pearson correlation value with the R table value (n= 30, df=28, so the R table value=0.3061 and for n=40, df=38, so the R table value=0.2639). Questionnaire items are declared valid if the Pearson correlation value is greater than the R table value. Tests of reliability and validity were ~~are~~ conducted by employing SPSS statistical software. ~~The~~ Appendix 1~~.~~ ~~re~~presents the results of both tests. It shows that all the data collected were reliable and valid.

a. Gunungkidul ~~r~~Region

Respondents in Gunungkidul were ~~amounted to~~ 50 informal actors. From ~~, from~~ the respondents' answers, the average value of each factor studied and the value of collaboration intentions were ~~was~~ obtained, which is presented in Table 1. The calculation shows that the collaboration intention of informal actors in the GunungKidul region is 3.46, which means the ~~I~~informal actors argue that they are neutral and tend to collaborate.

Table 1. Results of descriptive analysis of respondents' answers in Gunungkidul Regency

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.46	3.00	3.40	3.40	3.40	3.70

Before performing regression analysis, it is necessary to test the classical assumptions. The purpose of classical assumption testing is to provide certainty that the regression equation obtained is accurate in estimation, unbiased, and consistent. This classic assumption test is a prerequisite test that is carried out before carrying out further analysis of ~~the~~ data ~~that has been~~ collected. Classical assumption test in this research consists of normality test, multicollinearity test, and heteroscedasticity test. The summary of classical assumption tests is ~~are~~ displayed in Table 2. The classical assumption test results ~~in detail~~ for each region are presented ~~shown~~ in Appendix 2. It can be seen that for ~~the~~ Gunungkidul area, all classical assumption tests are met.

Table 2. The summary of classical assumption test for Gunungkidul Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
1. Residual data plot spread around the diagonal line	1. Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.766), management commitment (0.530), and financial benefits (0.368), government support (0.740) and competitor pressure (0.337)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern

2. Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.631	2. The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.306), management commitment (1.887), and financial benefits (2.714), government support (1.352) and competitor pressure (2.967)

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in Gunungkidul region is presented in Table 3. It can be seen that the government support is the most significant driving factor compared to others.

Table 3. The regression result for Gunung Kidul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.700	0.572		1.328	0.191
Environmental attitude	-0.084	0.120	-0,089	-0.702	0.486
Management commitment	0.212	0.147	0.218	1.436	0.158
Financial benefits	0.071	0.181	0.71	0.390	0.699
Government support	0.376	0.125	0.388	3.018	0.004
Competitor pressure	0.187	0.186	0.191	1.005	0.320

Factors that affect collaboration intentions are seen if the significance value is smaller than 0.05. Therefore, then these factors affect collaboration intentions in handling used cell phones. In Gunung Kidul region, there is one factor that influences collaboration intentions in handling used cell phones, that is namely government support with a significance value of 0.004. It and it was also found that management commitment had a moderate effect on collaboration intentions with a significance value of 0.158. Based on the results of multiple determination (R^2) of 0.462 (see Table 4), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 46.2% while 53.8% is influenced by other factors outside the model.

Table 4. The R^2 result for the driving factors of collaboration intention for Gunung Kidul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.680	0.462	0.401	0.61640

b. Bantul rRegion

In Bantul area, A total of 75 informal actors were involved as respondents in the Bantul area. The average value of each factor and the value of collaboration intentions, based on the respondents' answers, are presented in Table 5. The results show that the value of collaboration intentions of informal actors in Bantul Regency is 3.87, meaning that informal actors have the intention to collaborate.

Table 5. Results of descriptive analysis of the respondents' answers in Bantul region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.87	4	3,8	3,8	4.2	3.8

As this in general research uses regression analysis, it is preceded by applying the classical assumption test. The results of classical assumption tests is are displayed in Table 6. The classical assumption test results in detail are shown in Appendix 2. The results of the classical assumption test for the Bantul region show that it is fulfilled for all types of tests.

Table 6. The summary of classical assumption test for Bantul Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
1. Residual data plot spread around the diagonal line	1. Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.776), management commitment (0.727), and financial benefits (0.564), government support (0.723) and competitor pressure (0.413)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
2. Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.678	2. The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.289), management commitment (1.375), and financial benefits (1.772), government support (1.383) and competitor pressure (2.422)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Bantul region is presented in Table 7. It can be seen that the management commitment is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors

in ~~the~~ Bantul region is 3.87.

Table 7. The regression result for Bantul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.756	0.728		1.038	0.303
Environmental attitude	0.195	0.135	0.168	1.441	0.154
Management commitment	0.334	0.125	0.321	2.665	0.010
Financial benefits	0.090	0.120	0.103	0.755	0.453
Government support	0.092	0.130	0.086	0.707	0.482
Competitor pressure	0.080	0.160	0.0802	0.498	0.620

Factors that affect collaboration intentions are seen if the significance value of ~~-~~α is smaller than (0.05). Then, ~~then~~ these factors affect collaboration intentions in handling used cell phones. In ~~the~~ Bantul region, ~~there is~~ one factor ~~that~~ influences collaboration intentions in handling used cell phones, which is ~~namely~~ management commitment with a significance value of 0.010. Also, ~~and also obtained~~ a factor that has a moderate influence on collaboration intentions, namely environmental attitude with a significance value of 0.154, was obtained. Based on the results of multiple determination (R^2) of 0.270 (see Table 8), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27% while 73% is influenced by other factors outside the model.

Table 8. The R^2 result for the driving factors of collaboration intention for Bantul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.501	0.270	0.217	0.41717

c. Kulonprogo ~~r~~Region

In the Kulonprogo area, there are 49 informal actors involved ~~who act~~ as respondents. Table 9 shows the average value of respondents' answers for each factor and collaboration intention. The value of collaboration intention is 3.783, meaning that informal actors in Kulonprogo Regency intend to collaborate in handling used cell phones with formal actors.

Table 9. Results of descriptive analysis of respondents' answers in Kulonprogo region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.783	4.097	3.963	4.021	4.438	3.982

Classical assumption test needs to be done before performing regression analysis. The summary of classical assumption tests for Kulonprogo region is ~~are~~ displayed in Table 10. The complete results of the classical assumption test are presented ~~shown~~ in Appendix 2. ~~It appears that f~~For ~~the~~ Kulonprogo ~~area~~region, all classical assumption tests are fulfilled.

Table 10. The summary of classical assumption test for Kulonprogo Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
1. Residual data plot spread around the diagonal line	1. Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.700), management commitment (0.588), and financial benefits (0.694), government support (0.893) and competitor pressure (0.583)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
2. Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.636	2. The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.428), management commitment (1.699), and financial benefits (1.442), government support (1.229) and competitor pressure (1.717)	

The regression result of driving factors on handling collaboration of used cell phones for second~~-~~hand market informal actors in the Kulonprogo region is presented in Table 11. It can be seen that the competitor~~s's~~ pressure is the most significant driving factor compared to other factors. The calculation shows that the collaboration intention of informal actors in the Kulonprogo region is 3.783.

Table 11. The regression result for Kulonprogo region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.154	0.811		0.190	0.851
Environmental attitude	0.102	0.161	0.092	0.632	0.531
Management commitment	-0.122	0.150	-0.129	-0.814	0.420
Financial benefits	0.092	0.148	0.091	0.626	0.535
Government support	0.384	0.152	0.326	2.533	0.015
Competitor's pressure	0.414	0.160	0.413	2.593	0.013

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, then these factors affect collaboration intentions in handling used cell phones. In Kulonprogo region, there is one factor that influences collaboration intentions in handling used cell phones, that is namely competitor pressure with a significance value of 0.013 and government support with in significance of 0.015. Based on the results of multiple determination (R^2) of 0.364 (see Table 12), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 36.4% while 63.6% is influenced by other factors outside the model.

Table 12. The R^2 result for the driving factors of collaboration intention for Kulonprogo region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.603	0.364	0.290	0.46400

d. Sleman rRegion

Respondents in Sleman Regency were 160 informal actors. In summary, theThe average value of the respondents' answers about the five factors studied and the average value of collaboration intentions are presented in Table 13. It can be seen from the table that the value of collaboration intentions of informal actors in Sleman is 4,008. This value is the highest intention value compared to other regions. That means they really intend to collaborate.

Table 13. Results of descriptive analysis of respondents' answers in Sleman region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	4.008	3.904	3.979	3.983	4.019	4.009

Before performing regression analysis, it is necessary to test the classical assumptions. The results of classical assumption tests for Sleman region is are displayed in Table 14. The complete results of the classical assumption test are shown in Appendix 2. The results of the classical assumption test for the Sleman region show that it is fulfilled for all types of tests.

Table 14. The summary of classical assumption test for Sleman Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
1. Residual data plot spread around the diagonal line	1. Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.851), management commitment (0.900), and financial benefits (0.800), government support (0.866) and competitor pressure (0.733)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
2. Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.668	2. The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.175), management commitment (1.111), and financial benefits (1.250), government support (1.155) and competitor pressure (1.364)	

The regression result of driving factors on handling collaboration of used cell phones for second–hand market informal actors in the Sleman region is presented in Table 15. It can be seen that the government support is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Sleman region is 4.008.

Table 15. The regression result for Sleman region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	2.408	0.406		5.938	0.000
Environmental attitude	0.029	0.048	0.049	0.603	0.547
Management commitment	0.142	0.069	0.163	2.066	0.040
Financial benefits	0.137	0.071	0.161	1.926	0.056
Government support	0.218	0.069	0.254	3.160	0.002
Competitor pressure	-0.125	0.085	-0.128	-1.466	0.145

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, then these factors affect collaboration intentions in handling used cell phones. In the Sleman region, there is one factor that influences collaboration intentions in handling used cell phones, that is namely government support with a significance value of 0.002, followed by then management commitment and financial benefit with successive levels of significance level of 0.040 and 0.056. Based on the results of multiple determination (R^2) of 0.141 (see Table 16), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 14.1% while 85.9% is influenced by other factors outside the model.

Table 16. The R^2 result for the driving factors of collaboration intention for Sleman region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.375	0.141	0.113	0.34253

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e. Yogyakarta ~~m~~Municipality

For the Yogyakarta city area, ~~there are~~ 90 informal actors were involved as respondents. Table 17 presents the average value of each factor and the value of collaboration intention, which was obtained from the answers of the respondents. It can be seen that the value of collaboration intention is 3.60. This means that the level of collaboration intention of informal actors in the city of Yogyakarta is neutral and close to agreeing to collaborate.

Table 17. Results of descriptive analysis of respondents' answers in Yogyakarta municipality

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.60	4,00	3.75	3.70	4.21	3.86

The summary of classical assumption test that was carried out before the regression analysis is shown in Table 18. The detailed results of the classical assumption test are shown in Appendix 2. The results for all types of tests ~~It~~ are fulfilled for the Yogyakarta city area, so it can be continued with regression analysis.

Table 18. The summary of classical assumption test for Yogyakarta Municipality

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
1. Residual data plot spread around the diagonal line	1. Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.826), management commitment (0.640), and financial benefits (0.622), government support (0.757) and competitor pressure (0.686)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
2. Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.975	2. The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.211), management commitment (1.562), and financial benefits (1.608), government support (1.322) and competitor pressure (1.458)	

The regression result of driving factors on handling collaboration of used cell phones for second ~~-~~ hand market informal actors in the Yogyakarta municipality is presented in Table 19. It can be seen that the environmental attitude is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Yogyakarta municipality is 3.60.

Table 19. The regression result for Yogyakarta municipality

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0,866	0,618		1,403	0.164
Environmental attitude	0,396	0,118	0,343	3,372	0.001
Management commitment	-0,011	0,143	-0,009	-0,075	0.940
Financial benefit	0,292	0,121	0,282	2,408	0,081
Government support	0,014	0,106	0,014	0,135	0,839
Competitor pressure	0.010	0,115	0,010	0,089	0,929

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, ~~then~~ these factors affect collaboration intentions in handling used cell phones. In the Yogyakarta municipality, ~~there is~~ one factor ~~that~~ influences collaboration intentions in handling used cell phones, which is ~~namely~~ environmental attitude with a significance value of 0.002 and financial benefit has ~~have~~ a moderate impact with a significance level of 0.081. Based on the results of multiple determination (R^2) of 0.274 (see Table 20), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27.4% while 72.6% is influenced by other factors outside the model.

Table 20. The R^2 result for the driving factors of collaboration intention for Yogyakarta municipality

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.524	0.274	0.232	0.57013

~~In summary, the~~The most influential factors on the intention to collaborate in each region are presented in Figure 10. From the figure, ~~it can also be seen~~ the position of one region compared to other region in the Special Region of Yogyakarta Province can be seen.

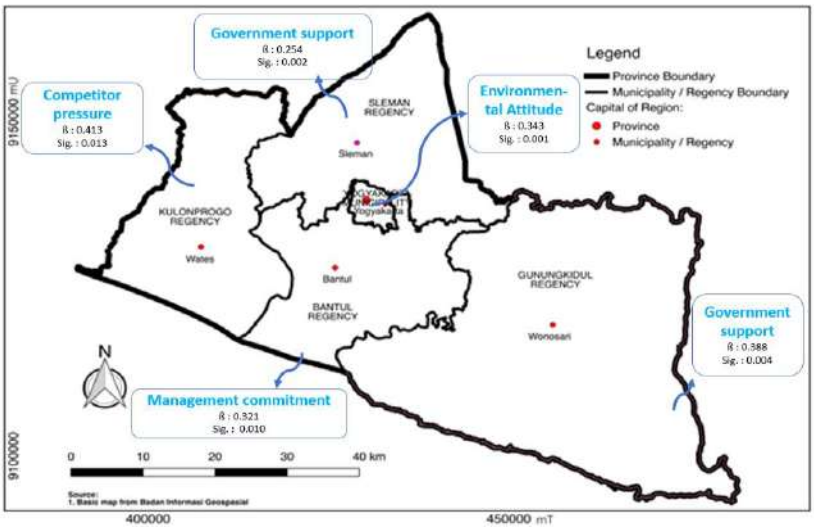

Figure 10. The most significant driving factors in each region in The Special Region of Yogyakarta Province, Indonesia

f. The Special Region of Yogyakarta Province

The results for the Special Region of Yogyakarta Province were obtained by processing the data from five regions, which included ~~is the total~~ 424 respondents. The value of this collaboration intention for all actors was 3.744. It means that generally the respondents had the collaboration intention in handling used cell phones with formal actors. The values for each factor at the provincial level, which were ~~are~~ obtained from the average values of the five regions, are shown in Table 21.

Table 21. Results of descriptive analysis of respondents' answers in Special Region of Yogyakarta Province

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3,744	3,800	3,778	3,781	4,113	3,810

Next, to obtain the factors that influence the collaboration intentions of all actors at the province level, the Structural Equation Modelling (SEM) approach was~~is~~ used. Before the structural model was formed, the CFA (Confirmatory Factor Analysis) was conducted on exogenous variables. For endogenous variables, CFA is not necessary, because there is only one variable. CFA is intended to check whether all questionnaire items can be used. There is no general rule in determining the cut-off value for loading factor (Doll et al., 1995). This paper specified the loading factor as more than 0.5. In the exogenous CFA, the fit model was achieved with the p-value=0.665, $\chi 2$=210.536, GFI=0.960, AGFI=0.931, and RMSEA=0.000. Based on the value of the loading factor, there were two items deleted; ~~,~~ ~~namely~~ the first item was ~~on~~ the government support factor and the sixth item was ~~on~~ competitor pressure.

The structural model result is shown in Table 22. The structural fit model was obtained with p-value=0.051, $\chi 2$=343.389, GFI=0.945, AGFI=0.915, and RMSEA=0.019. It shows that the most significant driving factors in the Special Region of Yogyakarta Province is financial benefit and government support with the influence values of ~~are~~ 0.231 dan 0.150, respectively and the significance levels are 0.014 and 0.041, respectively.

Table 22. Structural model result

			Estimate	S.E.	C.R.	P	Label
Collaboration intention	<---	Environmental attitude	-.049	.033	-1.491	.136	par_20
Collaboration intention	<--	Management commitment	.148	.141	1.050	.294	par_21
Collaboration intention	<--	Financial benefit	.231	.094	2.463	.014	par_22
Collaboration intention	<--	Government support	.150	.073	2.048	.041	par_23
Collaboration intention	<--	Competitor pressure	.113	.093	1.216	.224	par_24

The coefficient of determination is 0.284, shown in Table 23, meaning that the five factors considered in this study describe collaboration intentions of 28.4%, and other factors form 71.6% of collaboration intentions.

Table 23. Squared Multiple Correlations

	Estimate
Collaboration intention	.284

4.4. *Discussion*

In this discussion section,The the results of each factor influencing collaboration intentions and their managerial implications are will be discussed as follows.

a. Environmental attitude

The environmental attitude factor is as the dominant factor influencing the intention to collaborate with informal actors in the Yogyakarta municipality and as a moderate driving for informal actors in the Bantul Region. This factor is related to the attitude of informal actors towards the environment. It means that informal actors with high environmental attitudes will also show high collaboration intentions.

The result shows that the average environmental attitude of informal actors in both Yogyakarta municipality and Bantul Region is 4, which means that the actors have a high environmental attitude. Furthermore, in terms of when viewed from the level of education, the education background of informal actors in Yogyakarta is have a minimum of high school education of with 93.3%, while in Bantul, it is 92%. According to Latif et al. (2012) [75], education level has had a significant impact on in pro-environmental intention and behaviorbehaviour. , aAs did Wenshun et al. (2011) [76] demonstrated, the difference in the education level correlates with environmental behaviorbehaviour. Yin et al. (2014) [77] stated that the differences in the education level will result in make a differences in the desire to carry out environmentally friendly behaviorbehaviour. Thus, the higher a person's education level, the higher his concern for the environment.

The results of this study are in line with Arshad et al. (2022) [40], where environmental concern significantly affects the ecological behaviorbehaviour of employees in small and medium hotels in Pakistan. Also, aAccording to Chan et al. (2017) [39], environmental concern was positively related to ecological behaviorbehaviour of international tourist hotel employees in Hong Kong. Likewise, He et al. (20187) [35] showed that employee and top management environmental awareness could affect corporate environmental behaviorbehaviour. In addition, Long et al. (2017) [42] demonstrated the positive and significant impact of the attitude toward environment factors on the environment. Still related to the influence of environmental attitude, the results of Okumus et al. (2019) [41] showed that the environmental concern of hotel employees in Turkey is the best predictor of ecological behaviorbehaviour. Then, Tesța et al. (2016) [36] showed that environmental awareness has a positive and significant effect on proactive environmental strategy. This also aligns Next is also in line with Zientara and & Zamojska's (2018) [44] research which demonstrated that where environmental values were positively related to organizational citizenship behaviorbehaviour for the environment (OCBE).

The managerial implication of this study 's results is that to maintain environmental attitudes, informal groups of actors should often hold discussions on environmental issues so that the understanding of the environment becomes even and equal among the actors. Through the Department of Trade and Cooperatives, the government can also provide contribute to providing information about the environment and its relation to used cell phones. In addition, the formal actors should conduct their social responsibilitiesy, such as coaching informal actors to understand how to handle the used cell phones so that they that are safe for the environment and human beings.

b. Management commitment

Management commitment in this study refers to means the commitment of owners and employees in carrying out pro-environmental activities, in this case, collaborating with formal parties in managing used cell phones. The results showed that the management commitment factor strongly influences the intention to collaborate ofon informal actors in the Bantul and Sleman regions. As for the Gunung Kidul Region actors, this factor has a moderate influence. The value of management commitment in the three regions is 3.8; 3.979; and 3.4 for Bantul, Sleman, and Gunung Kidul, respectively. It can be seen that the management commitment of the informal actors in the Bantul and Sleman Regions is higher than that of the informal actors in Gunung Kidul, so it can be said that it is in line with the level of influence.

The strong influence of management commitment is in line with the research of Ates et al. (2012) [47], which showed that organizational commitment has a positive impact on the adoption of a proactive environmental strategy. It is also in line with the research of He et al. (20187) [35] which stated that one of the internal pressures in the form of commitment management affects corporate environmental behaviorbehaviour. Research Subsequent results by Tariqk et al. (2020) [43] found that a manager's environmental commitment strengthens the relationship between employees' environmental attitude and employees' ecological behavior. Yen and& Yen (2012) [37] showed a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities. In addition, Yusliza et al. (2019) [46] found that top management commitment positively and significantly affects various green human resource management (GHRM) activities. Lee and& Joo (2020) [52] show that top management is an essential factor which to influences the level of collaboration between suppliers and customers in a green supply chain.

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Meanwhile, Burki et al (2019) [51] found that top management commitment has a positive and significant effect on green process innovation, while its influence on green managerial innovation is moderate. In contrast, the results of Bhatia and& Jakhar (2021) [50] are not in line with this study, where top management commitment (TMCO) has no significant effect on green product innovation (GPI).

With the results found in Bantul, Sleman, and Gunung Kidul Region, the managerial implication that can be emphasized is that informal actors with a high level of management commitment need to be maintained. . Sso that owners and employees of informal actors are always committed to carrying out activities that support environmental conservation.

This commitment can be transmitted to other informal actors through meetings held in informal actors' associations in several areas so that owners and employees will even understand the importance of being committed to environmental conservation. Local and central governments and formal actors can also contribute to fostering and enhancing this management commitment factor by providing additional information and education related to environmental problems and their handling.

c. Financial benefit

The strong influence of financial benefits on the collaboration intention occurred in informal actors in the Sleman Region and studies at the provincial level. It means that informal actors will intend to collaborate in managing used cell phones if they feel there are economic benefits for them. The effect of moderate financial benefits was found in actors in the Yogyakarta municipality area.

The average value of the respondents' answers regarding the financial benefit factor was 3.983 for actors in Sleman Regency, and 3.781 for all provinces, 3.781 were obtained, which is the average value of financial benefits in all regions. The value of financial benefits to actors in the Yogyakarta municipality area is 3.7. The value of financial benefits that has have a strong impact is more significant than those with a moderate influence.

The results of this study are in line with the results of Wang et al. (2018) [59] found that cost factor s significantly influences internal and external green practices. In addition, the used cell phones are usually sold through the informal sector for cashback [55] (Shevchenko et al., 2019).

For managerial insight, the financial benefits for informal actors are one of the most important reasons for running their business. However, the role of these informal actors has not received adequate attentionis less attention. Therefore, the formal actors should support the informal ones to collaborate in handling used cell phones.

d. Government support

There are three regions and a study at the provincial level. It was found that the government support factor had a strong influence on the intention to collaborate , namely in Kulon Progo, Sleman, and the Gunung Kidul Region. Meanwhile, there was no moderate influence of the government support factor for actors in any region. The value of the government support factor in each regions is 4.438, 4.019; and 3.7 for Kulon Progo, Sleman, and Gunung Kidul, respectively. Meanwhile, the value of government support for actors in all provinces is 4.113.

From the The government support questionnaire items show that , it means that the actors expect the government to support the implementation of pro-environment activities. It will encourage the actors to intend to collaborate in handling used cell phones with formal parties. Therefore, by looking again at the value of government support from the Kulon Progo and Sleman regions, as well as at the provincial level, it seems that this value is very high. So, , so it can be interpreted that these actors expect the government to condition, provide information and technical assistance, popularize environmental management, and provide infrastructure for facilitating environmental activities.

The result of the study is that government support significantly encourages collaboration intention, that is in line with studies by Lee (2008) in which government involvement plays an important role in the willingness of suppliers to participate in the green supply chain. Also, in the research of He et al. (20178) [35], government pressure influenced corporate environmental behaviorbehaviour. Ye et al. (2013) [33] showed that government pressure has a significant effect on managers' attitudes to RL implementation. Next, Nguyen et al. (20188) [78] investigated that laws and regulations play the most significant impacts on recycling behavioralbehavioural intention, compared to environmental awareness and attitude toward recycling, social pressure, cost of recycling, and inconvenience of recycling.

Furthermore, the management implication of this result is that the government is authorized to provide support in collaboration between formal and informal actors. This support can be in the form of rules, policies, facilities, resources, and information. So far, regulations related to e-waste in Indonesia can be seen in [25] Maheswari (2019). However, these regulations, namely Government Regulation no. 101 of 2014, do not explicitly mention e-waste, but the waste in question is hazardous and toxic material waste in general. Thus, there are no specific regulations regarding e- waste management in Indonesia.

e. Competitor pressure

The results show that the competitor pressure factor strongly influences informal actors in the Kulon Progo Region only and is also not seen as a moderate driving factor. It means the informal actors in Kulon Progo will be encouraged to do collaborative activities in handling used cell phones when their competitors carry out activities related to the environment.

The value of competitor pressure for informal actors in the Kulon Progo Region is 3.982, which means this value is relatively high and higher than the value of competitor pressure in all provinces. If it is seen fFrom the number of informal actors in Kulon Progo, there are fewer informal actors compared to than in the other regions, and they are not spread throughout the region, so there is a possibility that the level of competition between informal actors will be high.

The results of research related to competitor pressure are in line with the study of Weng et al. (2015) [65], which found that competitor pressure had a positive and significant effect on the company's green innovation activities. This ~~Also~~ is also in line with Ye et al. (2013) [33], where competitor pressure significantly affects managers' attitudes to RL implementation. This finding is ~~was~~ supported by previous research conducted by Riva and Gani (2020) [79] demonstrating that competitor pressure also positively affects the environmental performance of upscale hotels. Competitor initiatives and strategies guide the hotels to adopt green marketing practices. The managerial implication of ~~the results of~~ this research is the need for the ~~role of~~ government and formal actors to provide counselling and training for upgrading knowledge and skills of ~~to~~ informal actors.

Generally, the results of this study can be considered by stakeholders who may be involved in handling e-waste, mainly used cell phones in Indonesia. For the government as part of the policymakers, these results can be used as input for setting rules, providing information, providing assistance, funding assistance, etc., for the safe management of used cell phones. For formal actors such as mobile phone manufacturers, the results of this study can be considered in ~~used to~~ redesigning and promoting~~e~~ a program to take back used cell phones from ~~the hands of~~ consumers as a form of corporate social responsibility. In the end, informal actors' handling of used cell phones will not harm health and the environment but still provide~~s~~ economic benefits for informal actors.

~~Seeing~~ Taking into account the results of the coefficient ~~of~~ determination in each region and the study at the provincial level, which is below 50%, it is still necessary to explore other factors that can motivate second-hand cell phone market players to collaborate in cell phone management. Furthermore, it is also essential to study the factors that can hinder informal actors from collaborating with formal actors in handling used cell phones ~~with formal actors~~. Understanding the factors driving and inhibiting collaboration intentions among informal actors will make it easier to design policy-making and design appropriate forms of collaboration.

5. Conclusion

Based on the analysis of collaboration intentions among informal actors, it was found that:

- ~~The descriptive analysis showed that~~ informal actors intend to collaborate with formal actors in managing used cell phones with an average intention value of 3.744.
- ~~Regression analysis showed that~~ the factors that have the most significant effect on collaboration intentions, including the environmental attitude, is the most substantial driving factor for informal actors in Yogyakarta Municipality, with a value of 0.343 and a significance level of 0.001. The management commitment has a strong impact in two areas, namely Bantul with a value of 0.321 and a significance level of 0.010 and Sleman Region with a value of 0.163 and a significance level of 0.040. The financial benefit strongly influenced the secondhand market players in the Sleman Region of 0.161 with a significance value of 0.056, while the actors in the Yogyakarta municipality were 0.282 with a significance value of 0.081. Furthermore, the government support strongly encouraged collaboration among informal actors in Sleman, Kulon Progo, and the Gunung Kidul Region with influence values and significance levels, respectively: 0.254 and 0.002; 0.326 and 0.015; 0.388 and 0.004. The competitor pressure only appears as a positive and significant encouraging factor for informal actors in the Kulon Progo Region, with a value of 0.413 and a significance level of 0.013.
- The structural equation modelling as the study for the provincial level showed that the two main factors that encourage all informal actors are financial benefits of 0.231 with ~~and~~ a significance level of 0.014, while government support is 0.150 ~~and~~ with a significance level of 0.041.
- There is no form of collaboration between informal and formal actors in Indonesia in handling used cell phones. The results of this study can be used as consideration for policymakers to regulate e-waste management, mainly used cell phones.
- Formal actors can also use the results of this study in promoting the take-back program of used cell phones as a form of waste management through corporate social responsibility and collaboration with informal actors.

6. Declarations

6.1. *Author Contributions*

Conceptualization, S.M.B. and I.Y.P.; methodology, S.M.B.; formal analysis, S.M.B; data curation, S.M.B.; writing—original draft preparation, S.M.B. and H.M.A; writing—review and editing, S.M.B., I.Y.P., and H.M.A.; visualization, H.M.A.; supervision, I.Y.P; funding acquisition, S.M.B. All authors have read and agreed to the published version of the manuscript.

6.2. *Data Availability Statement*

The data presented in this study are available on request from the corresponding author.

6.3. *Funding*

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6.5. *Conflicts of Interest*

The authors declare no conflict of interest.

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Appendix 1

The results of the reliability and validity test of the research questionnaire

		Yogyakarta municipality[1]	Sleman Region[2]	Bantul Region[1]	Gunungkidul Region[1]	Kulonprogo Region[1]
Collaboration intention		Cronbach α 0.931	Cronbach α 0.852	Cronbach α 0.852	Cronbach α 0.941	Cronbach α 0.851
		Correlated item –Total Correlation				
1	You intend to take part in the collaborative activity	0.838	0.379	0.808	0.788	0.730
2	You will try to participate in the collaborative activity	0.871	0.489	0.571	0.825	0.662
3	You plan to take part in the collaborative activity	0.906	0.569	0.678	0.880	0.778
4	You are willing to participate in the collaborative activity	0.922	0.434	0.813	0.916	0.676
5	You wish to participate in the collaborative activity	0.913	0.471	0.660	0.789	0.444
Environmental Attitude		Cronbach α 0.721	Cronbach α 0.711	Cronbach α 0.711	Cronbach α 0.797	Cronbach α 0.782
		Correlated item –Total Correlation				
1	Environmental issues need to be a priority in business management.	0.598	0.466	0.408	0.591	0.561
2	Environmentally friendly behavior by the company can provide significant cost reductions.	0.7	0.584	0.375	0.431	0.615
3	The company's environmentally friendly behavior can help companies enter new markets.	0.876	0.401	0.559	0.711	0.459
4	Environmentally friendly behavior carried out by the company can lead the company to become a leader in the market.	0.75	0.683	0.572	0.601	0.822
5	Environmentally friendly behavior by the company can improve the company's image.	0.624	0.348	0.419	0.577	0.389
Commitment Management		Cronbach α 0.844	Cronbach α 0.741	Cronbach α 0.741	Cronbach α 0.905	Cronbach α 0.784
		Correlated item –Total Correlation				
1	All members of the organization/company (owner, manager, and employee) are committed to environmental management and policies.	0.8	0.349	0.408	0.723	0.483
2	Organizational/company culture supports environmental conservation activities	0.687	0.654	0.568	0.895	0.697
3	The organization/company directs and facilitates the implementation of environmental conservation activities	0.867	0.548	0.589	0.790	0.457
4	There are ongoing efforts to support environmental conservation activities	0.802	0.751	0.671	0.807	0.707
5	There is environmental related training for employees	0.796	0.507	0.312	0.611	0.425
Financial Benefits		Cronbach α 0.899	Cronbach α 0.710	Cronbach α 0.710	Cronbach α 0.793	Cronbach α 0.892
		Correlated item –Total Correlation				
1	Potential for financial assistance	0.898	0.664	0.466	0.463	0.774
2	Gaining economic benefits in the	0.903	0.608	0.308	0.406	0.806

	form of reducing costs while helping to protect the environment					
3	Be more competitive by promoting achievements in the environmental field	0.791	0.516	0.596	0.683	0.578
4	Can survive in the market in the long term	0.76	0.343	0.542	0.589	0.757
5	Potential to get financial and technical management guidance	0.888	0.451	0.471	0.744	0.776
Government Support		Cronbach α 0.959	Cronbach α 0.773	Cronbach α 0.773	Cronbach α 0.941	Cronbach α 0.852
		Correlated item –Total Correlation				
1	The government needs to coordinate environmental conservation initiatives	0.866	0.682	0.728	0.826	0.696
2	Government needs to increase funding for environmental conservation initiatives	0.928	0.616	0.316	0.903	0.707
3	The government needs to provide information and technical assistance to small and medium-sized enterprises related to environmental conservation.	0.948	0.707	0.503	0.837	0.469
4	The government needs to popularize knowledge about environmental management.	0.953	0.509	0.644	0.828	0.794
5	The government needs to build infrastructure to facilitate environmental conservation initiatives	0.944	0.782	0.613	0.802	0.667
Competition Pressure		Cronbach α 0.944	Cronbach α 0.808	Cronbach α 0.808	Cronbach α 0.909	Cronbach α 0.887
		Correlated item –Total Correlation				
1	Competitors comply with environmental regulations	0.883	0.728	0.671	0.767	0.716
2	Competitors carry out environmental conservation activities	0.926	0.769	0.576	0.804	0.740
3	Competitors are committed to various stakeholders in environmental conservation activities	0.842	0.764	0.626	0.716	0.768
4	Competitors collaborate with professionals to support environmental conservation	0.907	0.564	0.520	0.694	0.697
5	Competitors set environmental standards for their products and operations	0.798	0.621	0.357	0.787	0.776
6	Competitors get new business opportunities when carrying out environmental conservation	0.812	0.574	0.331	0.637	0.474
7	Competitors promote successful implementation of environmental conservation	0.929	0.578	0.742	0.673	0.613

Note:

1. Validity test for the area of Yogyakarta City, Bantul Regency, Gunungkidul Regency, and Kulonprogo Regency using answers from 30 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 30-2=28. Based on the level of confidence and degrees of freedom, the R table value is 0.3061, so the questionnaire item is said to be valid if the calculated r value is greater than r table and is positive.

2. The validity test for the Sleman Regency area uses answers from 40 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 40-2=38. Based on the level of confidence and degrees of freedom, the R table value is 0.2638, so the questionnaire item is said to be valid if the calculated r value is more than r table and is positive.

Appendix 2.

Classical assumption test results

1. Normality test results

The results of the normality test are displayed in the form of a plot of residual data, which is shown in Figure A.1 and the results of the Kolmogorov-Smirnov test in Figure A.2. From Figure A.1 it can be seen that the data plot is spread around the diagonal line, which means the model fulfill the assumption of normality. Moreover, from Figure A.2 it is shown that the value of the Kolmogorov-Smirnov statistical test in the five research areas has a significance level greater than 0.05, so that the regression model in all regions meets the normality test.

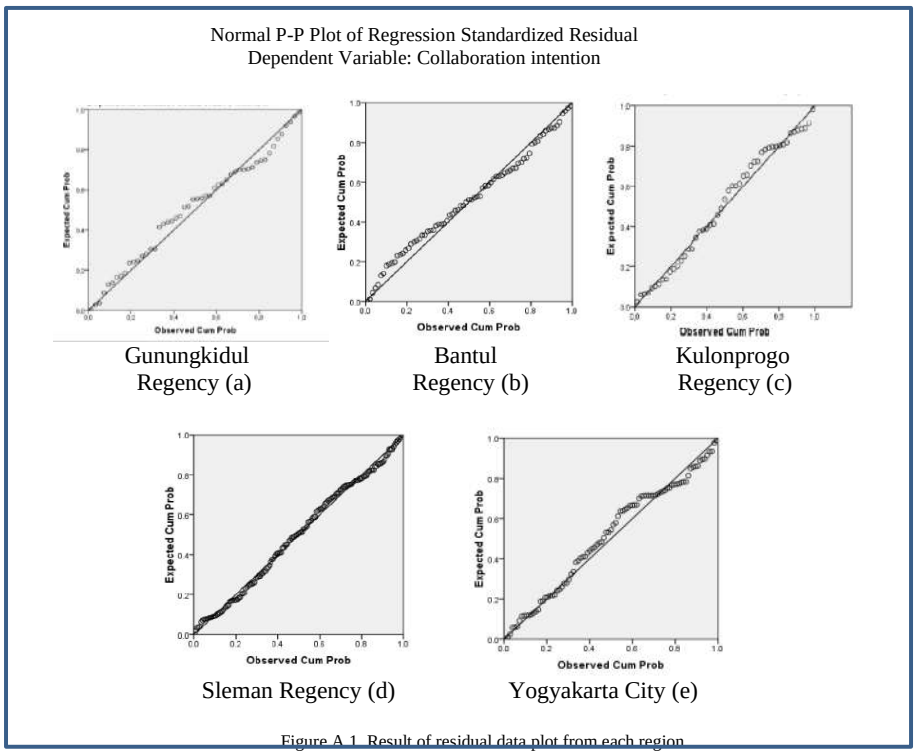

Figure A.1. Result of residual data plot from each region

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.631
Asymp. Sig. (2-tailed)	.820

a. Test distribution is Normal.
b. Calculated from data.

Gunungkidul Regency (a)

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.678
Asymp. Sig. (2-tailed)	.748

a. Test distribution is Normal.
b. Calculated from data.

Bantul Regency (b)

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.636
Asymp. Sig. (2-tailed)	.813

a. Test distribution is Normal.
b. Calculated from data.

Kulonprogo Regency (c)

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.668
Asymp. Sig. (2-tailed)	.764

a. Test distribution is Normal.
b. Calculated from data.

Sleman Regency (d)

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual
Kolmogorov-Smirnov Z	.975
Asymp. Sig. (2-tailed)	.298

a. Test distribution is Normal.
b. Calculated from data.

Yogyakarta City (e)

Figure A.2. Result of Kolmogorov-Smirnov test

2. Multicollinearity test results

The results of the multicollinearity test are presented in Figure A.3. From the figure, it can be seen that the tolerance value for all variables is greater than 0.1 and the Variance Inflation Factor (VIF) value for all variables is less than 10, in all research areas. Thus, it can be concluded that there is no multicollinearity between the independent variables.

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.766	1.306
Management commitment	.530	1.887
Financial benefit	.368	2.714
Government support	.740	1.352
Competitor pressure	.337	2.967

Gunungkidul Regency (a)

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.776	1.289
Management commitment	.727	1.375
Financial benefit	.564	1.772
Government support	.723	1.383
Competitor pressure	.413	2.422

Bantul Regency (b)

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.700	1.428
Management commitment	.588	1.699
Financial benefit	.694	1.442
Government support	.893	1.119
Competitor pressure	.583	1.717

Kulonprogo Regency (c)

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.851	1.175
Management commitment	.900	1.111
Financial benefit	.800	1.250
Government support	.866	1.155
Competitor pressure	.733	1.364

Sleman Regency (d)

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	.826	1.211
Management commitment	.640	1.562
Financial benefit	.622	1.608
Government support	.757	1.322
Competitor pressure	.686	1.458

Yogyakarta City (e)

Figure A.3. Result of multicollinearity test

3. Heteroscedasticity test results

In this study, the heteroscedasticity test was carried out using the Park test. The results of the heteroscedasticity test are displayed in the form of a scatterplot which is presented in Figure A.4. From the figure, it can be seen that the points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern. This means that there is no heteroscedasticity in the regression model.

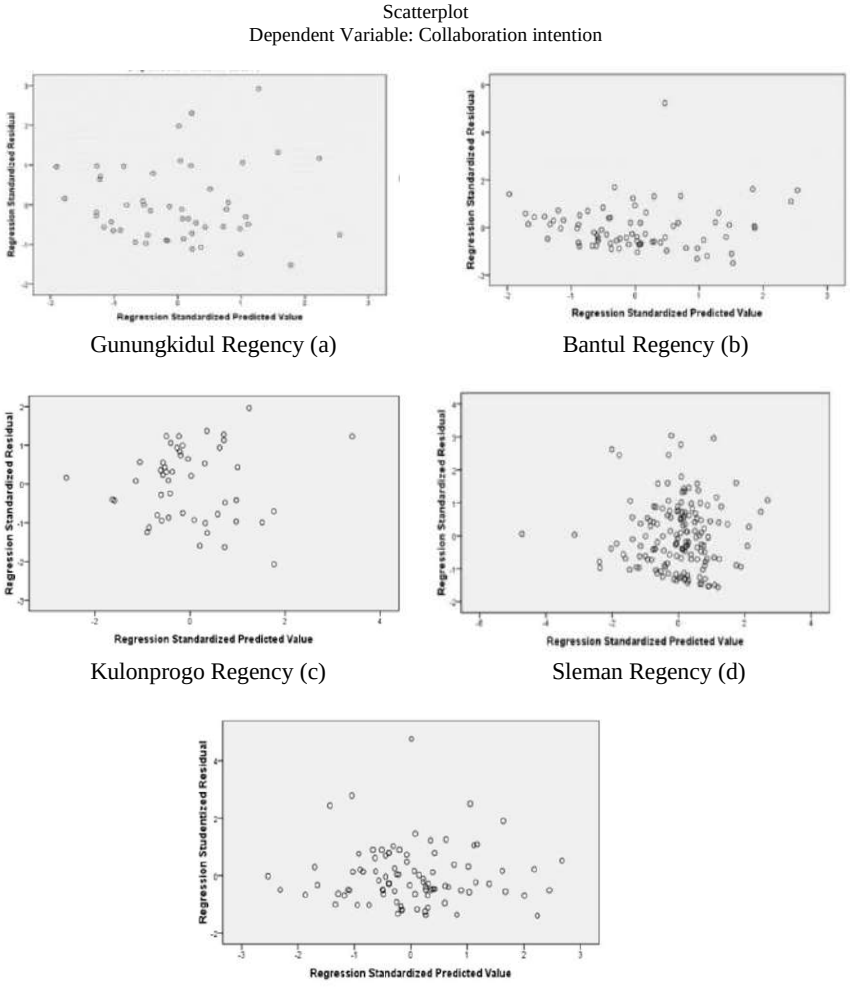

Figure A.4. Result of heteroscedasticity test

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An Analysis of Driving Factors of Collaboration in Handling Used Cell Phones as a Waste Management Practice

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Abstract

The handling of used cell phones in Indonesia is mostly carried out by informal actors starting from second-hand market actors. However, the activities of the informal actors often endanger the environment and human health. To reduce the impact, some of the activities should be transferred to formal parties. This requires collaboration of both parties as a form of waste management, which previously has never been established. The objective of this study is to explore the driving factors of collaboration intention of informal actors in handling used cell phones with the formal ones. Data were collected using questionnaires distributed to second hand market actors in five districts in the Special Region of Yogyakarta Province. In this study, three internal driving factors are considered, which are environmental attitude, management commitment, and financial benefits, as well as two external driving factors, which are government support and competitor pressure. The regression analysis in each region revealed that the most significant driving factors vary across different regions, such as government support in Gunungkidul, management commitment in Bantul, competitive pressure and government support in Kulonprogo, government support, management commitment, and financial benefit in Sleman, as well as environmental attitude and financial benefit in Yogyakarta City. From the structural equation modelling at the provincial level, it was found that financial benefit and government support were the most significant factors influencing collaboration intentions of all informal actors. The results of this study can be used as a reference.

Keywords: Collaboration Intention; Driving Factors; Used Cell Phone; Waste Management.

1. Introduction

The number of mobile phone users in Indonesia, especially in the Special Region of Yogyakarta Province (DIY Province), are increasing. Data from the Central Bureau of Statistics (BPS) generally show that the percentage of the population using mobile phones has increased from 2012 to 2019. However, there has been a slight decline in 2020, possibly due to the COVID-19 pandemic. The increase in mobile phone users is shown in Figure 1.

The increase in the number of cell phone usage indicates that there is also an increase in cell phone waste, which is e-waste. The development of technology is followed by an increase in the amount and complexity of the waste. Since the waste contains toxic materials which might have a negative impact on both human and environmental health, waste management requires accurate identification and an awareness of the risks involved [1]. Hazardous metals in e-waste are lead, cadmium, mercury, hexavalent chromium, and refractory materials [2–6]. In the long term, these hazardous metals can have an impact on human health and environmental. According to Robinson (2009) [7], in every 1 kg of e-waste, there is 180 mg of cadmium and 0.8 mg of mercury, especially in battery components. Furthermore, the BBC

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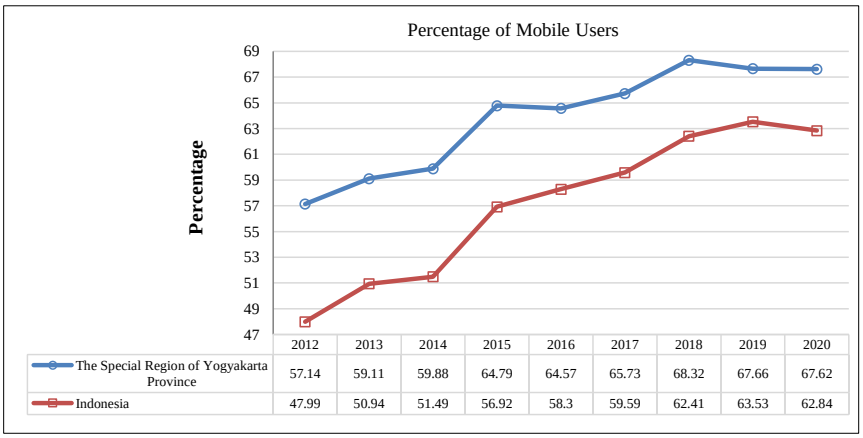
(2002) in Polak & Drápalová (2012) [8] described that cadmium from a cell phone battery can contaminate 600,000 litres of water. Research conducted by Robinson (2009) [7] in Guiyu City, Guangdong region, China, which is the largest e-waste recycling area in the world, found that dioxin contamination in Guiyu air resulted in the level of exposure to humans reaching 15–56 times the maximum standard recommended by WHO. Elevated levels of dioxins are found in breast milk, placenta, and hair, indicating that dioxins are acquired by humans from the air, water, or foodstuffs, at levels which pose a serious health risk. Children in Guiyu had significantly higher blood lead and cadmium levels than normal children. It was also reported that e-waste recycling workers from villages in the Jinghai region had chromosomal aberrations 20 times higher than villagers who were not exposed to e-waste. For this reason, it can be said that e-waste is a potential source of genetic mutations and can cause cytogenetic damage in the general population exposed to e-waste pollution. Furthermore, as Orlins & Guan (2016) [9] described, during the process of e-waste dismantling without adequate technology, the content of hazardous materials in e-waste will remain in the environment for a long time.



	2012	2013	2014	2015	2016	2017	2018	2019	2020
The Special Region of Yogyakarta Province	57.14	59.11	59.88	64.79	64.57	65.73	68.32	67.66	67.62
Indonesia	47.99	50.94	51.49	56.92	58.3	59.59	62.41	63.53	62.84

Figure 1. Data on the percentage of mobile phone users in the Special Region of Yogyakarta Province (DIY Province) and Indonesia in 2012-2020 *

Waste is generally defined as something that is no longer used and thrown away by its owner. Furthermore, Dadzie et al. (2020) [10] explain various definitions of waste. It is understood that all forms of waste must be managed and handled correctly not to burden the environment and disturb public health.

E-waste is waste from various electronic and electrical products. The definition and classification of e-waste depend on the regulation or standards that apply in each country. Gollakota et al. (2020) [11] present a detailed classification of e-waste based on several standards. Likewise, Shittu et al. (2021) [12] explained the definition of e-waste and its classification. In contrast to developed countries that explicitly define and classify e-waste and have standardized rules for its management, Indonesia has no specific rules regarding e-waste management. Generally, e-waste is classified as toxic and hazardous material regulated in Minister of Environment and Forestry Regulation No. 6 of 2021 concerning procedures and requirements for managing hazardous and toxic waste.

One of the activities that can be used to manage End of Life (EoL) or End of Use (EoU) products such as used cell phones is waste management. Waste management is a step or various strategies for managing and disposing waste. It can be done by disposing, destroying, processing, recycling, reusing, or controlling waste. Waste management aims to reduce unusable materials while preventing potential environmental damage and threats to human health. The management of used cell phones as electronic waste is known as e-waste management.

Several authors described effective e-waste management, including Isernia et al. (2019) [13] stated that the collection point is the key to e-waste management. The effectiveness of the collection process is influenced by the distribution of collection points in an area. Rautela et al. (2021) [14] stated that for effective implementation of sustainable e-waste management, government supervision is needed in the reciprocal relationship between manufacturers, producers, wholesalers, traders, consumers, and recyclers. Furthermore, Shittu et al. (2021) [12] suggested that one part that needs attention in effective e-waste management is to apply and enforce e-waste management rules for informal actors. As for e-waste management in developing countries, Ilankoon et al. (2018) [15] mentioned that it is necessary to apply a strict

* (Source: Data of the year 2012-2018 were obtained from: (Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah, 2012-2018, 2020)- Data of the year 2018-2020 were obtained : (*Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah 2018-2020*, 2020)

legislative framework to realize an e-waste management strategy. These regulations can be developed through modification of the EPR scheme, which provides an e-waste management system that is easy to adopt, provides benefits to all stakeholders, and is adapted to the local economy.

Several obstacles caused the implementation of e-waste management not to run optimally. Gollakota et al. (2020) [11] explained that effective e-waste management is not yet available in most developing countries, and the focal point of successful e-waste management is debatable. One of the shortcomings of e-waste management in developing countries is that the integration of the formal and informal sectors has not been integrated. In addition, there are several other factors, such as the unavailability of special rules for e-waste, the influence of socio-cultural aspects, and the lack of responsibility of producers and consumers. Meanwhile, Rautela et al. (2021) [14] stated that e-waste management in developing countries does not effectively run because e-waste is treated and managed informally in an illegitimate way. Moreover, the unavailability of policies, rules, and regulations, lack of law enforcement, and the implementation of the legal framework for EPR have not yet been maximized.

In Indonesia, mobile phone waste is mostly managed by informal actors, through the starting point of the second-hand market. Informal actors will obtain economic benefits from the activities of managing used cell phones. However, if used cell phone management activities are carried out without safe technology, the impact can affect the health of informal actors and damage the environment. Several researchers such as Chatterjee and Kumar (2009) [2], Chi et al. (2011) [3], Joseph (2007) [4], Li et al. (2011) [16], Kyere et al. (2018) [17], and Robinson (2009) [7] have elaborated the contamination of the environment due to e-waste management activities by informal parties. As Wilson (2007) [18] stated, one of the drivers of waste management is the remaining value of waste, which encourages people to use it as a source of income, especially in developing countries.

On the other hand, Original Equipment Manufacturers (OEMs) as formal actors have technological capabilities to handle used cell phones. However, the offer of a used cell phone return program in Indonesia is not carried out routinely and according to Budijati et al. (2015) [19], the program is not well known by the public, so that after cell phone usage, consumers sell the used mobile phones in the second-hand market, dispose, store, or give them to other people.

To reduce or eliminate the negative impact of the management of used cell phones by informal parties and still provide economic benefits for them, it is necessary establish collaboration in the management of used cell phones involving informal and formal parties. This collaboration aims to regulate the distribution of stages in the management of used cell phones to the disposal process that is safe for the environment and health.

Several authors have provided the definition of collaboration within the supply chain framework. Simatupang and Sridharan (2002) [20] define collaboration as two or more independent companies that work together to plan and implement supply chain operations in order to get a better success rate. Dung (2015) [21], Hudnurkar et al. (2014) [22], Soita (2015) [23], and Wu and Chiu (2018) [24] elaborated the definition of collaboration based on the definitions of other researchers. On the other hand, Maheswari (2019) [25] proposed an engagement model involving the government and intermediary businesses in handling e-waste problems in Indonesia that included empowerment, collaboration, and participation.

The potential or possibility of collaboration between informal and formal actors was conveyed by [26]. They reviewed the situation in several countries and proposed the integration of ISR (Informal Sector Recycling) into the formal sector by taking into account contexts and local conditions. Furthermore, Sasaki et al. (2014) [27] investigated the possibility of integrating the informal sector into formal waste management in Indonesia. Meanwhile, based on an analysis of the situation in four countries regarding informal sector business processes, Wilson et al. (2009) [28] stated that there was a clear potential for mutually beneficial cooperation between the formal and informal sectors. Furthermore, Li and Tee (2012) [29] suggested that to minimize the negative impact of informal channel activities, RL activities and the integration of IWS (Informal Waste Sector) into the formal sector are required.

To the best of the researchers' knowledge, no formal and informal forms of cooperation have been found in Indonesia in the handling of used cell phones. However, there are communities of second-hand market actors in some regions. This community has regular meetings to strengthen their relationship.

This study aims to explore the intention for collaboration of informal parties in managing used cell phones with the formal ones and the driving factors of the collaboration intentions. The intention of collaboration in this study is the intention to carry out management activities for used cell phones so that used cell phones can be returned to their origin point for the handling process or if the disposal is required, it does not damage the environment or endanger human health.

Factors driving collaboration intentions are based on factors that can encourage informal actors to carry out activities that lead to the prevention of environmental damage or environmental behaviours in general. Several researchers who explain the environmental behaviour of managers include Leszczynska (2010) [30] who examines the environmental awareness of managers and further investigates whether this awareness is related to socio-economic development. This study involved 200 managers in Australia and Ukraine and 250 managers in Poland. Lopez-Gamero et al. (2011) [31]

examined the environmental attitudes of hotel managers in Spain in the form of perceptions of the natural environment which are influenced by internal and external factors of the company. Next, Nambiar and Chitty (2014) [32] examined the views of business managers in India on the relationship between sustainability and the environment. Ye et al. (2013) [33] examined the attitudes of top managers in 209 companies in China regarding the implementation of reverse logistics in the form of product returns and product recovery. Therefore, the research objectives in this study are:

- To explore the collaboration intention of informal actors to manage used cell phones with formal actors so that cell phone waste remains safe for the environment and human health;
- To identify the driving factors of the collaboration intention of informal actors in handling used cell phones;
- To examine the influence of the driving factors on the collaboration intention of informal actors in handling used cell phones.

2. Literature Review and Hypotheses Development

This sub-section discusses the driving factors that can influence collaboration intentions for informal actors. This collaboration intention refers to the intention to behave in the environment. The driving factors for environmental behaviour comes from the internal or external. Internal driving factors are factors that come from individuals as part of the company or factors that describe the company's internal conditions. On the other hand, the external driving factors are factors that come from outside the company. The factors are outside the company's control but are able to affect the company's performance.

Fraj-Andrés et al. (2008) [34] stated that the environmental behaviour of firms depends on some internal and external forces. He et al. (2018) [35] also proposed the existence of internal and external pressures on corporate environmental behaviour in their study of 702 paper-making companies in China. Testa et al. (2016) [36]conducted a study to determine the effect of external pressure, internal factors, and environmental attitudes of entrepreneurs on a small and micro-scale company's proactive environmental strategy. Yen & Yen (2012) [37] explored internal and external motivations for green purchasing activities in electronic companies in Taiwan.

The factors considered in this research include internal and external factors, which consist of three internal factors (environmental attitude, management commitment, and financial benefits) and two external factors (government support and competitor pressure). These factors were determined based on a literature review of factors that can motivate environmental intentions and behaviour in a company and adjustments of the case studies in this research were done through field validation by asking several respondents in each research area whether the informal actors felt these factors involved.

The driving factors considered in this study are explained as follows.

2.1. Environmental Attitude

Environmental attitude in this study refers to the positive attitude of informal actors (second hand cellphone actors) towards the environment, commonly referred to as an environmentally friendly attitude. Janmaimool & Khajohnmanee (2019) [38] define environmental attitude as a person's belief in the relationship between humans and the environment. This belief also includes understanding the consequences when environmental damage occurs. Meanwhile, Chan et al., (2017) [39] stated that environmental attitude is often equated or interchanged with environmental concern. Arshad et al. (2022) [40] and Okumus et al. (2019) [41] explored environmental attitudes in environmental knowledge, awareness, and concern.

He et al. (2018) [35] showed that internal pressure could affect corporate environmental behaviour, where employees' and top management's environmental awareness are part of internal pressures. Then, Okumus et al. (2019) [41] proposed that the environmental attitude (in terms of environment concern) of hotel employees in Turkey is the best predictor of ecological behaviour. Furthermore, Arshad et al. (2022) [40] stated that employees with an excellent environmental attitude would encourage organizations to implement environmental management system policies. Moreover, Long et al. (2017) [42] examined the impact of attitude toward environmental behaviour on environmental innovation intention in 182 companies of various types in China. Then, Tariq et al. (2020) [43] examined the relationship between employees' environmental attitudes and employees' ecological behavior of employees in 65 small and medium-sized hotels operating in Pakistan's tourist areas. Next, Testa et al. (2016) [36] conducted a study to determine the effect of environmental awareness of managers to adopt a proactive corporate environmental strategy in 355 small and micro-scale businesses in Liguria, a region in central Italy. Then, Zientara & Zamojska (2018) [44] examined the relationship between environmental values or beliefs held by hotel employees in Poland with organizational citizenship behaviour for the environment (OCBE), and the results showed a positive relationship. From the previous studies reviewed, it is expected that someone with a high environmental attitude will show positive environmental behaviour. Therefore, the hypothesis of this research is as follows.

H1: Environmental attitude has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.2. Management Commitment

Management commitment is a form of responsibility and commitment from the owners and employees of the second-hand cell phone market to carry out activities that support the environment. In this case, it can be realized through collaboration in the management of used cell phones among formal parties so that the activities of handling used cell phones do not damage the environment or endanger workers' health.

In general, as stated by El-Kassar and Singh (2019) [45], management commitment is the encouragement given by a company to carry out environmentally friendly activities and to incorporate the ideas into the corporate culture. Yusliza et al. (2019) [46] argued that to achieve the successful implementation of green activities, top management must provide a high commitment so that the implementation of green activities can offer a competitive advantage for the company. In addition, Ates et al. (2012) [47] stated that organizational capability plays an important role in facilitating the implementation of the company's environmental strategy and impacts environmental performance, where one source of organizational capability is organizational commitment.

Ates et al. (2012) [47] demonstrated that organizational commitment positively impacts the extent to which firms adopt a proactive environmental strategy in manufacturing firms in Turkey. Ghazilla et al. (2015) [48] stated that management commitment is one of the drivers for implementing green manufacturing practices of SMEs in Malaysia. Likewise, Nordin et al. (2014) [49] showed that top management commitment is one of the main driving factors of sustainable manufacturing in manufacturing companies in Malaysia, involving respondents from operation managers, manufacturing managers, and the environmental, safety and health managers. In addition, He et al. (2018) [35] stated that internal and external pressure affects corporate environmental behaviour, where one form of internal pressure is commitment management. Tariq et al. (2020) [43] found that managers' environmental commitment strengthens the relationship between employees' environmental attitudes and their ecological behavior. Yen and Yen (2012) [37] show a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities in the electronics industry in Taiwan. Yusliza et al. (2019) [46] found that top management commitment influences various green human resource management (GHRM) activities, which include green analysis and job description of job position, green performance, green recruitment, green rewards, green selection, and green training in 400 Malaysian manufacturing and service organizations.

Furthermore, Bhatia and Jakhar (2021) [50] studied the effect of top management commitment (TMCO) on green product innovation (GPI) in Indian automotive manufacturing companies empirically. Burki et al. (2019) [51] examined the relationship between top management commitment and process innovation in the green supply chain (GSC), in the form of green process innovation and green managerial innovation in selected ISO 14000 certified Turkish exporting firms located in the Izmir region (Turkey). Meanwhile, Lee and Joo (2020) [52] investigated whether support from top management can significantly increase the level of environmental collaboration with participating companies in upstream and downstream green supply chains and their impact on environmental work in companies in manufacturing industries in South Korea.

It is necessary to have awareness from the internal parties in implementing environmental conservation activities. The management commitment factor explains organizational commitment from top management to employees in behaviour that supports environmental preservation. Therefore, related to this research, the proposed hypothesis is as follows:

H2: Management commitment has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.3. Financial Benefit

The financial benefit as a driving factor in this study is the potential benefits obtained when informal actors carry out environmental conservation activities in the form of collaboration in handling used cell phones. Maheswari, et al. (2020) [53] investigated that finance was one of the informal e-waste business performance measurements using a sustainable reverse logistics scorecard. Financial was one of the dimensions/driving factors that influenced the green supply chain collaboration [54] and green manufacturing practice in small medium enterprises [48].

Likewise, Nordin et al. (2014) [49] identified that one of the driving factors of sustainable manufacturing activity is economic benefit; the research was conducted in Malaysian manufacturing industries. Aside from the improper disposal, the challenges of the current EoL electrical and electronic equipment recycling program were the home storage and the informal actors. The reason is the lack of economic incentives for the proper return of used electronic equipment, especially for expensive and quickly obsolete products [55].

Henriques and Catarino (2016) [56] conducted a preliminary study on small and medium-sized companies in Portugal adopting energy efficiency improvements. One of the identified motivators is financial factor, which provide

benefits in strengthening capacity, providing financing, external parties for financial and technical guidance, access to capital, financial resources to develop bankable projects, and financial support for investment. Then, Kudlak (2017) [57] examined the drivers for implementing environmental management systems in companies in Poland. These drivers include efforts to reduce costs, increase sales, and increase market share. Next, Meath et al. (2016) [58] identified the key factors that motivate and hinder the design process of a voluntary energy efficiency program for SMEs in Queensland. Factors related to economic profit are one of the motivators, namely financial interests in the form of reducing energy costs, opportunities to obtain funding, and obtaining marketing opportunities due to the promotion of environmental performance achievements.

Testa et al. (2016) [36] examined managers' opinions about motivators in the adoption of proactive corporate environmental strategies. One of the motivators is the internal factor which is cost-saving. Meanwhile, Wang et al. (2018) [59] stated that one of the reasons companies support green supply chain management activities is the cost driver, where companies can reduce costs while helping environmental sustainability. This research was applied to plants in three industries: machinery, electronics, and transportation in various countries. It was found that the cost drivers significantly influence internal and external green practices. Referring to the results of previous studies, the hypothesis in this study is as follows:

H3: Financial benefit has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.4. Government Support

As one of the stakeholders in environmental control, the government plays a role in motivating environmental conservation. Government support in this study is the role of the government in supporting informal actors to reduce used cell phone management activities that are not safe for the environment and health. This support can be in the form of regulation, incentives provided, and facilities and infrastructure that informal actors can utilize in carrying out their activities.

The previous studies showed the government's role in encouraging companies to carry out environmental conservation activities. As stated by Lee (2008) [60], the involvement of local and central governments in green supply chain (GSC) initiatives is in the forms of coordinating the GSC initiatives, increasing funds for the activities, providing information and technical assistance to small and medium-sized firms, popularizing knowledge of environmental management, and build infrastructure for facilitating GSC initiatives. Meanwhile, Tatoglu et al. (2015) [61] examined the relative importance of each dimension of the Corporate Environmental Policies (CEP). One of the dimensions is stakeholder pressure, including government policies and regulations.

Several studies are related to an initial study on the importance of government support in environmental activities, including [48]. They conducted a preliminary study to determine the driving and inhibiting factors for applying green manufacturing practice in Malaysian SMEs. They found that the legislation factor in which there is a financial incentive from the government is one form of government support. Then, Henriques and Catarino (2016) [56] identified the situation in small and medium-sized companies in Portugal adopting energy efficiency improvements. Government policy is considered as a motivator, where government policies include the obligation of the state and government to develop effective energy programs and the need to design energy efficiency programs. There are government representatives in suppressing energy efficiency, providing fiscal subsidies, and providing grants for technology investment. Next, Moktadir et al. (2018) [62] identified the primary motivators in adopting sustainable manufacturing practices for the Bangladesh leather industry. One of the identified drivers is governmental support and legislation, which the government requires to provide funds to implement these activities smoothly.

Meanwhile, studies examining how government support influences corporate environmental activities include [35]. They examined government pressure which influenced corporate environmental behaviour, which consists of environmental defensive behaviour, environmental accommodative behaviour, and proactive environmental behaviour. Ye et al. (2013) [33] examined government pressure on the attitude of top managers to implement RL in the form of product returns and product recovery and found that government pressure had a significant effect on managers' attitudes.

From these previous studies, it is clear that government support is one of the driving factors of the company's environmental activities. For this reason, the hypothesis developed regarding government support is as follows:

H4: Government support has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.5. Competitor Pressure

According to Dai et al. (2018) [63], competitive pressure influences a company's response to aggressive environmental strategies. It is the key role in adopting small medium enterprises because it is sensitive to the competition they have [64]. The competitor pressure factor means competitor activities such as obeying existing regulations, being committed to environmental activities, and establishing cooperation in environmental conservation which will affect informal parties. The influence of competitor pressure related to environmental preservation will encourage informal actors to do the same.

Ghazilla et al. (2015) [48] considered competitor pressure as one of the business environments for implementing green manufacturing practices. Meanwhile, Tatoglu et al. (2015) [61] examined the relative importance of the Corporate Environmental Policies (CEP) dimension, where competitor pressure is part of the stakeholder pressure dimension. Weng et al. (2015) [65] examined the effect of competitor pressure in applying green innovation in manufacturing and service firms in Taiwan. This study found that competitor pressure had a positive and significant impact on the company's green innovation activities. Furthermore, Ye et al. (2013) [33] examined the effect of competitor pressure on the attitude of top managers to carry out RL activities in the form of product returns and product recovery. It was found that competitor pressure had a significant effect on the attitude of managers toward the implementation of the RL. From the previous research reviewed, the proposed hypothesis in this study is as follows:

H5: Competitor pressure has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

Based on the explanation of the factors that influence the intention of second-hand market actors to collaborate in handling used cell phones, the research model proposed in this study is shown in Figure 2.

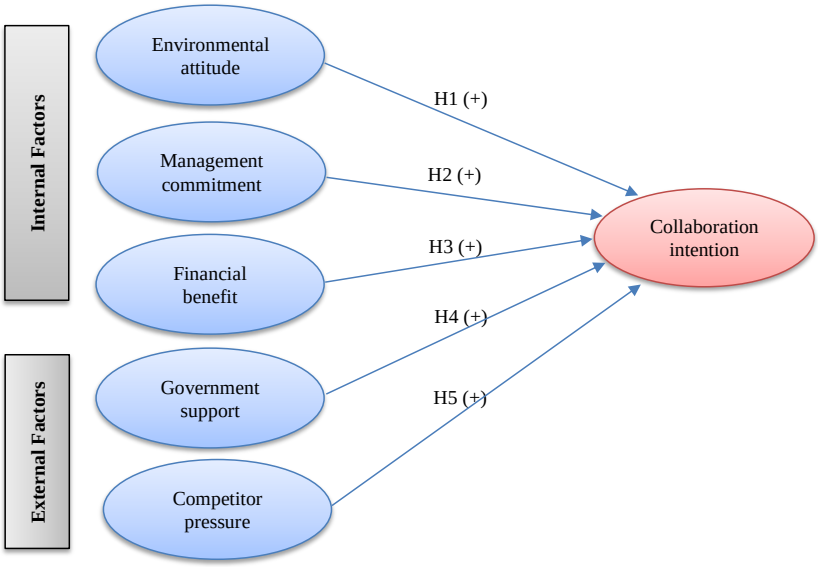


Figure 2. Conceptual model

3. Research Methodology

3.1. Research Object

The research object is the second-hand mobile phone market actors who are the initial players in the informal channel of handling used cell phones. This research started from the phenomenon of the rise of second-hand cell phone market actors in Indonesia who carry out selling, buying, and repairing used cell phones. It is because Indonesia has not obliged cell phones manufacturers to take back used cell phones that consumers no longer use. This condition is an opportunity for the informal sector to buy and sell used mobile phones that can provide economic benefits.

On the other hand, the activities of informal actors in handling used cell phones, such as burning, throwing the remaining components into the trash, and taking precious metals by chemical processes, can pollute the environment

and endanger their health. To reduce the danger level due to informal actors' activities, it is necessary to propose management of mobile phone waste involving informal and formal actors. Based on these reasons, this research was conducted to identify the intentions of informal actors to collaborate in handling cell phones with formal actors.

The research respondents were market actors for second-hand mobile phones in five regencies/cities in the Special Region of Yogyakarta Province (DIY Province), consisting of the Regencies of Gunungkidul, Bantul, Kulonprogo, Sleman, and the City of Yogyakarta.

3.2. Measurement

The measurement of collaboration intention was conducted using questionnaire with a Likert scale of 1 to 5. The initial questionnaire consisted of 32 items. Those factors are adapted from the following previous studies:

- Environmental attitude was adapted from [36, 42].
- Management commitment was adapted from [47, 48].
- Financial benefit was taken from [49, 56, 58, 59].
- Government support was adapted from [56, 61].
- Competitor pressure was adapted from [48, 61, 65, 66].
- Collaboration intention 3 items adapted from Ajzen (2002) [67] and 2 items developed in this study.

The complete questionnaire items are shown in Appendix I.

3.3. Research Stages

The stages of the research included:

- Distribution of the initial questionnaire to the respondents;
- The validity and reliability test of the initial questionnaire using the SPSS software version 16;
- Distribution of the formal questionnaire to the respondents;
- Conducting a classic assumption test for data in each district/city using the SPSS software version 16;
- Performing regression analysis for data in each district/city using the SPSS software version 16;
- Conducting confirmatory factor analysis (CFA) using AMOS 25 for data in all areas of DIY Province;
- Developing structural equation modelling (SEM) development using AMOS 25 software for data in all areas of DIY Province; confirmatory factor analysis (CFA) used AMOS 25.

4. Result and Discussion

4.1. Demographic Characteristic

The questionnaire was distributed to second hand market actors (that includes buying and selling, cell phone service or cannibalization) in Yogyakarta province (424 respondents from September to October 2018). It consists of several regencies, such as Bantul with 75 respondents, Sleman with 160 respondents, Yogyakarta municipality with 90 respondents, Gunungkidul with 50 respondents, and Kulonprogo with 49 respondents. The respondents' characteristics are age, gender, household member, income, education level, marital status, position at work, and treatment of used components as shown in Figure 3 and 4.

The majority of respondents are male and 71% of the respondents is between 20 and 30 years old. Interestingly, 92% of respondents have senior high school background and above for education level; almost 55% of the respondents have an income of approximately 1-2 million per month.

In addition, as shown in Figure 4, the majority of the respondents are unmarried and the position at work is an employee. Almost 60% of the respondents save the used components. The reason is that the respondents often reuse those parts for other broken cell phones and repair those parts for resale.

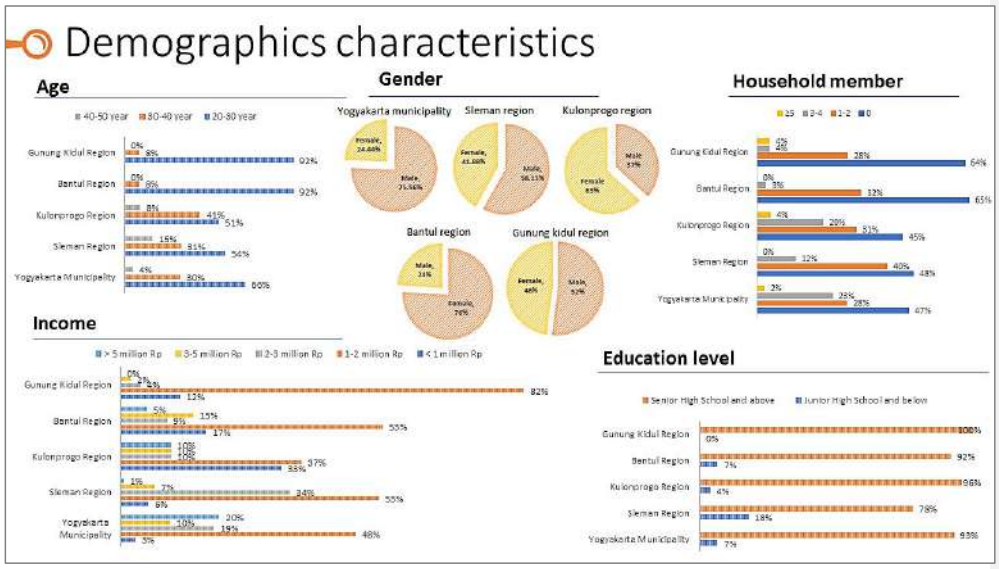


Figure 3. The demographic characteristics: age, gender, household member, income and education level

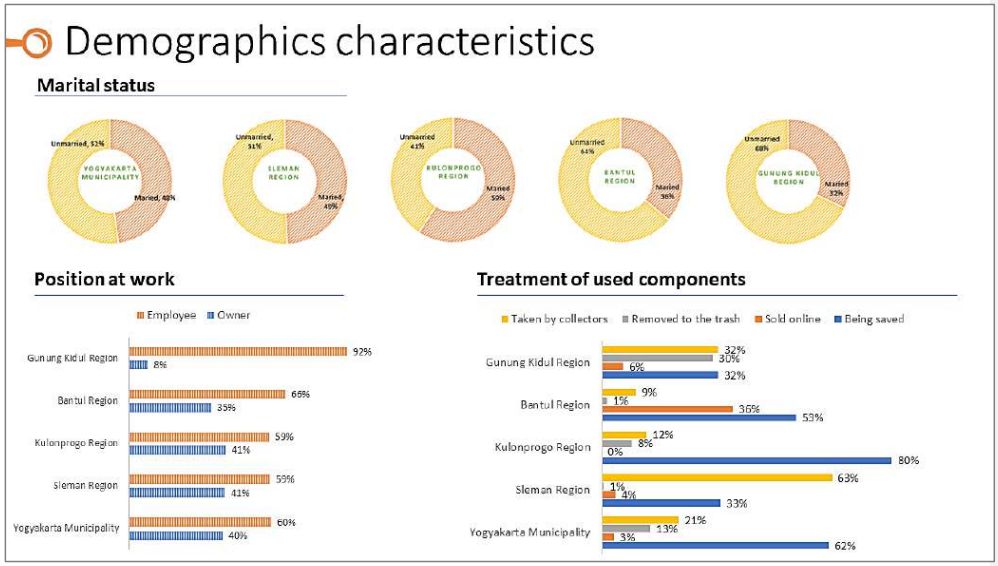


Figure 4. The demographic characteristics: marital status, position at work, and treatments of used components

4.2. The Location of Second-Hand Market Actors

Second-hand market actors as research objects are spread across five regencies/ cities within the DIY Province. DIY Province is one of the provinces in Indonesia, located on the South-Central side of Java Island. It is known as a Special Region because it is the territory of the Yogyakarta Palace. The location of the DIY Province is between 7.33-8.12 South Latitude and 110.00- 110.50 East Longitude, with an area of 3185.80 km^2 or 0.17% of the total area of Indonesia.

Figure 5 to 9 present the position of used cell phone second hand market actors based on snowball sampling in some regions of the Special Region of Yogyakarta Province.

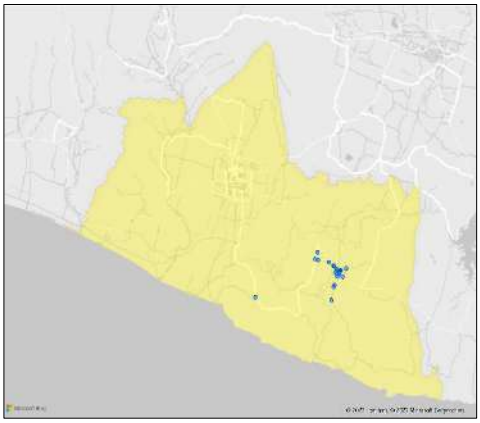


Figure 5. The position of used cell phone second-hand market actors in Gunungkidul Region

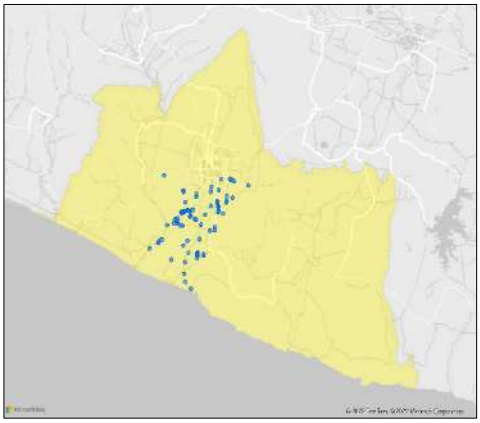


Figure 6. The position of used cell phone second hand market actors in Bantul Region

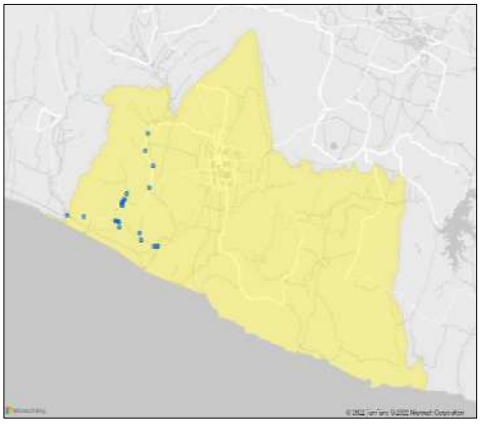


Figure 7. The position of used cell phone second hand market actors in Kulonprogo Region

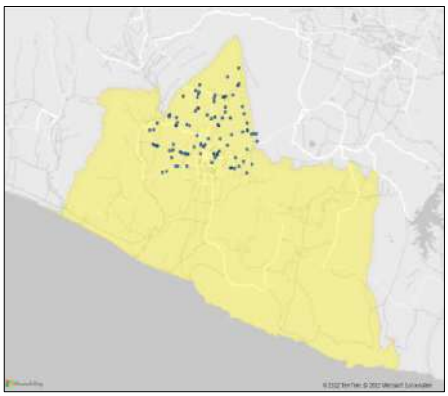


Figure 8. The position of used cell phone second hand market actors in Sleman Region

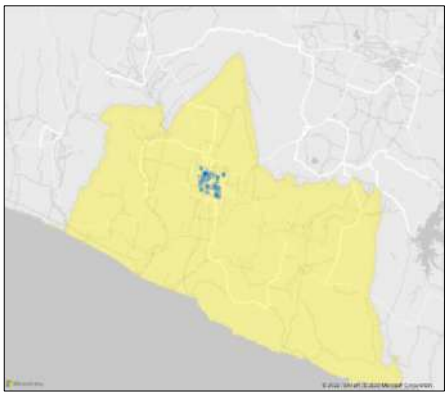


Figure 9. The position of used cell phone second hand market actors in Yogyakarta Municipality

Gunungkidul region has the position 007°46'00"-008°09'00" south latitude & 110° 21' 00"- 110° 50' 00" east longitude;the border on the north is Klaten region, the south is Indian Ocean, the west is Bantul region and Sleman region, and the east is Wonogiri region. It is the biggest area compared to other areas; it is about 1,431 km^2 [68]. Then, a total population about 747,161 per 2020 and population growth rate of 0.88% [69]. This region has 18 sub-districts, 144 villages, and 1,431 hamlets. Geographically, Gunungkidul region is located in the southeastern part of the Special Region of Yogyakarta. Gunungkidul Regency has neither inland nor remote areas. According to the geographical conditions, there are 18 coastal villages, 56 villages located on the slopes/ridges of the hills and 70 villages located on the plains. The capital of this region is Wonosari.

The position of Bantul region is 14º 04' 50" - 27º 50' 50" South Latitude and 110º 10' 41" - 110º 34' 40" East Longitude. This region is surrounded by Gunungkidul region on the east, Yogyakarta municipality and Sleman region on the north, Kulonprogo region and Indian Ocean are on the west and the south, respectively. The area is about 508.13 km^2 [68].Then, in 2020, the population was about 985,770. This region had the highest growth rate compared to other regions, which is 1.14% [69]. Bantul region has a plain area located in the middle and hilly areas located in the east and west, as well as a coastal area in the south. This region consists of 17 sub-districts divided into 75 villages and 933 hamlets [70]. The capital of this region is Bantul.

The position of Kulonprogo region is 007 º 38' 42" - 007 º 59' 3" South Latitude and 110 º 01' 37" - 110 º 16' 26" East Longitude. It is surrounded by Bantul region and Sleman region on the west; Magelang, Indian Ocean, and Purworejo are on the north, the south, and the west, respectively. Not much different from Bantul region, the area of Kulonprogo region is 586 km^2 [68]. In 2020, the population was about 436,395 with the growth rate at about 0.99% [69]. This region consists of 12 sub-districts and 88 villages [71]. The capital city of this region is Wates.

The position of Sleman region is 110º 33' 00" and 110º 13' 00" East Longitude, 7º 34' 51" and 7º 47' 30" South Latitude. It is surrounded by Boyolali region and Central Java on the north; Yogyakarta municipality, Bantul region, and Gunungkidul region on the south; Kulonprogo region and Magelang region on the west; and Klaten region and Central Java on the east. The area of the Sleman region is about 574 km^2 [68]. Compared to other regions, Sleman region has the highest population which is about 1,125,804 with the growth rate of 1.06% [69]. It consists of 17 sub-districts with 86 villages and 1212 hamlets [72]. The capital of this region is Sleman.

The position of Yogyakarta municipality is 110º 24' 19" to 110º 28' 53" East Longitude and 7º 15' 24" to 7º 49' 26" South Latitude with an average elevation of 114 m above sea level. The borders are Sleman region and Bantul region on the north and the south, respectively. Then, Bantul region and Sleman region are both on the west and the east. Compared to other regions, Yogyakarta municipality has the smallest area which is about 32.50 km^2 [68]. Even though the total population was about 373,589 people and the growth rate was 1.06%, this region is the most densely populated area [69]. There are fourteen districts and 45 villages [73]. The capital of this region is Yogyakarta city.

4.3. Regression Analysis Result

This section discusses the results of collaboration intention and regression analysis of driving factors on handling the collaboration of used cell phones for the second-hand market actors. Before the regression analysis was applied, the reliability and validity tests were carried out on the questionnaires distributed in each region. The tests for the city of Yogyakarta, Bantul, Gunungkidul, and Kulonprogo districts used 30 initial respondents' answers, while for Sleman Regency used 40 respondents' answers. Reliability tests were conducted to measure the consistency of the questionnaire which is an indicator of the variables. A questionnaire is said to be reliable if a respondent's answers to the questions are consistent from time to time. According to Barr and Gilg (2007) [74], the questionnaire is said to be reliable if the value of Cronbach α is more than 0.6. The test results for each region showed that the Cronbach α coefficient of six variables was more than 0.6, which means that all the factors were reliable.

In addition, the validity test was required to show the extent to which the questionnaire items used in a study were able to measure what it aimed to measure. Validity test was used to measure the validity of questionnaire items. The validity test in this study was carried out by comparing the total Pearson correlation value with the R table value (n= 30, df=28, so the R table value=0.3061 and for n=40, df=38, so the R table value=0.2639). Questionnaire items are declared valid if the Pearson correlation value is greater than the R table value. Tests of reliability and validity were conducted by employing SPSS statistical software. Appendix I presents the results of both tests. It shows that all the data collected were reliable and valid.

4.3.1. Gunungkidul Region

Respondents in Gunungkidul were 50 informal actors. From the respondents' answers, the average value of each factor studied and the value of collaboration intentions were obtained, which is presented in Table 1. The calculation shows that the collaboration intention of informal actors in the Gunungkidul region is 3.46, which means the informal actors argue that they are neutral and tend to collaborate.

Table 1. Results of descriptive analysis of respondents' answers in Gunungkidul Regency

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.46	3.00	3.40	3.40	3.40	3.70

Before performing regression analysis, it is necessary to test the classical assumptions. The purpose of classical assumption testing is to provide certainty that the regression equation obtained is accurate in estimation, unbiased, and consistent. This classic assumption test is a prerequisite test that is carried out before carrying out further analysis of data collected. Classical assumption test in this research consists of normality test, multicollinearity test, and heteroscedasticity test. The summary of classical assumption tests is displayed in Table 2. The classical assumption test results for each region are presented in Appendix II. It can be seen that for Gunungkidul area, all classical assumption tests are met.

Table 2. The summary of classical assumption test for Gunungkidul Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.766), management commitment (0.530), and financial benefits (0.368), government support (0.740) and competitor pressure (0.337)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.631	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.306), management commitment (1.887), and financial benefits (2.714), government support (1.352) and competitor pressure (2.967)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in Gunungkidul region is presented in Table 3. It can be seen that the government support is the most significant driving factor compared to others.

Table 3. The regression result for Gunungkidul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.700	0.572		1.328	0.191
Environmental attitude	-0.084	0.120	-0,089	-0.702	0.486
Management commitment	0.212	0.147	0.218	1.436	0.158
Financial benefits	0.071	0.181	0.71	0.390	0.699
Government support	0.376	0.125	0.388	3.018	0.004
Competitor pressure	0.187	0.186	0.191	1.005	0.320

Factors that affect collaboration intentions are seen if the significance value is smaller than 0.05. Therefore, these factors affect collaboration intentions in handling used cell phones. In Gunungkidul region, one factor influences collaboration intentions in handling used cell phones that is government support with a significance value of 0.004. It was also found that management commitment had a moderate effect on collaboration intentions with a significance value of 0.158. Based on the results of multiple determination (R^2) of 0.462 (see Table 4), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 46.2% while 53.8% is influenced by other factors outside the model.

Table 4. The R^2 result for the driving factors of collaboration intention for Gunungkidul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.680	0.462	0.401	0.61640

4.3.2. Bantul Region

In Bantul area, 75 informal actors were involved as respondents. The average value of each factor and the value of collaboration intentions, based on the respondents' answers, are presented in Table 5. The results show that the value of collaboration intentions of informal actors in Bantul Regency is 3.87, meaning that informal actors have the intention to collaborate.

Table 5. Results of descriptive analysis of the respondents' answers in Bantul region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.87	4	3,8	3,8	4.2	3.8

As this research uses regression analysis, it is preceded by the classical assumption test. The results of classical assumption tests is displayed in Table 6. The classical assumption test results in detail are shown in Appendix II. The results of the classical assumption test for the Bantul region show that it is fulfilled for all types of tests.

Table 6. The summary of classical assumption test for Bantul Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.776), management commitment (0.727), and financial benefits (0.564), government support (0.723) and competitor pressure (0.413)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.678	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.289), management commitment (1.375), and financial benefits (1.772), government support (1.383) and competitor pressure (2.422)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Bantul region is presented in Table 7. It can be seen that the management commitment is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in Bantul region is 3.87.

Table 7. The regression result for Bantul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.756	0.728		1.038	0.303
Environmental attitude	0.195	0.135	0.168	1.441	0.154
Management commitment	0.334	0.125	0.321	2.665	0.010
Financial benefits	0.090	0.120	0.103	0.755	0.453
Government support	0.092	0.130	0.086	0.707	0.482
Competitor pressure	0.080	0.160	0.0802	0.498	0.620

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In Bantul region, one factor influences collaboration intentions in handling used cell phones, which is management commitment with a significance value of 0.010. Also, a factor that has a moderate influence on collaboration intentions, namely environmental attitude with a significance value of 0.154, was obtained. Based on the results of multiple determination (R^2) of 0.270 (see Table 8), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27% while 73% is influenced by other factors outside the model.

Table 8. The R^2 result for the driving factors of collaboration intention for Bantul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.501	0.270	0.217	0.41717

4.3.3. Kulonprogo Region

In the Kulonprogo area, there are 49 informal actors involved as respondents. Table 9 shows the average value of respondents' answers for each factor and collaboration intention. The value of collaboration intention is 3.783, meaning that informal actors in Kulonprogo Regency intend to collaborate in handling used cell phones with formal actors.

Table 9. Results of descriptive analysis of respondents' answers in Kulonprogo region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.783	4.097	3.963	4.021	4.438	3.982

Classical assumption test needs to be done before performing regression analysis. The summary of classical assumption tests for Kulonprogo region is displayed in Table 10. The complete results of the classical assumption test are presented in Appendix II. For Kulonprogo region, all classical assumption tests are fulfilled.

Table 10. The summary of classical assumption test for Kulonprogo Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.700), management commitment (0.588), and financial benefits (0.694), government support (0.893) and competitor pressure (0.583)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.636	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.428), management commitment (1.699), and financial benefits (1.442), government support (1.229) and competitor pressure (1.717)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Kulonprogo region is presented in Table 11. It can be seen that the competitors' pressure is the most significant driving factor compared to other factors. The calculation shows that the collaboration intention of informal actors in the Kulonprogo region is 3.783.

Table 11. The regression result for Kulonprogo region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.154	0.811		0.190	0.851
Environmental attitude	0.102	0.161	0.092	0.632	0.531
Management commitment	-0.122	0.150	-0.129	-0.814	0.420
Financial benefits	0.092	0.148	0.091	0.626	0.535
Government support	0.384	0.152	0.326	2.533	0.015
Competitor's pressure	0.414	0.160	0.413	2.593	0.013

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In Kulonprogo region, one factor influences collaboration intentions in handling used cell phones that is competitor pressure with a significance value of 0.013 and government support with significance of 0.015. Based on the results of multiple determination (R2) of 0.364 (see Table 12), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 36.4% while 63.6% is influenced by other factors outside the model.

Table 12. The R^2 result for the driving factors of collaboration intention for Kulonprogo region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.603	0.364	0.290	0.46400

4.3.4. Sleman Region

Respondents in Sleman Regency were 160. The average value of the respondents' answers about the five factors studied and the average value of collaboration intentions are presented in Table 13. It can be seen from the table that the value of collaboration intentions of informal actors in Sleman is 4,008. This value is the highest intention value compared to other regions. That means they really intend to collaborate.

Table 13. Results of descriptive analysis of respondents' answers in Sleman region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	4.008	3.904	3.979	3.983	4.019	4.009

Before performing regression analysis, it is necessary to test the classical assumptions. The results of classical assumption tests for Sleman region is displayed in Table 14. The complete results of the classical assumption test are shown in Appendix II. The results of the classical assumption test for the Sleman region show that it is fulfilled for all types of tests.

Table 14. The summary of classical assumption test for Sleman Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.851), management commitment (0.900), and financial benefits (0.800), government support (0.866) and competitor pressure (0.733)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.668	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.175), management commitment (1.111), and financial benefits (1.250), government support (1.155) and competitor pressure (1.364)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Sleman region is presented in Table 15. It can be seen that the government support is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Sleman region is 4.008.

Table 15. The regression result for Sleman region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	2.408	0.406		5.938	0.000
Environmental attitude	0.029	0.048	0.049	0.603	0.547
Management commitment	0.142	0.069	0.163	2.066	0.040
Financial benefits	0.137	0.071	0.161	1.926	0.056
Government support	0.218	0.069	0.254	3.160	0.002
Competitor pressure	-0.125	0.085	-0.128	-1.466	0.145

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In the Sleman region, one factor influences collaboration intentions in handling used cell phones that is government support with a significance value of 0.002, followed by management commitment and financial benefit significance level of 0.040 and 0.056. Based on the results of multiple determination (R^2) of 0.141 (see Table 16), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 14.1% while 85.9% is influenced by other factors outside the model.

Table 16. The R^2 result for the driving factors of collaboration intention for Sleman region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.375	0.141	0.113	0.34253

4.3.5. Yogyakarta Municipality

For the Yogyakarta city area, 90 informal actors were involved as respondents. Table 17 presents the average value of each factor and the value of collaboration intention, which was obtained from the answers of the respondents. It can be seen that the value of collaboration intention is 3.60. This means that the level of collaboration intention of informal actors in the city of Yogyakarta is neutral and close to agreeing to collaborate.

Table 17. Results of descriptive analysis of respondents' answers in Yogyakarta municipality

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.60	4,00	3.75	3.70	4.21	3.86

The summary of classical assumption test that was carried out before the regression analysis is shown in Table 18. The detailed results of the classical assumption test are shown in Appendix II. The results for all types of tests are fulfilled for the Yogyakarta city area, so it can be continued with regression analysis.

Table 18. The summary of classical assumption test for Yogyakarta Municipality

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.826), management commitment (0.640), and financial benefits (0.622), government support (0.757) and competitor pressure (0.686)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.975	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.211), management commitment (1.562), and financial benefits (1.608), government support (1.322) and competitor pressure (1.458)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Yogyakarta municipality is presented in Table 19. It can be seen that the environmental attitude is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Yogyakarta municipality is 3.60.

Table 19. The regression result for Yogyakarta municipality

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.866	0.618		1.403	0.164
Environmental attitude	0.396	0.118	0.343	3.372	0.001
Management commitment	-0.011	0.143	-0.009	-0.075	0.940
Financial benefit	0.292	0.121	0.282	2.408	0.081
Government support	0.014	0.106	0.014	0.135	0.839
Competitor pressure	0.010	0.115	0.010	0.089	0.929

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In the Yogyakarta municipality, one factor influences collaboration intentions in handling used cell phones, which is environmental attitude with a significance value of 0.002 and financial benefit has a moderate impact with a significance level of 0.081. Based on the results of multiple determination (R^2) of 0.274 (see Table 20), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27.4% while 72.6% is influenced by other factors outside the model.

Table 20. The R^2 result for the driving factors of collaboration intention for Yogyakarta municipality

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.524	0.274	0.232	0.57013

The most influential factors on the intention to collaborate in each region are presented in Figure 10. From the figure, the position of one region compared to other region in the Special Region of Yogyakarta Province can be seen.

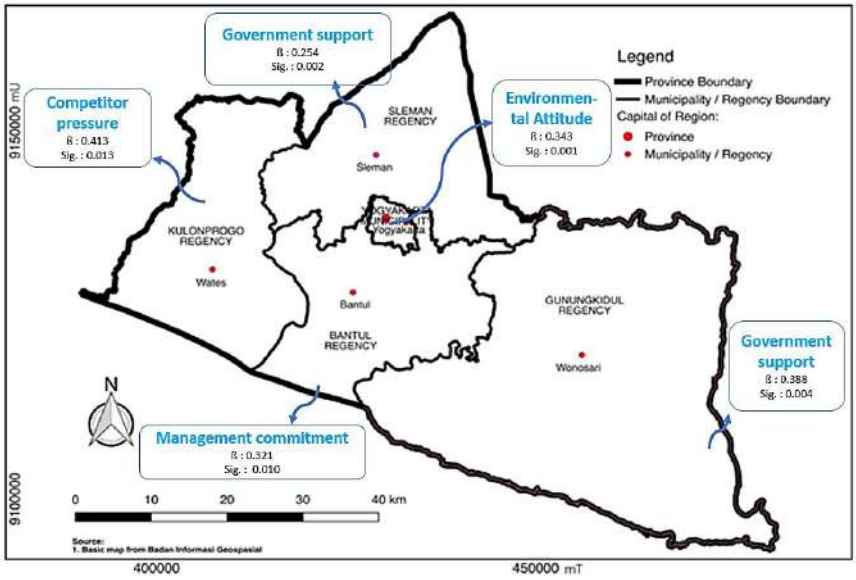


Figure 10. The most significant driving factors in each region in The Special Region of Yogyakarta Province, Indonesia

4.3.6. The Special Region of Yogyakarta Province

The results for the Special Region of Yogyakarta Province were obtained by processing the data from five regions, which included 424 respondents. The value of this collaboration intention for all actors was 3.744. It means that generally the respondents had the collaboration intention in handling used cell phones with formal actors. The values for each factor at the provincial level, which were obtained from the average values of the five regions, are shown in Table 21.

Table 21. Results of descriptive analysis of respondents' answers in Special Region of Yogyakarta Province

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.744	3.800	3.778	3.781	4.113	3.810

Next, to obtain the factors that influence the collaboration intentions of all actors at the province level, the Structural Equation Modelling (SEM) approach was used. Before the structural model was formed, the CFA (Confirmatory Factor Analysis) was conducted on exogenous variables. For endogenous variables, CFA is not necessary, because there is only one variable. CFA is intended to check whether all questionnaire items can be used. There is no general rule in determining the cut-off value for loading factor (Doll et al., 1995). This paper specified the loading factor as more than 0.5. In the exogenous CFA, the fit model was achieved with the p-value=0.665, $\chi 2$=210.536, GFI=0.960, AGFI=0.931, and RMSEA=0.000. Based on the value of the loading factor, there were two items deleted; the first item was the government support factor and the sixth item was competitor pressure.

The structural model result is shown in Table 22. The structural fit model was obtained with p-value=0.051, $\chi 2$=343.389, GFI=0.945, AGFI=0.915, and RMSEA=0.019. It shows that the most significant driving factors in the Special Region of Yogyakarta Province is financial benefit and government support with the influence values of 0.231 dan 0.150, respectively and the significance levels are 0.014 and 0.041, respectively.

Table 22. Structural model result

			Estimate	S.E.	C.R.	P	Label
Collaboration intention	←	Environmental attitude	-0.049	0.033	-1.491	0.136	par_20
Collaboration intention	←	Management commitment	0.148	0.141	1.050	0.294	par_21
Collaboration intention	←	Financial benefit	0.231	0.094	2.463	0.014	par_22
Collaboration intention	←	Government support	0.150	0.073	2.048	0.041	par_23
Collaboration intention	←	Competitor pressure	0.113	0.093	1.216	0.224	par_24

The coefficient of determination is 0.284, shown in Table 23, meaning that the five factors considered in this study describe collaboration intentions of 28.4%, and other factors form 71.6% of collaboration intentions.

Table 23. Squared Multiple Correlations

??????	Estimate
Collaboration intention	0.284

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4.4. Discussion

The results of each factor influencing collaboration intentions and their managerial implications are discussed as follows.

4.4.1. Environmental Attitude

The environmental attitude factor is the dominant factor influencing the intention to collaborate with informal actors in the Yogyakarta municipality and a moderate driving for informal actors in the Bantul Region. This factor is related to the attitude of informal actors towards the environment. It means that informal actors with high environmental attitudes will also show high collaboration intentions.

The result shows that the average environmental attitude of informal actors in both Yogyakarta municipality and Bantul Region is 4, which means that the actors have a high environmental attitude. Furthermore, in terms of the level of education, the education background of informal actors in Yogyakarta is high school with 93.3%, while in Bantul, it is 92%. According to Latif et al. (2012) [75], education level has a significant impact on pro-environmental intention and behaviour. As Wenshun et al. (2011) [76] demonstrated, the difference in the education level correlates with environmental behaviour. Yin et al. (2014) [77] stated that differences in the education level will result in differences in the desire to carry out environmentally friendly behaviour. Thus, the higher a person's education level, the higher his concern for the environment.

The results of this study are in line with Arshad et al. (2022) [40], where environmental concern significantly affects the ecological behaviour of employees in small and medium hotels in Pakistan. According to Chan et al. (2017) [39], environmental concern was positively related to ecological behaviour of international tourist hotel employees in Hong Kong. Likewise, He et al. (2018) [35] showed that employee and top management environmental awareness could affect

corporate environmental behaviour. In addition, Long et al. (2017) [42] demonstrated the positive and significant impact of the attitude toward environment factors on the environment. Still related to the influence of environmental attitude, the results of Okumus et al. (2019) [41] showed that the environmental concern of hotel employees in Turkey is the best predictor of ecological behaviour. Then, Testa et al. (2016) [36] showed that environmental awareness has a positive and significant effect on proactive environmental strategy. This also aligns with Zientara and Zamojska's (2018) [44] research which demonstrated that environmental values were positively related to organizational citizenship behaviour for the environment (OCBE).

The managerial implication of this study is that to maintain environmental attitudes, informal groups of actors should often hold discussions on environmental issues so that the understanding of the environment becomes even and equal among the actors. Through the Department of Trade and Cooperatives, the government can also provide information about the environment and its relation to used cell phones. In addition, the formal actors should conduct their social responsibilities, such as coaching informal actors to understand how to handle used cell phones so that they are safe for the environment and human beings.

4.4.2. Management Commitment

Management commitment in this study refers to the commitment of owners and employees in carrying out pro-environmental activities, in this case, collaborating with formal parties in managing used cell phones. The results showed that the management commitment factor strongly influences the intention to collaborate of informal actors in Bantul and Sleman regions. As for the Gunungkidul Region actors, this factor has a moderate influence. The value of management commitment in the three regions is 3.8; 3.979; and 3.4 for Bantul, Sleman, and Gunungkidul, respectively. It can be seen that the management commitment of informal actors in Bantul and Sleman Regions is higher than that of the informal actors in Gunungkidul, so it can be said that it is in line with the level of influence.

The strong influence of management commitment is in line with the research of Ates et al. (2012) [47], which showed that organizational commitment has a positive impact on the adoption of a proactive environmental strategy. It is also in line with the research of He et al. (2018) [35] which stated that one of the internal pressures in the form of commitment management affects corporate environmental behaviour. Research by Tariq et al. (2020) [43] found that a manager's environmental commitment strengthens the relationship between employees' environmental attitude and employees' ecological behavior. Yen and Yen (2012) [37] showed a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities. In addition, Yusliza et al. (2019) [46] found that top management commitment positively and significantly affects various green human resource management (GHRM) activities. Lee and Joo (2020) [52] show that top management is an essential factor which influences the level of collaboration between suppliers and customers in a green supply chain.

Meanwhile, Burki et al (2019) [51] found that top management commitment has a positive and significant effect on green process innovation, while its influence on green managerial innovation is moderate. In contrast, the results of Bhatia and Jakhar (2021) [50] are not in line with this study, where top management commitment (TMCO) has no significant effect on green product innovation (GPI).

With the results found in Bantul, Sleman, and Gunungkidul Region, the managerial implication that can be emphasized is that informal actors with a high level of management commitment need to be maintained, so that owners and employees of informal actors are always committed to carrying out activities that support environmental conservation. This commitment can be transmitted to other informal actors through meetings held in informal actors' associations in several areas so that owners and employees will understand the importance of being committed to environmental conservation. Local and central governments and formal actors can also contribute to fostering and enhancing this management commitment factor by providing additional information and education related to environmental problems and their handling.

4.4.3. Financial Benefit

The strong influence of financial benefits on the collaboration intention occurred in informal actors in the Sleman Region and studies at the provincial level. It means that informal actors will intend to collaborate in managing used cell phones if they feel there are economic benefits for them. The effect of moderate financial benefits was found in actors in the Yogyakarta municipality area.

The average value of the respondents' answers regarding the financial benefit factor was 3.983 for actors in Sleman Regency, and 3.781 for all provinces, which is the average value of financial benefits in all regions. The value of financial benefits to actors in the Yogyakarta municipality area is 3.7. The value of financial benefits that has a strong impact is more significant than those with a moderate influence.

The results of this study are in line with the results of Wang et al. (2018) [59] found that cost factor significantly influences internal and external green practices. In addition, the used cell phones are usually sold through the informal

sector for cashback [55]. For managerial insight, the financial benefits for informal actors are one of the most important reasons for running their business. However, the role of these informal actors has not received adequate attention. Therefore, the formal actors should support the informal ones to collaborate in handling used cell phones.

4.4.4. Government Support

There are three regions and a study at the provincial level. It was found that the government support factor had a strong influence on the intention to collaborate in Kulon Progo, Sleman, and the Gunungkidul Region. Meanwhile, there was no moderate influence of the government support factor for actors in any region. The value of the government support factor in each region is 4.438, 4.019; and 3.7 for Kulonprogo, Sleman, and Gunungkidul, respectively. Meanwhile, the value of government support for actors in all provinces is 4.113.

The government support questionnaire items show that the actors expect the government to support the implementation of pro-environment activities. It will encourage the actors to intend to collaborate in handling used cell phones with formal parties. Therefore, by looking at the value of government support from the Kulon Progo and Sleman regions, as well as at the provincial level, it seems that this value is very high. So, it can be interpreted that these actors expect the government to condition, provide information and technical assistance, popularize environmental management, and provide infrastructure for facilitating environmental activities.

The result of the study is that government support significantly encourages collaboration intention that is in line with studies by Lee (2008) in which government involvement plays an important role in the willingness of suppliers to participate in the green supply chain. Also, in the research of He et al. (2018) [35], government pressure influenced corporate environmental behaviour. Ye et al. (2013) [33] showed that government pressure has a significant effect on managers' attitudes to RL implementation. Next, Nguyen et al. (2018) [78] investigated that laws and regulations play the most significant impacts on recycling behavioural intention, compared to environmental awareness and attitude toward recycling, social pressure, cost of recycling, and inconvenience of recycling.

Furthermore, the management implication of this result is that the government is authorized to provide support in collaboration between formal and informal actors. This support can be in the form of rules, policies, facilities, resources, and information. So far, regulations related to e-waste in Indonesia can be seen in [25]. However, these regulations, namely Government Regulation no. 101 of 2014, do not explicitly mention e-waste, but the waste in question is hazardous and toxic material waste in general. Thus, there are no specific regulations regarding e-waste management in Indonesia.

4.4.5. Competitor Pressure

The results show that the competitor pressure factor strongly influences informal actors in the Kulon Progo Region only and is also not seen as a moderate driving factor. It means the informal actors in Kulon Progo will be encouraged to do collaborative activities in handling used cell phones when their competitors carry out activities related to the environment.

The value of competitor pressure for informal actors in the Kulon Progo Region is 3.982, which means this value is relatively high and higher than the value of competitor pressure in all provinces. From the number of informal actors in Kulon Progo, there are fewer informal actors compared to the other regions, and they are not spread throughout the region, so there is a possibility that the level of competition between informal actors will be high.

The results of research related to competitor pressure are in line with the study of Weng et al. (2015) [65], which found that competitor pressure had a positive and significant effect on the company's green innovation activities. This is also in line with Ye et al. (2013) [33], where competitor pressure significantly affects managers' attitudes to RL implementation. This finding is supported by previous research conducted by Riva and Gani (2020) [79] demonstrating that competitor pressure also positively affects the environmental performance of upscale hotels. Competitor initiatives and strategies guide the hotels to adopt green marketing practices. The managerial implication of this research is the need for the government and formal actors to provide counselling and training for upgrading knowledge and skills of informal actors.

Generally, the results of this study can be considered by stakeholders who may be involved in handling e-waste, mainly used cell phones in Indonesia. For the government as part of the policymakers, these results can be used as input for setting rules, providing information, providing assistance, funding assistance, etc., for the safe management of used cell phones. For formal actors such as mobile phone manufacturers, the results of this study can be considered in redesigning and promoting a program to take back used cell phones from consumers as a form of corporate social responsibility. In the end, informal actors' handling of used cell phones will not harm health and the environment but still provides economic benefits for informal actors.

Taking into account the results of the coefficient determination in each region and the study at the provincial level, which is below 50%, it is still necessary to explore other factors that can motivate second-hand cell phone market players

to collaborate in cell phone management. Furthermore, it is also essential to study the factors that can hinder informal actors from collaborating with formal actors in handling used cell phones. Understanding the factors driving and inhibiting collaboration intentions among informal actors will make it easier to design policy-making and design appropriate forms of collaboration.

5. Conclusions

Based on the analysis of collaboration intentions among informal actors, it was found that:

- Informal actors intend to collaborate with formal actors in managing used cell phones with an average intention value of 3.744.
- The factors that have the most significant effect on collaboration intentions, including the environmental attitude, is the most substantial driving factor for informal actors in Yogyakarta Municipality, with a value of 0.343 and a significance level of 0.001. The management commitment has a strong impact in two areas, namely Bantul with a value of 0.321 and a significance level of 0.010 and Sleman Region with a value of 0.163 and a significance level of 0.040. The financial benefit strongly influenced the second-hand market players in the Sleman Region of 0.161 with a significance value of 0.056, while the actors in the Yogyakarta municipality were 0.282 with a significance value of 0.081. Furthermore, the government support strongly encouraged collaboration among informal actors in Sleman, Kulon Progo, and the Gunungkidul Region with influence values and significance levels, respectively: 0.254 and 0.002; 0.326 and 0.015; 0.388 and 0.004. The competitor pressure only appears as a positive and significant encouraging factor for informal actors in the Kulon Progo Region, with a value of 0.413 and a significance level of 0.013.
- The structural equation modelling as the study for the provincial level showed that the two main factors that encourage all informal actors are financial benefits of 0.231 with a significance level of 0.014, while government support is 0.150 with a significance level of 0.041.
- There is no form of collaboration between informal and formal actors in Indonesia in handling used cell phones. The results of this study can be used as consideration for policymakers to regulate e-waste management, mainly used cell phones.
- Formal actors can also use the results of this study in promoting the take-back program of used cell phones as a form of waste management through corporate social responsibility and collaboration with informal actors.

6. Declarations

6.1. Author Contributions

Conceptualization, S.M.B. and I.Y.P.; methodology, S.M.B.; formal analysis, S.M.B; data curation, S.M.B.; writing—original draft preparation, S.M.B. and H.M.A; writing—review and editing, S.M.B., I.Y.P., and H.M.A.; visualization, H.M.A.; supervision, I.Y.P; funding acquisition, S.M.B. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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6.5. Conflicts of Interest

The authors declare no conflict of interest.

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Appendix I

The results of the reliability and validity test of the research questionnaire.

Table A1-?????????

Commented [DU2]: Query 2: Please present a proper title for this table.

		Yogyakarta municipality[1]	Sleman Region[2]	Bantul Region[1]	Gunungkidul Region[1]	Kulonprogo Region[1]
	Collaboration intention	**Cronbach α 0.931**	**Cronbach α 0.852**	**Cronbach α b 0.852**	**Cronbach α 0.941**	**Cronbach α 0.851**
		Correlated item –Total Correlation				
1	You intend to take part in the collaborative activity	0.838	0.379	0.808	0.788	0.730
2	You will try to participate in the collaborative activity	0.871	0.489	0.571	0.825	0.662
3	You plan to take part in the collaborative activity	0.906	0.569	0.678	0.880	0.778
4	You are willing to participate in the collaborative activity	0.922	0.434	0.813	0.916	0.676
5	You wish to participate in the collaborative activity	0.913	0.471	0.660	0.789	0.444
	Environmental Attitude	**Cronbach α 0.721**	**Cronbach α 0.711**	**Cronbach α 0.711**	**Cronbach α 0.797**	**Cronbach α 0.782**
		Correlated item –Total Correlation				
1	Environmental issues need to be a priority in business management.	0.598	0.466	0.408	0.591	0.561
2	Environmentally friendly behavior by the company can provide significant cost reductions.	0.7	0.584	0.375	0.431	0.615
3	The company's environmentally friendly behavior can help companies enter new markets.	0.876	0.401	0.559	0.711	0.459
4	Environmentally friendly behavior carried out by the company can lead the company to become a leader in the market.	0.75	0.683	0.572	0.601	0.822
5	Environmentally friendly behavior by the company can improve the company's image.	0.624	0.348	0.419	0.577	0.389
	Commitment Management	**Cronbach α 0.844**	**Cronbach α 0.741**	**Cronbach α 0.741**	**Cronbach α 0.905**	**Cronbach α 0.784**
		Correlated item –Total Correlation				
1	All members of the organization/company (owner, manager, and employee) are committed to environmental management and policies.	0.8	0.349	0.408	0.723	0.483
2	Organizational/company culture supports environmental conservation activities	0.687	0.654	0.568	0.895	0.697
3	The organization/company directs and facilitates the implementation of environmental conservation activities	0.867	0.548	0.589	0.790	0.457
4	There are ongoing efforts to support environmental conservation activities	0.802	0.751	0.671	0.807	0.707
5	There is environmental related training for employees	0.796	0.507	0.312	0.611	0.425
	Financial Benefits	**Cronbach α 0.899**	**Cronbach α 0.710**	**Cronbach α 0.710**	**Cronbach α 0.793**	**Cronbach α 0.892**
		Correlated item –Total Correlation				
1	Potential for financial assistance	0.898	0.664	0.466	0.463	0.774
2	Gaining economic benefits in the form of reducing costs while helping to protect the environment	0.903	0.608	0.308	0.406	0.806
3	Be more competitive by promoting achievements in the environmental field	0.791	0.516	0.596	0.683	0.578
4	Can survive in the market in the long term	0.76	0.343	0.542	0.589	0.757
5	Potential to get financial and technical management guidance	0.888	0.451	0.471	0.744	0.776
	Government Support	**Cronbach α 0.959**	**Cronbach α 0.773**	**Cronbach α 0.773**	**Cronbach α 0.941**	**Cronbach α 0.852**
		Correlated item –Total Correlation				
1	The government needs to coordinate environmental conservation initiatives	0.866	0.682	0.728	0.826	0.696

2	Government needs to increase funding for environmental conservation initiatives	0.928	0.616	0.316	0.903	0.707
3	The government needs to provide information and technical assistance to small and medium-sized enterprises related to environmental conservation.	0.948	0.707	0.503	0.837	0.469
4	The government needs to popularize knowledge about environmental management.	0.953	0.509	0.644	0.828	0.794
5	The government needs to build infrastructure to facilitate environmental conservation initiatives	0.944	0.782	0.613	0.802	0.667
	Competition Pressure	**Cronbach α 0.944**	**Cronbach α 0.808**	**Cronbach α 0.808**	**Cronbach α 0.909**	**Cronbach α 0.887**
		Correlated item –Total Correlation				
1	Competitors comply with environmental regulations	0.883	0.728	0.671	0.767	0.716
2	Competitors carry out environmental conservation activities	0.926	0.769	0.576	0.804	0.740
3	Competitors are committed to various stakeholders in environmental conservation activities	0.842	0.764	0.626	0.716	0.768
4	Competitors collaborate with professionals to support environmental conservation	0.907	0.564	0.520	0.694	0.697
5	Competitors set environmental standards for their products and operations	0.798	0.621	0.357	0.787	0.776
6	Competitors get new business opportunities when carrying out environmental conservation	0.812	0.574	0.331	0.637	0.474
7	Competitors promote successful implementation of environmental conservation	0.929	0.578	0.742	0.673	0.613

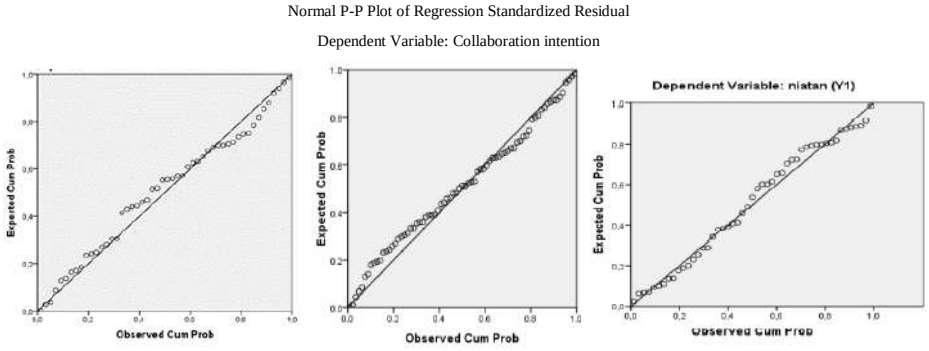
Note: 1. Validity test for the area of Yogyakarta City, Bantul Regency, Gunungkidul Regency, and Kulonprogo Regency using answers from 30 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 30-2=28. Based on the level of confidence and degrees of freedom, the R table value is 0.3061, so the questionnaire item is said to be valid if the calculated r value is greater than r table and is positive. 2. The validity test for the Sleman Regency area uses answers from 40 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 40-2=38. Based on the level of confidence and degrees of freedom, the R table value is 0.2638, so the questionnaire item is said to be valid if the calculated r value is more than r table and is positive.

Appendix II

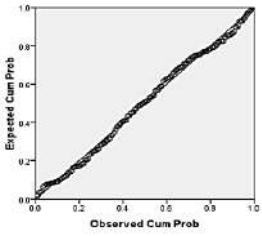
Classical assumption test results.

A2-1. Normality Test Results

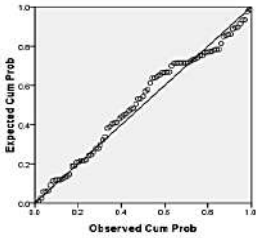
The results of the normality test are displayed in the form of a plot of residual data, which is shown in Figure A2-1 and the results of the Kolmogorov-Smirnov test in Figure A2-2. From Figure A2-1 it can be seen that the data plot is spread around the diagonal line, which means the model fulfill the assumption of normality. Moreover, from Figure A2-2 it is shown that the value of the Kolmogorov-Smirnov statistical test in the five research areas has a significance level greater than 0.05, so that the regression model in all regions meets the normality test.



Gunungkidul Regency (a) Bantul Regency (b) Kulonprogo Regency (c)



Sleman Regency (d)



Yogyakarta City (e)

Figure A2-1. Result of residual data plot from each region

One-Sample Kolmogorov-Smirnov Test		*One-Sample Kolmogorov-Smirnov Test*	
	Unstandardized Residual		Unstandardized Residual
Kolmogorov-Smirnov Z	0.631	Kolmogorov-Smirnov Z	0.678
Asymp. Sig. (2-tailed)	0.820	Asymp. Sig. (2-tailed)	0.748
a. Test distribution is Normal b. Calculate from data		a. Test distribution is Normal b. Calculate from data	
Gunungkidul Regency (a)		**Bantul Regency (b)**	
One-Sample Kolmogorov-Smirnov Test		*One-Sample Kolmogorov-Smirnov Test*	
	Unstandardized Residual		Unstandardized Residual
Kolmogorov-Smirnov Z	0.636	Kolmogorov-Smirnov Z	0.668
Asymp. Sig. (2-tailed)	0.813	Asymp. Sig. (2-tailed)	0.764
a. Test distribution is Normal b. Calculate from data		a. Test distribution is Normal b. Calculate from data	
Kulonprogo Regency (c)		**Sleman Regency (d)**	

One-Sample Kolmogorov-Smirnov Test	
	Unstandardized Residual
Kolmogorov-Smirnov Z	0.975
Asymp. Sig. (2-tailed)	0.298
a. Test distribution is Normal b. Calculate from data	
Yogyakarta City (e)	

Figure A2-2. Result of Kolmogorov-Smirnov test

A2-2. Multicollinearity Test Results

The results of the multicollinearity test are presented in Figure A2-3. From the figure, it can be seen that the tolerance value for all variables is greater than 0.1 and the Variance Inflation Factor (VIF) value for all variables is less than 10, in all research areas. Thus, it can be concluded that there is no multicollinearity between the independent variables.

Variable	**Collinearity Statistics**		**Variable**	**Collinearity Statistics**	
	Tolerance	**VIF**		**Tolerance**	**VIF**
Environmental attitude	0.766	1.306	Environmental attitude	0.776	1.289
Management commitment	0.530	1.887	Management commitment	0.727	1.375
Financial benefit	0.368	2.714	Financial benefit	0.564	1.772
Government support	0.740	1.383	Government support	0.723	1.383
Competitor pressure	0.337	2.967	Competitor pressure	0.413	2.442
Gunungkidul Regency (a)			Bantul Regency (b)		
Variable	**Collinearity Statistics**		**Variable**	**Collinearity Statistics**	
	Tolerance	**VIF**		**Tolerance**	**VIF**
Environmental attitude	0.700	1.428	Environmental attitude	0.851	1.175
Management commitment	0.588	1.699	Management commitment	0.900	1.111
Financial benefit	0.694	1.442	Financial benefit	0.800	1.250

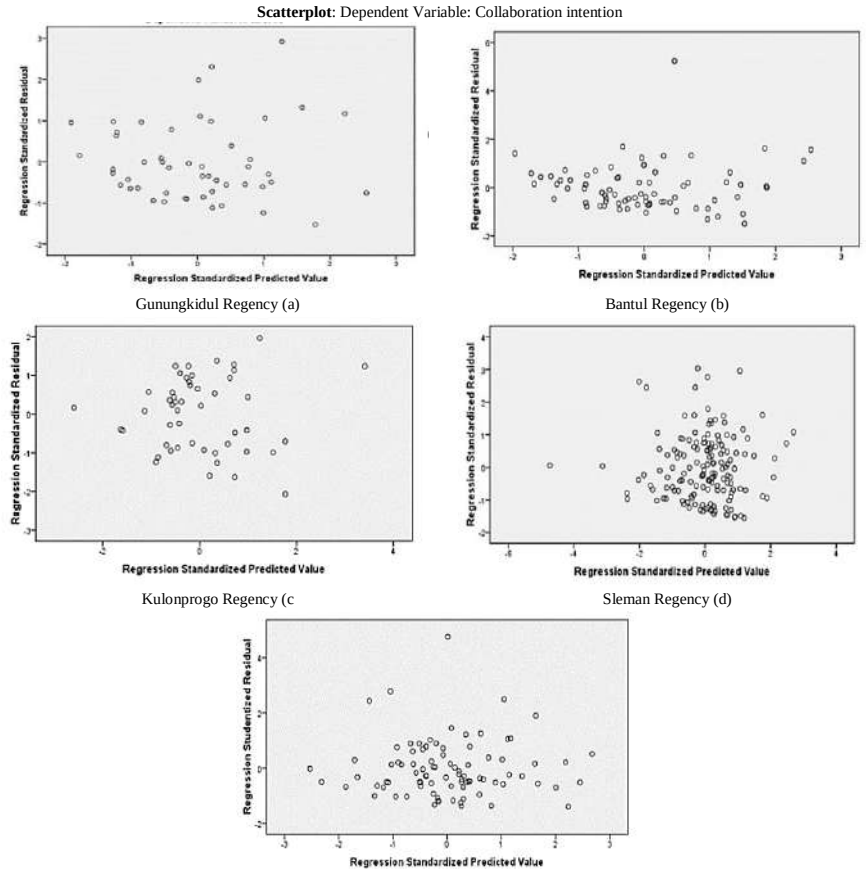
Government support	0.893	1.119	Government support	0.866	1.155
Competitor pressure	0.583	1.717	Competitor pressure	0.733	1.364
Kulonprogo Regency (c)			Sleman Regency (d)		

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	0.826	1.211
Management commitment	0.640	1.562
Financial benefit	0.622	1.608
Government support	0.757	1.322
Competitor pressure	0.686	1.458
Yogyakarta City (e)		

Figure A2-3. Result of multicollinearity test

A2-3. Heteroscedasticity Test Results

In this study, the heteroscedasticity test was carried out using the Park test. The results of the heteroscedasticity test are displayed in the form of a scatterplot which is presented in Figure A2-4. From the figure, it can be seen that the points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern. This means that there is no heteroscedasticity in the regression model.



Gunungkidul Regency (a)

Bantul Regency (b)

Kulonprogo Regency (c

Sleman Regency (d)

Yogyakarta City (e)

Figure A2-4. Result of heteroscedasticity test

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An Analysis of Driving Factors of Collaboration in Handling Used Cell Phones as a Waste Management Practice

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Abstract

The handling of used cell phones in Indonesia is mostly carried out by informal actors starting from second-hand market actors. However, the activities of the informal actors often endanger the environment and human health. To reduce the impact, some of the activities should be transferred to formal parties. This requires collaboration of both parties as a form of waste management, which previously has never been established. The objective of this study is to explore the driving factors of collaboration intention of informal actors in handling used cell phones with the formal ones. Data were collected using questionnaires distributed to second hand market actors in five districts in the Special Region of Yogyakarta Province. In this study, three internal driving factors are considered, which are environmental attitude, management commitment, and financial benefits, as well as two external driving factors, which are government support and competitor pressure. The regression analysis in each region revealed that the most significant driving factors vary across different regions, such as government support in Gunungkidul, management commitment in Bantul, competitive pressure and government support in Kulonprogo, government support, management commitment, and financial benefit in Sleman, as well as environmental attitude and financial benefit in Yogyakarta City. From the structural equation modelling at the provincial level, it was found that financial benefit and government support were the most significant factors influencing collaboration intentions of all informal actors. The results of this study can be used as a reference.

Keywords: Collaboration Intention; Driving Factors; Used Cell Phone; Waste Management.

1. Introduction

The number of mobile phone users in Indonesia, especially in the Special Region of Yogyakarta Province (DIY Province), are increasing. Data from the Central Bureau of Statistics (BPS) generally show that the percentage of the population using mobile phones has increased from 2012 to 2019. However, there has been a slight decline in 2020, possibly due to the COVID-19 pandemic. The increase in mobile phone users is shown in Figure 1.

The increase in the number of cell phone usage indicates that there is also an increase in cell phone waste, which is e-waste. The development of technology is followed by an increase in the amount and complexity of the waste. Since the waste contains toxic materials which might have a negative impact on both human and environmental health, waste management requires accurate identification and an awareness of the risks involved [1]. Hazardous metals in e-waste are lead, cadmium, mercury, hexavalent chromium, and refractory materials [2–6]. In the long term, these hazardous metals can have an impact on human health and environmental. According to Robinson (2009) [7], in every 1 kg of e-waste, there is 180 mg of cadmium and 0.8 mg of mercury, especially in battery components. Furthermore, the BBC

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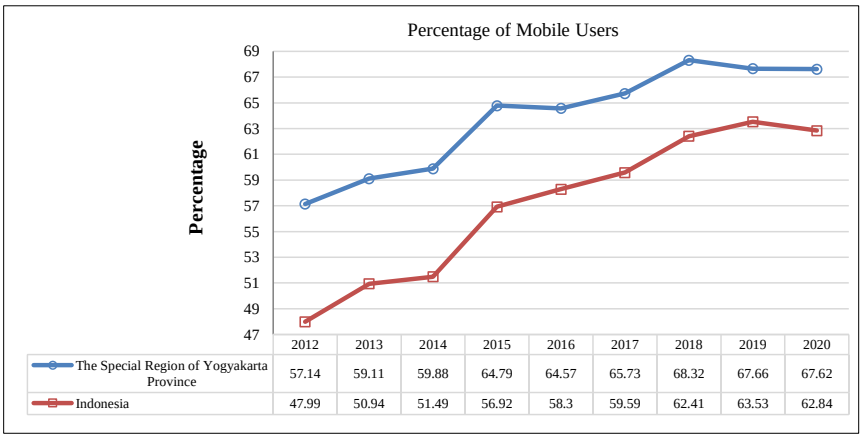
(2002) in Polak & Drápalová (2012) [8] described that cadmium from a cell phone battery can contaminate 600,000 litres of water. Research conducted by Robinson (2009) [7] in Guiyu City, Guangdong region, China, which is the largest e-waste recycling area in the world, found that dioxin contamination in Guiyu air resulted in the level of exposure to humans reaching 15–56 times the maximum standard recommended by WHO. Elevated levels of dioxins are found in breast milk, placenta, and hair, indicating that dioxins are acquired by humans from the air, water, or foodstuffs, at levels which pose a serious health risk. Children in Guiyu had significantly higher blood lead and cadmium levels than normal children. It was also reported that e-waste recycling workers from villages in the Jinghai region had chromosomal aberrations 20 times higher than villagers who were not exposed to e-waste. For this reason, it can be said that e-waste is a potential source of genetic mutations and can cause cytogenetic damage in the general population exposed to e-waste pollution. Furthermore, as Orlins & Guan (2016) [9] described, during the process of e-waste dismantling without adequate technology, the content of hazardous materials in e-waste will remain in the environment for a long time.



	2012	2013	2014	2015	2016	2017	2018	2019	2020
The Special Region of Yogyakarta Province	57.14	59.11	59.88	64.79	64.57	65.73	68.32	67.66	67.62
Indonesia	47.99	50.94	51.49	56.92	58.3	59.59	62.41	63.53	62.84

Figure 1. Data on the percentage of mobile phone users in the Special Region of Yogyakarta Province (DIY Province) and Indonesia in 2012-2020 *

Waste is generally defined as something that is no longer used and thrown away by its owner. Furthermore, Dadzie et al. (2020) [10] explain various definitions of waste. It is understood that all forms of waste must be managed and handled correctly not to burden the environment and disturb public health.

E-waste is waste from various electronic and electrical products. The definition and classification of e-waste depend on the regulation or standards that apply in each country. Gollakota et al. (2020) [11] present a detailed classification of e-waste based on several standards. Likewise, Shittu et al. (2021) [12] explained the definition of e-waste and its classification. In contrast to developed countries that explicitly define and classify e-waste and have standardized rules for its management, Indonesia has no specific rules regarding e-waste management. Generally, e-waste is classified as toxic and hazardous material regulated in Minister of Environment and Forestry Regulation No. 6 of 2021 concerning procedures and requirements for managing hazardous and toxic waste.

One of the activities that can be used to manage End of Life (EoL) or End of Use (EoU) products such as used cell phones is waste management. Waste management is a step or various strategies for managing and disposing waste. It can be done by disposing, destroying, processing, recycling, reusing, or controlling waste. Waste management aims to reduce unusable materials while preventing potential environmental damage and threats to human health. The management of used cell phones as electronic waste is known as e-waste management.

Several authors described effective e-waste management, including Isernia et al. (2019) [13] stated that the collection point is the key to e-waste management. The effectiveness of the collection process is influenced by the distribution of collection points in an area. Rautela et al. (2021) [14] stated that for effective implementation of sustainable e-waste management, government supervision is needed in the reciprocal relationship between manufacturers, producers, wholesalers, traders, consumers, and recyclers. Furthermore, Shittu et al. (2021) [12] suggested that one part that needs attention in effective e-waste management is to apply and enforce e-waste management rules for informal actors. As for e-waste management in developing countries, Ilankoon et al. (2018) [15] mentioned that it is necessary to apply a strict

* (Source: Data of the year 2012-2018 were obtained from: (Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah, 2012-2018, 2020)- Data of the year 2018-2020 were obtained : (*Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah 2018-2020*, 2020)

legislative framework to realize an e-waste management strategy. These regulations can be developed through modification of the EPR scheme, which provides an e-waste management system that is easy to adopt, provides benefits to all stakeholders, and is adapted to the local economy.

Several obstacles caused the implementation of e-waste management not to run optimally. Gollakota et al. (2020) [11] explained that effective e-waste management is not yet available in most developing countries, and the focal point of successful e-waste management is debatable. One of the shortcomings of e-waste management in developing countries is that the integration of the formal and informal sectors has not been integrated. In addition, there are several other factors, such as the unavailability of special rules for e-waste, the influence of socio-cultural aspects, and the lack of responsibility of producers and consumers. Meanwhile, Rautela et al. (2021) [14] stated that e-waste management in developing countries does not effectively run because e-waste is treated and managed informally in an illegitimate way. Moreover, the unavailability of policies, rules, and regulations, lack of law enforcement, and the implementation of the legal framework for EPR have not yet been maximized.

In Indonesia, mobile phone waste is mostly managed by informal actors, through the starting point of the second-hand market. Informal actors will obtain economic benefits from the activities of managing used cell phones. However, if used cell phone management activities are carried out without safe technology, the impact can affect the health of informal actors and damage the environment. Several researchers such as Chatterjee and Kumar (2009) [2], Chi et al. (2011) [3], Joseph (2007) [4], Li et al. (2011) [16], Kyere et al. (2018) [17], and Robinson (2009) [7] have elaborated the contamination of the environment due to e-waste management activities by informal parties. As Wilson (2007) [18] stated, one of the drivers of waste management is the remaining value of waste, which encourages people to use it as a source of income, especially in developing countries.

On the other hand, Original Equipment Manufacturers (OEMs) as formal actors have technological capabilities to handle used cell phones. However, the offer of a used cell phone return program in Indonesia is not carried out routinely and according to Budijati et al. (2015) [19], the program is not well known by the public, so that after cell phone usage, consumers sell the used mobile phones in the second-hand market, dispose, store, or give them to other people.

To reduce or eliminate the negative impact of the management of used cell phones by informal parties and still provide economic benefits for them, it is necessary establish collaboration in the management of used cell phones involving informal and formal parties. This collaboration aims to regulate the distribution of stages in the management of used cell phones to the disposal process that is safe for the environment and health.

Several authors have provided the definition of collaboration within the supply chain framework. Simatupang and Sridharan (2002) [20] define collaboration as two or more independent companies that work together to plan and implement supply chain operations in order to get a better success rate. Dung (2015) [21], Hudnurkar et al. (2014) [22], Soita (2015) [23], and Wu and Chiu (2018) [24] elaborated the definition of collaboration based on the definitions of other researchers. On the other hand, Maheswari (2019) [25] proposed an engagement model involving the government and intermediary businesses in handling e-waste problems in Indonesia that included empowerment, collaboration, and participation.

The potential or possibility of collaboration between informal and formal actors was conveyed by [26]. They reviewed the situation in several countries and proposed the integration of ISR (Informal Sector Recycling) into the formal sector by taking into account contexts and local conditions. Furthermore, Sasaki et al. (2014) [27] investigated the possibility of integrating the informal sector into formal waste management in Indonesia. Meanwhile, based on an analysis of the situation in four countries regarding informal sector business processes, Wilson et al. (2009) [28] stated that there was a clear potential for mutually beneficial cooperation between the formal and informal sectors. Furthermore, Li and Tee (2012) [29] suggested that to minimize the negative impact of informal channel activities, RL activities and the integration of IWS (Informal Waste Sector) into the formal sector are required.

To the best of the researchers' knowledge, no formal and informal forms of cooperation have been found in Indonesia in the handling of used cell phones. However, there are communities of second-hand market actors in some regions. This community has regular meetings to strengthen their relationship.

This study aims to explore the intention for collaboration of informal parties in managing used cell phones with the formal ones and the driving factors of the collaboration intentions. The intention of collaboration in this study is the intention to carry out management activities for used cell phones so that used cell phones can be returned to their origin point for the handling process or if the disposal is required, it does not damage the environment or endanger human health.

Factors driving collaboration intentions are based on factors that can encourage informal actors to carry out activities that lead to the prevention of environmental damage or environmental behaviours in general. Several researchers who explain the environmental behaviour of managers include Leszczynska (2010) [30] who examines the environmental awareness of managers and further investigates whether this awareness is related to socio-economic development. This study involved 200 managers in Australia and Ukraine and 250 managers in Poland. Lopez-Gamero et al. (2011) [31]

examined the environmental attitudes of hotel managers in Spain in the form of perceptions of the natural environment which are influenced by internal and external factors of the company. Next, Nambiar and Chitty (2014) [32] examined the views of business managers in India on the relationship between sustainability and the environment. Ye et al. (2013) [33] examined the attitudes of top managers in 209 companies in China regarding the implementation of reverse logistics in the form of product returns and product recovery. Therefore, the research objectives in this study are:

- To explore the collaboration intention of informal actors to manage used cell phones with formal actors so that cell phone waste remains safe for the environment and human health;
- To identify the driving factors of the collaboration intention of informal actors in handling used cell phones;
- To examine the influence of the driving factors on the collaboration intention of informal actors in handling used cell phones.

2. Literature Review and Hypotheses Development

This sub-section discusses the driving factors that can influence collaboration intentions for informal actors. This collaboration intention refers to the intention to behave in the environment. The driving factors for environmental behaviour comes from the internal or external. Internal driving factors are factors that come from individuals as part of the company or factors that describe the company's internal conditions. On the other hand, the external driving factors are factors that come from outside the company. The factors are outside the company's control but are able to affect the company's performance.

Fraj-Andrés et al. (2008) [34] stated that the environmental behaviour of firms depends on some internal and external forces. He et al. (2018) [35] also proposed the existence of internal and external pressures on corporate environmental behaviour in their study of 702 paper-making companies in China. Testa et al. (2016) [36]conducted a study to determine the effect of external pressure, internal factors, and environmental attitudes of entrepreneurs on a small and micro-scale company's proactive environmental strategy. Yen & Yen (2012) [37] explored internal and external motivations for green purchasing activities in electronic companies in Taiwan.

The factors considered in this research include internal and external factors, which consist of three internal factors (environmental attitude, management commitment, and financial benefits) and two external factors (government support and competitor pressure). These factors were determined based on a literature review of factors that can motivate environmental intentions and behaviour in a company and adjustments of the case studies in this research were done through field validation by asking several respondents in each research area whether the informal actors felt these factors involved.

The driving factors considered in this study are explained as follows.

2.1. Environmental Attitude

Environmental attitude in this study refers to the positive attitude of informal actors (second hand cellphone actors) towards the environment, commonly referred to as an environmentally friendly attitude. Janmaimool & Khajohnmanee (2019) [38] define environmental attitude as a person's belief in the relationship between humans and the environment. This belief also includes understanding the consequences when environmental damage occurs. Meanwhile, Chan et al., (2017) [39] stated that environmental attitude is often equated or interchanged with environmental concern. Arshad et al. (2022) [40] and Okumus et al. (2019) [41] explored environmental attitudes in environmental knowledge, awareness, and concern.

He et al. (2018) [35] showed that internal pressure could affect corporate environmental behaviour, where employees' and top management's environmental awareness are part of internal pressures. Then, Okumus et al. (2019) [41] proposed that the environmental attitude (in terms of environment concern) of hotel employees in Turkey is the best predictor of ecological behaviour. Furthermore, Arshad et al. (2022) [40] stated that employees with an excellent environmental attitude would encourage organizations to implement environmental management system policies. Moreover, Long et al. (2017) [42] examined the impact of attitude toward environmental behaviour on environmental innovation intention in 182 companies of various types in China. Then, Tariq et al. (2020) [43] examined the relationship between employees' environmental attitudes and employees' ecological behavior of employees in 65 small and medium-sized hotels operating in Pakistan's tourist areas. Next, Testa et al. (2016) [36] conducted a study to determine the effect of environmental awareness of managers to adopt a proactive corporate environmental strategy in 355 small and micro-scale businesses in Liguria, a region in central Italy. Then, Zientara & Zamojska (2018) [44] examined the relationship between environmental values or beliefs held by hotel employees in Poland with organizational citizenship behaviour for the environment (OCBE), and the results showed a positive relationship. From the previous studies reviewed, it is expected that someone with a high environmental attitude will show positive environmental behaviour. Therefore, the hypothesis of this research is as follows.

H1: Environmental attitude has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.2. Management Commitment

Management commitment is a form of responsibility and commitment from the owners and employees of the second-hand cell phone market to carry out activities that support the environment. In this case, it can be realized through collaboration in the management of used cell phones among formal parties so that the activities of handling used cell phones do not damage the environment or endanger workers' health.

In general, as stated by El-Kassar and Singh (2019) [45], management commitment is the encouragement given by a company to carry out environmentally friendly activities and to incorporate the ideas into the corporate culture. Yusliza et al. (2019) [46] argued that to achieve the successful implementation of green activities, top management must provide a high commitment so that the implementation of green activities can offer a competitive advantage for the company. In addition, Ates et al. (2012) [47] stated that organizational capability plays an important role in facilitating the implementation of the company's environmental strategy and impacts environmental performance, where one source of organizational capability is organizational commitment.

Ates et al. (2012) [47] demonstrated that organizational commitment positively impacts the extent to which firms adopt a proactive environmental strategy in manufacturing firms in Turkey. Ghazilla et al. (2015) [48] stated that management commitment is one of the drivers for implementing green manufacturing practices of SMEs in Malaysia. Likewise, Nordin et al. (2014) [49] showed that top management commitment is one of the main driving factors of sustainable manufacturing in manufacturing companies in Malaysia, involving respondents from operation managers, manufacturing managers, and the environmental, safety and health managers. In addition, He et al. (2018) [35] stated that internal and external pressure affects corporate environmental behaviour, where one form of internal pressure is commitment management. Tariq et al. (2020) [43] found that managers' environmental commitment strengthens the relationship between employees' environmental attitudes and their ecological behavior. Yen and Yen (2012) [37] show a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities in the electronics industry in Taiwan. Yusliza et al. (2019) [46] found that top management commitment influences various green human resource management (GHRM) activities, which include green analysis and job description of job position, green performance, green recruitment, green rewards, green selection, and green training in 400 Malaysian manufacturing and service organizations.

Furthermore, Bhatia and Jakhar (2021) [50] studied the effect of top management commitment (TMCO) on green product innovation (GPI) in Indian automotive manufacturing companies empirically. Burki et al. (2019) [51] examined the relationship between top management commitment and process innovation in the green supply chain (GSC), in the form of green process innovation and green managerial innovation in selected ISO 14000 certified Turkish exporting firms located in the Izmir region (Turkey). Meanwhile, Lee and Joo (2020) [52] investigated whether support from top management can significantly increase the level of environmental collaboration with participating companies in upstream and downstream green supply chains and their impact on environmental work in companies in manufacturing industries in South Korea.

It is necessary to have awareness from the internal parties in implementing environmental conservation activities. The management commitment factor explains organizational commitment from top management to employees in behaviour that supports environmental preservation. Therefore, related to this research, the proposed hypothesis is as follows:

H2: Management commitment has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.3. Financial Benefit

The financial benefit as a driving factor in this study is the potential benefits obtained when informal actors carry out environmental conservation activities in the form of collaboration in handling used cell phones. Maheswari, et al. (2020) [53] investigated that finance was one of the informal e-waste business performance measurements using a sustainable reverse logistics scorecard. Financial was one of the dimensions/driving factors that influenced the green supply chain collaboration [54] and green manufacturing practice in small medium enterprises [48].

Likewise, Nordin et al. (2014) [49] identified that one of the driving factors of sustainable manufacturing activity is economic benefit; the research was conducted in Malaysian manufacturing industries. Aside from the improper disposal, the challenges of the current EoL electrical and electronic equipment recycling program were the home storage and the informal actors. The reason is the lack of economic incentives for the proper return of used electronic equipment, especially for expensive and quickly obsolete products [55].

Henriques and Catarino (2016) [56] conducted a preliminary study on small and medium-sized companies in Portugal adopting energy efficiency improvements. One of the identified motivators is financial factor, which provide

benefits in strengthening capacity, providing financing, external parties for financial and technical guidance, access to capital, financial resources to develop bankable projects, and financial support for investment. Then, Kudlak (2017) [57] examined the drivers for implementing environmental management systems in companies in Poland. These drivers include efforts to reduce costs, increase sales, and increase market share. Next, Meath et al. (2016) [58] identified the key factors that motivate and hinder the design process of a voluntary energy efficiency program for SMEs in Queensland. Factors related to economic profit are one of the motivators, namely financial interests in the form of reducing energy costs, opportunities to obtain funding, and obtaining marketing opportunities due to the promotion of environmental performance achievements.

Testa et al. (2016) [36] examined managers' opinions about motivators in the adoption of proactive corporate environmental strategies. One of the motivators is the internal factor which is cost-saving. Meanwhile, Wang et al. (2018) [59] stated that one of the reasons companies support green supply chain management activities is the cost driver, where companies can reduce costs while helping environmental sustainability. This research was applied to plants in three industries: machinery, electronics, and transportation in various countries. It was found that the cost drivers significantly influence internal and external green practices. Referring to the results of previous studies, the hypothesis in this study is as follows:

H3: Financial benefit has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.4. Government Support

As one of the stakeholders in environmental control, the government plays a role in motivating environmental conservation. Government support in this study is the role of the government in supporting informal actors to reduce used cell phone management activities that are not safe for the environment and health. This support can be in the form of regulation, incentives provided, and facilities and infrastructure that informal actors can utilize in carrying out their activities.

The previous studies showed the government's role in encouraging companies to carry out environmental conservation activities. As stated by Lee (2008) [60], the involvement of local and central governments in green supply chain (GSC) initiatives is in the forms of coordinating the GSC initiatives, increasing funds for the activities, providing information and technical assistance to small and medium-sized firms, popularizing knowledge of environmental management, and build infrastructure for facilitating GSC initiatives. Meanwhile, Tatoglu et al. (2015) [61] examined the relative importance of each dimension of the Corporate Environmental Policies (CEP). One of the dimensions is stakeholder pressure, including government policies and regulations.

Several studies are related to an initial study on the importance of government support in environmental activities, including [48]. They conducted a preliminary study to determine the driving and inhibiting factors for applying green manufacturing practice in Malaysian SMEs. They found that the legislation factor in which there is a financial incentive from the government is one form of government support. Then, Henriques and Catarino (2016) [56] identified the situation in small and medium-sized companies in Portugal adopting energy efficiency improvements. Government policy is considered as a motivator, where government policies include the obligation of the state and government to develop effective energy programs and the need to design energy efficiency programs. There are government representatives in suppressing energy efficiency, providing fiscal subsidies, and providing grants for technology investment. Next, Moktadir et al. (2018) [62] identified the primary motivators in adopting sustainable manufacturing practices for the Bangladesh leather industry. One of the identified drivers is governmental support and legislation, which the government requires to provide funds to implement these activities smoothly.

Meanwhile, studies examining how government support influences corporate environmental activities include [35]. They examined government pressure which influenced corporate environmental behaviour, which consists of environmental defensive behaviour, environmental accommodative behaviour, and proactive environmental behaviour. Ye et al. (2013) [33] examined government pressure on the attitude of top managers to implement RL in the form of product returns and product recovery and found that government pressure had a significant effect on managers' attitudes.

From these previous studies, it is clear that government support is one of the driving factors of the company's environmental activities. For this reason, the hypothesis developed regarding government support is as follows:

H4: Government support has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.5. Competitor Pressure

According to Dai et al. (2018) [63], competitive pressure influences a company's response to aggressive environmental strategies. It is the key role in adopting small medium enterprises because it is sensitive to the competition they have [64]. The competitor pressure factor means competitor activities such as obeying existing regulations, being committed to environmental activities, and establishing cooperation in environmental conservation which will affect informal parties. The influence of competitor pressure related to environmental preservation will encourage informal actors to do the same.

Ghazilla et al. (2015) [48] considered competitor pressure as one of the business environments for implementing green manufacturing practices. Meanwhile, Tatoglu et al. (2015) [61] examined the relative importance of the Corporate Environmental Policies (CEP) dimension, where competitor pressure is part of the stakeholder pressure dimension. Weng et al. (2015) [65] examined the effect of competitor pressure in applying green innovation in manufacturing and service firms in Taiwan. This study found that competitor pressure had a positive and significant impact on the company's green innovation activities. Furthermore, Ye et al. (2013) [33] examined the effect of competitor pressure on the attitude of top managers to carry out RL activities in the form of product returns and product recovery. It was found that competitor pressure had a significant effect on the attitude of managers toward the implementation of the RL. From the previous research reviewed, the proposed hypothesis in this study is as follows:

H5: Competitor pressure has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

Based on the explanation of the factors that influence the intention of second-hand market actors to collaborate in handling used cell phones, the research model proposed in this study is shown in Figure 2.

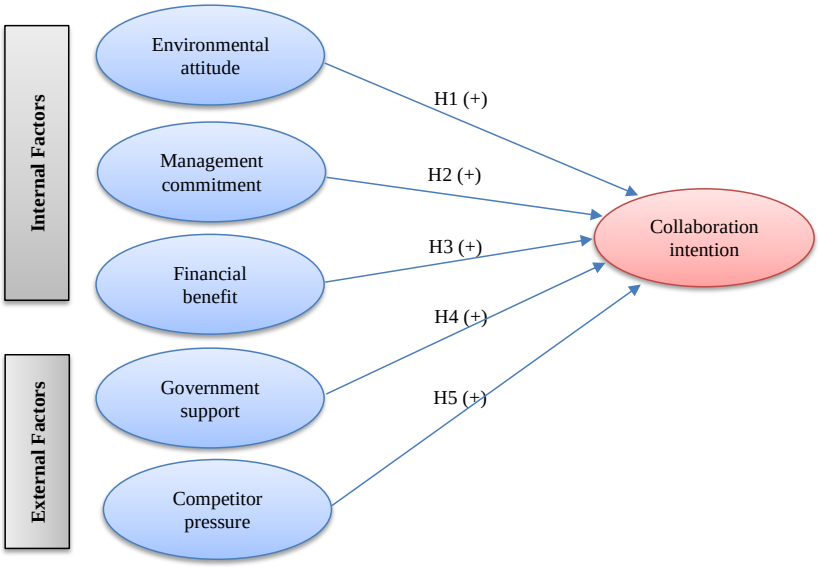


Figure 2. Conceptual model

3. Research Methodology

3.1. Research Object

The research object is the second-hand mobile phone market actors who are the initial players in the informal channel of handling used cell phones. This research started from the phenomenon of the rise of second-hand cell phone market actors in Indonesia who carry out selling, buying, and repairing used cell phones. It is because Indonesia has not obliged cell phones manufacturers to take back used cell phones that consumers no longer use. This condition is an opportunity for the informal sector to buy and sell used mobile phones that can provide economic benefits.

On the other hand, the activities of informal actors in handling used cell phones, such as burning, throwing the remaining components into the trash, and taking precious metals by chemical processes, can pollute the environment

and endanger their health. To reduce the danger level due to informal actors' activities, it is necessary to propose management of mobile phone waste involving informal and formal actors. Based on these reasons, this research was conducted to identify the intentions of informal actors to collaborate in handling cell phones with formal actors.

The research respondents were market actors for second-hand mobile phones in five regencies/cities in the Special Region of Yogyakarta Province (DIY Province), consisting of the Regencies of Gunungkidul, Bantul, Kulonprogo, Sleman, and the City of Yogyakarta.

3.2. Measurement

The measurement of collaboration intention was conducted using questionnaire with a Likert scale of 1 to 5. The initial questionnaire consisted of 32 items. Those factors are adapted from the following previous studies:

- Environmental attitude was adapted from [36, 42].
- Management commitment was adapted from [47, 48].
- Financial benefit was taken from [49, 56, 58, 59].
- Government support was adapted from [56, 61].
- Competitor pressure was adapted from [48, 61, 65, 66].
- Collaboration intention 3 items adapted from Ajzen (2002) [67] and 2 items developed in this study.

The complete questionnaire items are shown in Appendix I.

3.3. Research Stages

The stages of the research included:

- Distribution of the initial questionnaire to the respondents;
- The validity and reliability test of the initial questionnaire using the SPSS software version 16;
- Distribution of the formal questionnaire to the respondents;
- Conducting a classic assumption test for data in each district/city using the SPSS software version 16;
- Performing regression analysis for data in each district/city using the SPSS software version 16;
- Conducting confirmatory factor analysis (CFA) using AMOS 25 for data in all areas of DIY Province;
- Developing structural equation modelling (SEM) development using AMOS 25 software for data in all areas of DIY Province; confirmatory factor analysis (CFA) used AMOS 25.

4. Result and Discussion

4.1. Demographic Characteristic

The questionnaire was distributed to second hand market actors (that includes buying and selling, cell phone service or cannibalization) in Yogyakarta province (424 respondents from September to October 2018). It consists of several regencies, such as Bantul with 75 respondents, Sleman with 160 respondents, Yogyakarta municipality with 90 respondents, Gunungkidul with 50 respondents, and Kulonprogo with 49 respondents. The respondents' characteristics are age, gender, household member, income, education level, marital status, position at work, and treatment of used components as shown in Figure 3 and 4.

The majority of respondents are male and 71% of the respondents is between 20 and 30 years old. Interestingly, 92% of respondents have senior high school background and above for education level; almost 55% of the respondents have an income of approximately 1-2 million per month.

In addition, as shown in Figure 4, the majority of the respondents are unmarried and the position at work is an employee. Almost 60% of the respondents save the used components. The reason is that the respondents often reuse those parts for other broken cell phones and repair those parts for resale.

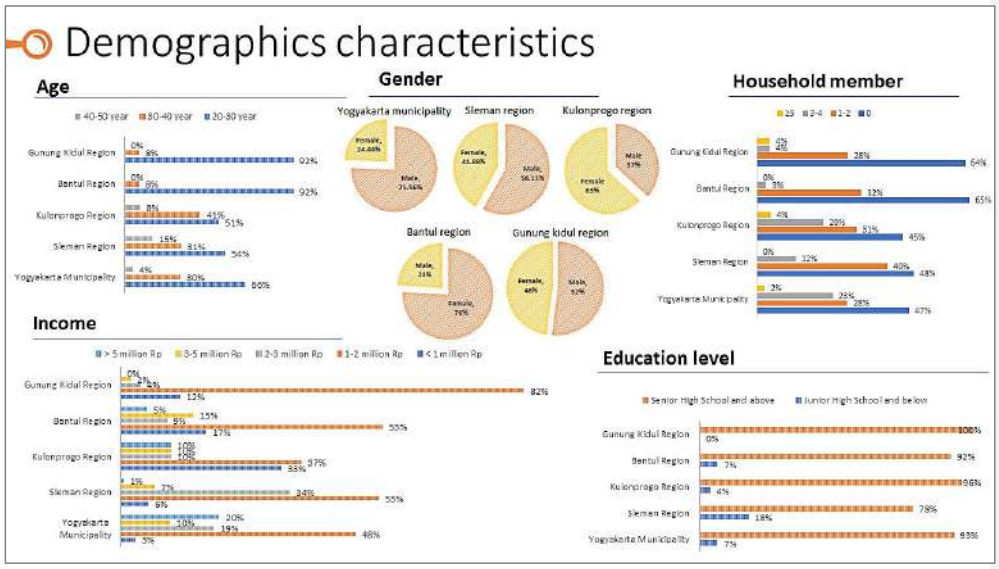


Figure 3. The demographic characteristics: age, gender, household member, income and education level

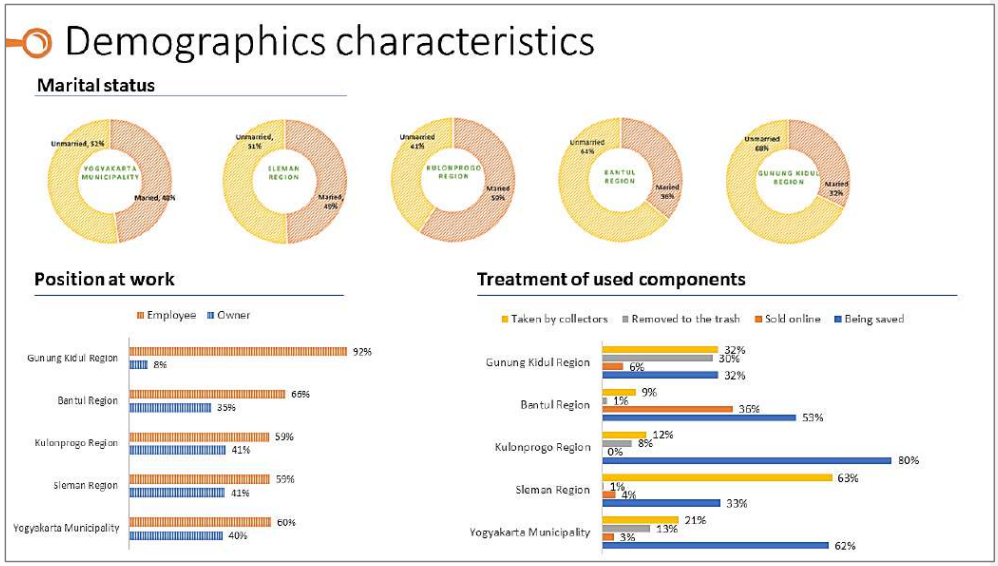


Figure 4. The demographic characteristics: marital status, position at work, and treatments of used components

4.2. The Location of Second-Hand Market Actors

Second-hand market actors as research objects are spread across five regencies/ cities within the DIY Province. DIY Province is one of the provinces in Indonesia, located on the South-Central side of Java Island. It is known as a Special Region because it is the territory of the Yogyakarta Palace. The location of the DIY Province is between 7.33-8.12 South Latitude and 110.00- 110.50 East Longitude, with an area of 3185.80 km^2 or 0.17% of the total area of Indonesia.

Figure 5 to 9 present the position of used cell phone second hand market actors based on snowball sampling in some regions of the Special Region of Yogyakarta Province.

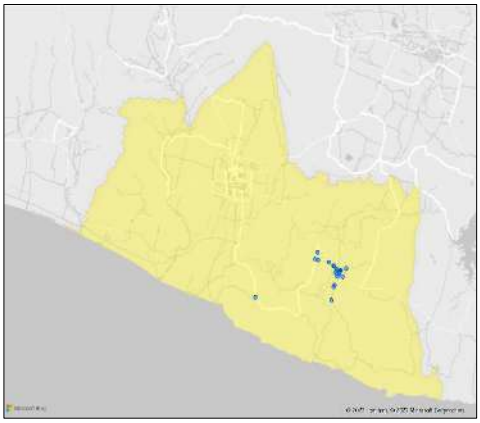


Figure 5. The position of used cell phone second-hand market actors in Gunungkidul Region

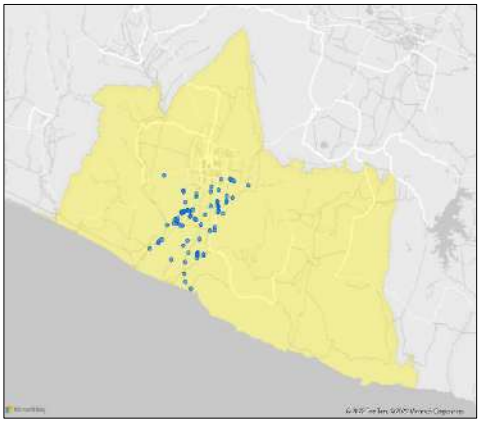


Figure 6. The position of used cell phone second hand market actors in Bantul Region

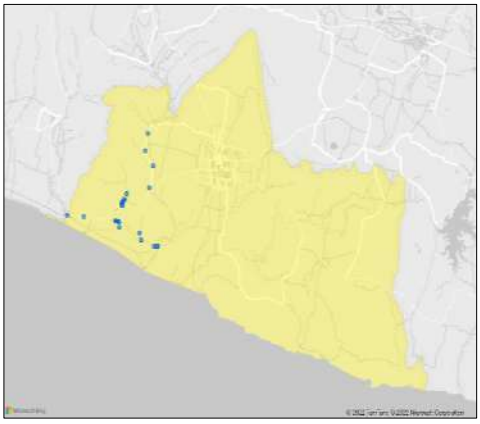


Figure 7. The position of used cell phone second hand market actors in Kulonprogo Region

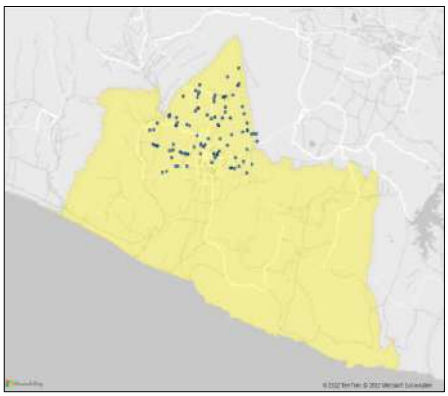


Figure 8. The position of used cell phone second hand market actors in Sleman Region

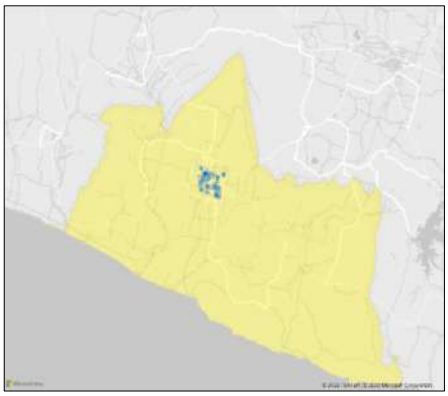


Figure 9. The position of used cell phone second hand market actors in Yogyakarta Municipality

Gunungkidul region has the position 007°46'00"-008°09'00" south latitude & 110° 21' 00"- 110° 50' 00" east longitude;the border on the north is Klaten region, the south is Indian Ocean, the west is Bantul region and Sleman region, and the east is Wonogiri region. It is the biggest area compared to other areas; it is about 1,431 km^2 [68]. Then, a total population about 747,161 per 2020 and population growth rate of 0.88% [69]. This region has 18 sub-districts, 144 villages, and 1,431 hamlets. Geographically, Gunungkidul region is located in the southeastern part of the Special Region of Yogyakarta. Gunungkidul Regency has neither inland nor remote areas. According to the geographical conditions, there are 18 coastal villages, 56 villages located on the slopes/ridges of the hills and 70 villages located on the plains. The capital of this region is Wonosari.

The position of Bantul region is 14º 04' 50" - 27º 50' 50" South Latitude and 110º 10' 41" - 110º 34' 40" East Longitude. This region is surrounded by Gunungkidul region on the east, Yogyakarta municipality and Sleman region on the north, Kulonprogo region and Indian Ocean are on the west and the south, respectively. The area is about 508.13 km^2 [68].Then, in 2020, the population was about 985,770. This region had the highest growth rate compared to other regions, which is 1.14% [69]. Bantul region has a plain area located in the middle and hilly areas located in the east and west, as well as a coastal area in the south. This region consists of 17 sub-districts divided into 75 villages and 933 hamlets [70]. The capital of this region is Bantul.

The position of Kulonprogo region is 007 º 38' 42" - 007 º 59' 3" South Latitude and 110 º 01' 37" - 110 º 16' 26" East Longitude. It is surrounded by Bantul region and Sleman region on the west; Magelang, Indian Ocean, and Purworejo are on the north, the south, and the west, respectively. Not much different from Bantul region, the area of Kulonprogo region is 586 km^2 [68]. In 2020, the population was about 436,395 with the growth rate at about 0.99% [69]. This region consists of 12 sub-districts and 88 villages [71]. The capital city of this region is Wates.

The position of Sleman region is 110º 33' 00" and 110º 13' 00" East Longitude, 7º 34' 51" and 7º 47' 30" South Latitude. It is surrounded by Boyolali region and Central Java on the north; Yogyakarta municipality, Bantul region, and Gunungkidul region on the south; Kulonprogo region and Magelang region on the west; and Klaten region and Central Java on the east. The area of the Sleman region is about 574 km^2 [68]. Compared to other regions, Sleman region has the highest population which is about 1,125,804 with the growth rate of 1.06% [69]. It consists of 17 sub-districts with 86 villages and 1212 hamlets [72]. The capital of this region is Sleman.

The position of Yogyakarta municipality is 110º 24' 19" to 110º 28' 53" East Longitude and 7º 15' 24" to 7º 49' 26" South Latitude with an average elevation of 114 m above sea level. The borders are Sleman region and Bantul region on the north and the south, respectively. Then, Bantul region and Sleman region are both on the west and the east. Compared to other regions, Yogyakarta municipality has the smallest area which is about 32.50 km^2 [68]. Even though the total population was about 373,589 people and the growth rate was 1.06%, this region is the most densely populated area [69]. There are fourteen districts and 45 villages [73]. The capital of this region is Yogyakarta city.

4.3. Regression Analysis Result

This section discusses the results of collaboration intention and regression analysis of driving factors on handling the collaboration of used cell phones for the second-hand market actors. Before the regression analysis was applied, the reliability and validity tests were carried out on the questionnaires distributed in each region. The tests for the city of Yogyakarta, Bantul, Gunungkidul, and Kulonprogo districts used 30 initial respondents' answers, while for Sleman Regency used 40 respondents' answers. Reliability tests were conducted to measure the consistency of the questionnaire which is an indicator of the variables. A questionnaire is said to be reliable if a respondent's answers to the questions are consistent from time to time. According to Barr and Gilg (2007) [74], the questionnaire is said to be reliable if the value of Cronbach α is more than 0.6. The test results for each region showed that the Cronbach α coefficient of six variables was more than 0.6, which means that all the factors were reliable.

In addition, the validity test was required to show the extent to which the questionnaire items used in a study were able to measure what it aimed to measure. Validity test was used to measure the validity of questionnaire items. The validity test in this study was carried out by comparing the total Pearson correlation value with the R table value (n= 30, df=28, so the R table value=0.3061 and for n=40, df=38, so the R table value=0.2639). Questionnaire items are declared valid if the Pearson correlation value is greater than the R table value. Tests of reliability and validity were conducted by employing SPSS statistical software. Appendix I presents the results of both tests. It shows that all the data collected were reliable and valid.

4.3.1. Gunungkidul Region

Respondents in Gunungkidul were 50 informal actors. From the respondents' answers, the average value of each factor studied and the value of collaboration intentions were obtained, which is presented in Table 1. The calculation shows that the collaboration intention of informal actors in the Gunungkidul region is 3.46, which means the informal actors argue that they are neutral and tend to collaborate.

Table 1. Results of descriptive analysis of respondents' answers in Gunungkidul Regency

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.46	3.00	3.40	3.40	3.40	3.70

Before performing regression analysis, it is necessary to test the classical assumptions. The purpose of classical assumption testing is to provide certainty that the regression equation obtained is accurate in estimation, unbiased, and consistent. This classic assumption test is a prerequisite test that is carried out before carrying out further analysis of data collected. Classical assumption test in this research consists of normality test, multicollinearity test, and heteroscedasticity test. The summary of classical assumption tests is displayed in Table 2. The classical assumption test results for each region are presented in Appendix II. It can be seen that for Gunungkidul area, all classical assumption tests are met.

Table 2. The summary of classical assumption test for Gunungkidul Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.766), management commitment (0.530), and financial benefits (0.368), government support (0.740) and competitor pressure (0.337)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.631	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.306), management commitment (1.887), and financial benefits (2.714), government support (1.352) and competitor pressure (2.967)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in Gunungkidul region is presented in Table 3. It can be seen that the government support is the most significant driving factor compared to others.

Table 3. The regression result for Gunungkidul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.700	0.572		1.328	0.191
Environmental attitude	-0.084	0.120	-0,089	-0.702	0.486
Management commitment	0.212	0.147	0.218	1.436	0.158
Financial benefits	0.071	0.181	0.71	0.390	0.699
Government support	0.376	0.125	0.388	3.018	0.004
Competitor pressure	0.187	0.186	0.191	1.005	0.320

Factors that affect collaboration intentions are seen if the significance value is smaller than 0.05. Therefore, these factors affect collaboration intentions in handling used cell phones. In Gunungkidul region, one factor influences collaboration intentions in handling used cell phones that is government support with a significance value of 0.004. It was also found that management commitment had a moderate effect on collaboration intentions with a significance value of 0.158. Based on the results of multiple determination (R^2) of 0.462 (see Table 4), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 46.2% while 53.8% is influenced by other factors outside the model.

Table 4. The R^2 result for the driving factors of collaboration intention for Gunungkidul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.680	0.462	0.401	0.61640

4.3.2. Bantul Region

In Bantul area, 75 informal actors were involved as respondents. The average value of each factor and the value of collaboration intentions, based on the respondents' answers, are presented in Table 5. The results show that the value of collaboration intentions of informal actors in Bantul Regency is 3.87, meaning that informal actors have the intention to collaborate.

Table 5. Results of descriptive analysis of the respondents' answers in Bantul region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.87	4	3,8	3,8	4.2	3.8

As this research uses regression analysis, it is preceded by the classical assumption test. The results of classical assumption tests is displayed in Table 6. The classical assumption test results in detail are shown in Appendix II. The results of the classical assumption test for the Bantul region show that it is fulfilled for all types of tests.

Table 6. The summary of classical assumption test for Bantul Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.776), management commitment (0.727), and financial benefits (0.564), government support (0.723) and competitor pressure (0.413)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.678	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.289), management commitment (1.375), and financial benefits (1.772), government support (1.383) and competitor pressure (2.422)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Bantul region is presented in Table 7. It can be seen that the management commitment is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in Bantul region is 3.87.

Table 7. The regression result for Bantul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.756	0.728		1.038	0.303
Environmental attitude	0.195	0.135	0.168	1.441	0.154
Management commitment	0.334	0.125	0.321	2.665	0.010
Financial benefits	0.090	0.120	0.103	0.755	0.453
Government support	0.092	0.130	0.086	0.707	0.482
Competitor pressure	0.080	0.160	0.0802	0.498	0.620

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In Bantul region, one factor influences collaboration intentions in handling used cell phones, which is management commitment with a significance value of 0.010. Also, a factor that has a moderate influence on collaboration intentions, namely environmental attitude with a significance value of 0.154, was obtained. Based on the results of multiple determination (R^2) of 0.270 (see Table 8), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27% while 73% is influenced by other factors outside the model.

Table 8. The R^2 result for the driving factors of collaboration intention for Bantul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.501	0.270	0.217	0.41717

4.3.3. Kulonprogo Region

In the Kulonprogo area, there are 49 informal actors involved as respondents. Table 9 shows the average value of respondents' answers for each factor and collaboration intention. The value of collaboration intention is 3.783, meaning that informal actors in Kulonprogo Regency intend to collaborate in handling used cell phones with formal actors.

Table 9. Results of descriptive analysis of respondents' answers in Kulonprogo region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.783	4.097	3.963	4.021	4.438	3.982

Classical assumption test needs to be done before performing regression analysis. The summary of classical assumption tests for Kulonprogo region is displayed in Table 10. The complete results of the classical assumption test are presented in Appendix II. For Kulonprogo region, all classical assumption tests are fulfilled.

Table 10. The summary of classical assumption test for Kulonprogo Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.700), management commitment (0.588), and financial benefits (0.694), government support (0.893) and competitor pressure (0.583)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.636	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.428), management commitment (1.699), and financial benefits (1.442), government support (1.229) and competitor pressure (1.717)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Kulonprogo region is presented in Table 11. It can be seen that the competitors' pressure is the most significant driving factor compared to other factors. The calculation shows that the collaboration intention of informal actors in the Kulonprogo region is 3.783.

Table 11. The regression result for Kulonprogo region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.154	0.811		0.190	0.851
Environmental attitude	0.102	0.161	0.092	0.632	0.531
Management commitment	-0.122	0.150	-0.129	-0.814	0.420
Financial benefits	0.092	0.148	0.091	0.626	0.535
Government support	0.384	0.152	0.326	2.533	0.015
Competitor's pressure	0.414	0.160	0.413	2.593	0.013

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In Kulonprogo region, one factor influences collaboration intentions in handling used cell phones that is competitor pressure with a significance value of 0.013 and government support with significance of 0.015. Based on the results of multiple determination (R2) of 0.364 (see Table 12), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 36.4% while 63.6% is influenced by other factors outside the model.

Table 12. The R^2 result for the driving factors of collaboration intention for Kulonprogo region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.603	0.364	0.290	0.46400

4.3.4. Sleman Region

Respondents in Sleman Regency were 160. The average value of the respondents' answers about the five factors studied and the average value of collaboration intentions are presented in Table 13. It can be seen from the table that the value of collaboration intentions of informal actors in Sleman is 4,008. This value is the highest intention value compared to other regions. That means they really intend to collaborate.

Table 13. Results of descriptive analysis of respondents' answers in Sleman region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	4.008	3.904	3.979	3.983	4.019	4.009

Before performing regression analysis, it is necessary to test the classical assumptions. The results of classical assumption tests for Sleman region is displayed in Table 14. The complete results of the classical assumption test are shown in Appendix II. The results of the classical assumption test for the Sleman region show that it is fulfilled for all types of tests.

Table 14. The summary of classical assumption test for Sleman Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.851), management commitment (0.900), and financial benefits (0.800), government support (0.866) and competitor pressure (0.733)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.668	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.175), management commitment (1.111), and financial benefits (1.250), government support (1.155) and competitor pressure (1.364)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Sleman region is presented in Table 15. It can be seen that the government support is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Sleman region is 4.008.

Table 15. The regression result for Sleman region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	2.408	0.406		5.938	0.000
Environmental attitude	0.029	0.048	0.049	0.603	0.547
Management commitment	0.142	0.069	0.163	2.066	0.040
Financial benefits	0.137	0.071	0.161	1.926	0.056
Government support	0.218	0.069	0.254	3.160	0.002
Competitor pressure	-0.125	0.085	-0.128	-1.466	0.145

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In the Sleman region, one factor influences collaboration intentions in handling used cell phones that is government support with a significance value of 0.002, followed by management commitment and financial benefit significance level of 0.040 and 0.056. Based on the results of multiple determination (R^2) of 0.141 (see Table 16), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 14.1% while 85.9% is influenced by other factors outside the model.

Table 16. The R^2 result for the driving factors of collaboration intention for Sleman region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.375	0.141	0.113	0.34253

4.3.5. Yogyakarta Municipality

For the Yogyakarta city area, 90 informal actors were involved as respondents. Table 17 presents the average value of each factor and the value of collaboration intention, which was obtained from the answers of the respondents. It can be seen that the value of collaboration intention is 3.60. This means that the level of collaboration intention of informal actors in the city of Yogyakarta is neutral and close to agreeing to collaborate.

Table 17. Results of descriptive analysis of respondents' answers in Yogyakarta municipality

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.60	4,00	3.75	3.70	4.21	3.86

The summary of classical assumption test that was carried out before the regression analysis is shown in Table 18. The detailed results of the classical assumption test are shown in Appendix II. The results for all types of tests are fulfilled for the Yogyakarta city area, so it can be continued with regression analysis.

Table 18. The summary of classical assumption test for Yogyakarta Municipality

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.826), management commitment (0.640), and financial benefits (0.622), government support (0.757) and competitor pressure (0.686)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.975	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.211), management commitment (1.562), and financial benefits (1.608), government support (1.322) and competitor pressure (1.458)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Yogyakarta municipality is presented in Table 19. It can be seen that the environmental attitude is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Yogyakarta municipality is 3.60.

Table 19. The regression result for Yogyakarta municipality

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.866	0.618		1.403	0.164
Environmental attitude	0.396	0.118	0.343	3.372	0.001
Management commitment	-0.011	0.143	-0.009	-0.075	0.940
Financial benefit	0.292	0.121	0.282	2.408	0.081
Government support	0.014	0.106	0.014	0.135	0.839
Competitor pressure	0.010	0.115	0.010	0.089	0.929

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In the Yogyakarta municipality, one factor influences collaboration intentions in handling used cell phones, which is environmental attitude with a significance value of 0.002 and financial benefit has a moderate impact with a significance level of 0.081. Based on the results of multiple determination (R^2) of 0.274 (see Table 20), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27.4% while 72.6% is influenced by other factors outside the model.

Table 20. The R^2 result for the driving factors of collaboration intention for Yogyakarta municipality

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.524	0.274	0.232	0.57013

The most influential factors on the intention to collaborate in each region are presented in Figure 10. From the figure, the position of one region compared to other region in the Special Region of Yogyakarta Province can be seen.

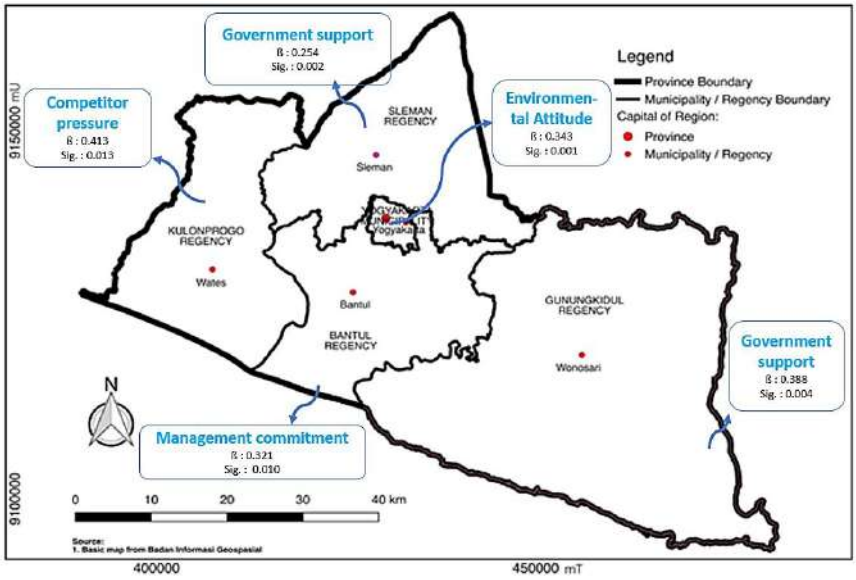


Figure 10. The most significant driving factors in each region in The Special Region of Yogyakarta Province, Indonesia

4.3.6. The Special Region of Yogyakarta Province

The results for the Special Region of Yogyakarta Province were obtained by processing the data from five regions, which included 424 respondents. The value of this collaboration intention for all actors was 3.744. It means that generally the respondents had the collaboration intention in handling used cell phones with formal actors. The values for each factor at the provincial level, which were obtained from the average values of the five regions, are shown in Table 21.

Table 21. Results of descriptive analysis of respondents' answers in Special Region of Yogyakarta Province

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.744	3.800	3.778	3.781	4.113	3.810

Next, to obtain the factors that influence the collaboration intentions of all actors at the province level, the Structural Equation Modelling (SEM) approach was used. Before the structural model was formed, the CFA (Confirmatory Factor Analysis) was conducted on exogenous variables. For endogenous variables, CFA is not necessary, because there is only one variable. CFA is intended to check whether all questionnaire items can be used. There is no general rule in determining the cut-off value for loading factor (Doll et al., 1995). This paper specified the loading factor as more than 0.5. In the exogenous CFA, the fit model was achieved with the p-value=0.665, $\chi 2$=210.536, GFI=0.960, AGFI=0.931, and RMSEA=0.000. Based on the value of the loading factor, there were two items deleted; the first item was the government support factor and the sixth item was competitor pressure.

The structural model result is shown in Table 22. The structural fit model was obtained with p-value=0.051, $\chi 2$=343.389, GFI=0.945, AGFI=0.915, and RMSEA=0.019. It shows that the most significant driving factors in the Special Region of Yogyakarta Province is financial benefit and government support with the influence values of 0.231 dan 0.150, respectively and the significance levels are 0.014 and 0.041, respectively.

Table 22. Structural model result

			Estimate	S.E.	C.R.	P	Label
Collaboration intention	←	Environmental attitude	-0.049	0.033	-1.491	0.136	par_20
Collaboration intention	←	Management commitment	0.148	0.141	1.050	0.294	par_21
Collaboration intention	←	Financial benefit	0.231	0.094	2.463	0.014	par_22
Collaboration intention	←	Government support	0.150	0.073	2.048	0.041	par_23
Collaboration intention	←	Competitor pressure	0.113	0.093	1.216	0.224	par_24

The coefficient of determination is 0.284, shown in Table 23, meaning that the five factors considered in this study describe collaboration intentions of 28.4%, and other factors form 71.6% of collaboration intentions.

Table 23. Squared Multiple Correlations

Variable	Estimate
Collaboration intention	0.284

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4.4. Discussion

The results of each factor influencing collaboration intentions and their managerial implications are discussed as follows.

4.4.1. Environmental Attitude

The environmental attitude factor is the dominant factor influencing the intention to collaborate with informal actors in the Yogyakarta municipality and a moderate driving for informal actors in the Bantul Region. This factor is related to the attitude of informal actors towards the environment. It means that informal actors with high environmental attitudes will also show high collaboration intentions.

The result shows that the average environmental attitude of informal actors in both Yogyakarta municipality and Bantul Region is 4, which means that the actors have a high environmental attitude. Furthermore, in terms of the level of education, the education background of informal actors in Yogyakarta is high school with 93.3%, while in Bantul, it is 92%. According to Latif et al. (2012) [75], education level has a significant impact on pro-environmental intention and behaviour. As Wenshun et al. (2011) [76] demonstrated, the difference in the education level correlates with environmental behaviour. Yin et al. (2014) [77] stated that differences in the education level will result in differences in the desire to carry out environmentally friendly behaviour. Thus, the higher a person's education level, the higher his concern for the environment.

The results of this study are in line with Arshad et al. (2022) [40], where environmental concern significantly affects the ecological behaviour of employees in small and medium hotels in Pakistan. According to Chan et al. (2017) [39], environmental concern was positively related to ecological behaviour of international tourist hotel employees in Hong Kong. Likewise, He et al. (2018) [35] showed that employee and top management environmental awareness could affect

corporate environmental behaviour. In addition, Long et al. (2017) [42] demonstrated the positive and significant impact of the attitude toward environment factors on the environment. Still related to the influence of environmental attitude, the results of Okumus et al. (2019) [41] showed that the environmental concern of hotel employees in Turkey is the best predictor of ecological behaviour. Then, Testa et al. (2016) [36] showed that environmental awareness has a positive and significant effect on proactive environmental strategy. This also aligns with Zientara and Zamojska's (2018) [44] research which demonstrated that environmental values were positively related to organizational citizenship behaviour for the environment (OCBE).

The managerial implication of this study is that to maintain environmental attitudes, informal groups of actors should often hold discussions on environmental issues so that the understanding of the environment becomes even and equal among the actors. Through the Department of Trade and Cooperatives, the government can also provide information about the environment and its relation to used cell phones. In addition, the formal actors should conduct their social responsibilities, such as coaching informal actors to understand how to handle used cell phones so that they are safe for the environment and human beings.

4.4.2. Management Commitment

Management commitment in this study refers to the commitment of owners and employees in carrying out pro-environmental activities, in this case, collaborating with formal parties in managing used cell phones. The results showed that the management commitment factor strongly influences the intention to collaborate of informal actors in Bantul and Sleman regions. As for the Gunungkidul Region actors, this factor has a moderate influence. The value of management commitment in the three regions is 3.8; 3.979; and 3.4 for Bantul, Sleman, and Gunungkidul, respectively. It can be seen that the management commitment of informal actors in Bantul and Sleman Regions is higher than that of the informal actors in Gunungkidul, so it can be said that it is in line with the level of influence.

The strong influence of management commitment is in line with the research of Ates et al. (2012) [47], which showed that organizational commitment has a positive impact on the adoption of a proactive environmental strategy. It is also in line with the research of He et al. (2018) [35] which stated that one of the internal pressures in the form of commitment management affects corporate environmental behaviour. Research by Tariq et al. (2020) [43] found that a manager's environmental commitment strengthens the relationship between employees' environmental attitude and employees' ecological behavior. Yen and Yen (2012) [37] showed a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities. In addition, Yusliza et al. (2019) [46] found that top management commitment positively and significantly affects various green human resource management (GHRM) activities. Lee and Joo (2020) [52] show that top management is an essential factor which influences the level of collaboration between suppliers and customers in a green supply chain.

Meanwhile, Burki et al (2019) [51] found that top management commitment has a positive and significant effect on green process innovation, while its influence on green managerial innovation is moderate. In contrast, the results of Bhatia and Jakhar (2021) [50] are not in line with this study, where top management commitment (TMCO) has no significant effect on green product innovation (GPI).

With the results found in Bantul, Sleman, and Gunungkidul Region, the managerial implication that can be emphasized is that informal actors with a high level of management commitment need to be maintained, so that owners and employees of informal actors are always committed to carrying out activities that support environmental conservation. This commitment can be transmitted to other informal actors through meetings held in informal actors' associations in several areas so that owners and employees will understand the importance of being committed to environmental conservation. Local and central governments and formal actors can also contribute to fostering and enhancing this management commitment factor by providing additional information and education related to environmental problems and their handling.

4.4.3. Financial Benefit

The strong influence of financial benefits on the collaboration intention occurred in informal actors in the Sleman Region and studies at the provincial level. It means that informal actors will intend to collaborate in managing used cell phones if they feel there are economic benefits for them. The effect of moderate financial benefits was found in actors in the Yogyakarta municipality area.

The average value of the respondents' answers regarding the financial benefit factor was 3.983 for actors in Sleman Regency, and 3.781 for all provinces, which is the average value of financial benefits in all regions. The value of financial benefits to actors in the Yogyakarta municipality area is 3.7. The value of financial benefits that has a strong impact is more significant than those with a moderate influence.

The results of this study are in line with the results of Wang et al. (2018) [59] found that cost factor significantly influences internal and external green practices. In addition, the used cell phones are usually sold through the informal

sector for cashback [55]. For managerial insight, the financial benefits for informal actors are one of the most important reasons for running their business. However, the role of these informal actors has not received adequate attention. Therefore, the formal actors should support the informal ones to collaborate in handling used cell phones.

4.4.4. Government Support

There are three regions and a study at the provincial level. It was found that the government support factor had a strong influence on the intention to collaborate in Kulon Progo, Sleman, and the Gunungkidul Region. Meanwhile, there was no moderate influence of the government support factor for actors in any region. The value of the government support factor in each region is 4.438, 4.019; and 3.7 for Kulonprogo, Sleman, and Gunungkidul, respectively. Meanwhile, the value of government support for actors in all provinces is 4.113.

The government support questionnaire items show that the actors expect the government to support the implementation of pro-environment activities. It will encourage the actors to intend to collaborate in handling used cell phones with formal parties. Therefore, by looking at the value of government support from the Kulon Progo and Sleman regions, as well as at the provincial level, it seems that this value is very high. So, it can be interpreted that these actors expect the government to condition, provide information and technical assistance, popularize environmental management, and provide infrastructure for facilitating environmental activities.

The result of the study is that government support significantly encourages collaboration intention that is in line with studies by Lee (2008) in which government involvement plays an important role in the willingness of suppliers to participate in the green supply chain. Also, in the research of He et al. (2018) [35], government pressure influenced corporate environmental behaviour. Ye et al. (2013) [33] showed that government pressure has a significant effect on managers' attitudes to RL implementation. Next, Nguyen et al. (2018) [78] investigated that laws and regulations play the most significant impacts on recycling behavioural intention, compared to environmental awareness and attitude toward recycling, social pressure, cost of recycling, and inconvenience of recycling.

Furthermore, the management implication of this result is that the government is authorized to provide support in collaboration between formal and informal actors. This support can be in the form of rules, policies, facilities, resources, and information. So far, regulations related to e-waste in Indonesia can be seen in [25]. However, these regulations, namely Government Regulation no. 101 of 2014, do not explicitly mention e-waste, but the waste in question is hazardous and toxic material waste in general. Thus, there are no specific regulations regarding e-waste management in Indonesia.

4.4.5. Competitor Pressure

The results show that the competitor pressure factor strongly influences informal actors in the Kulon Progo Region only and is also not seen as a moderate driving factor. It means the informal actors in Kulon Progo will be encouraged to do collaborative activities in handling used cell phones when their competitors carry out activities related to the environment.

The value of competitor pressure for informal actors in the Kulon Progo Region is 3.982, which means this value is relatively high and higher than the value of competitor pressure in all provinces. From the number of informal actors in Kulon Progo, there are fewer informal actors compared to the other regions, and they are not spread throughout the region, so there is a possibility that the level of competition between informal actors will be high.

The results of research related to competitor pressure are in line with the study of Weng et al. (2015) [65], which found that competitor pressure had a positive and significant effect on the company's green innovation activities. This is also in line with Ye et al. (2013) [33], where competitor pressure significantly affects managers' attitudes to RL implementation. This finding is supported by previous research conducted by Riva and Gani (2020) [79] demonstrating that competitor pressure also positively affects the environmental performance of upscale hotels. Competitor initiatives and strategies guide the hotels to adopt green marketing practices. The managerial implication of this research is the need for the government and formal actors to provide counselling and training for upgrading knowledge and skills of informal actors.

Generally, the results of this study can be considered by stakeholders who may be involved in handling e-waste, mainly used cell phones in Indonesia. For the government as part of the policymakers, these results can be used as input for setting rules, providing information, providing assistance, funding assistance, etc., for the safe management of used cell phones. For formal actors such as mobile phone manufacturers, the results of this study can be considered in redesigning and promoting a program to take back used cell phones from consumers as a form of corporate social responsibility. In the end, informal actors' handling of used cell phones will not harm health and the environment but still provides economic benefits for informal actors.

Taking into account the results of the coefficient determination in each region and the study at the provincial level, which is below 50%, it is still necessary to explore other factors that can motivate second-hand cell phone market players

to collaborate in cell phone management. Furthermore, it is also essential to study the factors that can hinder informal actors from collaborating with formal actors in handling used cell phones. Understanding the factors driving and inhibiting collaboration intentions among informal actors will make it easier to design policy-making and design appropriate forms of collaboration.

5. Conclusions

Based on the analysis of collaboration intentions among informal actors, it was found that:

- Informal actors intend to collaborate with formal actors in managing used cell phones with an average intention value of 3.744.
- The factors that have the most significant effect on collaboration intentions, including the environmental attitude, is the most substantial driving factor for informal actors in Yogyakarta Municipality, with a value of 0.343 and a significance level of 0.001. The management commitment has a strong impact in two areas, namely Bantul with a value of 0.321 and a significance level of 0.010 and Sleman Region with a value of 0.163 and a significance level of 0.040. The financial benefit strongly influenced the second-hand market players in the Sleman Region of 0.161 with a significance value of 0.056, while the actors in the Yogyakarta municipality were 0.282 with a significance value of 0.081. Furthermore, the government support strongly encouraged collaboration among informal actors in Sleman, Kulon Progo, and the Gunungkidul Region with influence values and significance levels, respectively: 0.254 and 0.002; 0.326 and 0.015; 0.388 and 0.004. The competitor pressure only appears as a positive and significant encouraging factor for informal actors in the Kulon Progo Region, with a value of 0.413 and a significance level of 0.013.
- The structural equation modelling as the study for the provincial level showed that the two main factors that encourage all informal actors are financial benefits of 0.231 with a significance level of 0.014, while government support is 0.150 with a significance level of 0.041.
- There is no form of collaboration between informal and formal actors in Indonesia in handling used cell phones. The results of this study can be used as consideration for policymakers to regulate e-waste management, mainly used cell phones.
- Formal actors can also use the results of this study in promoting the take-back program of used cell phones as a form of waste management through corporate social responsibility and collaboration with informal actors.

6. Declarations

6.1. Author Contributions

Conceptualization, S.M.B. and I.Y.P.; methodology, S.M.B.; formal analysis, S.M.B; data curation, S.M.B.; writing—original draft preparation, S.M.B. and H.M.A; writing—review and editing, S.M.B., I.Y.P., and H.M.A.; visualization, H.M.A.; supervision, I.Y.P; funding acquisition, S.M.B. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

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6.5. Conflicts of Interest

The authors declare no conflict of interest.

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Appendix I

The results of the reliability and validity test of the research questionnaire.

Table A1-Reliability and validity test results

		Yogyakarta municipality[1]	Sleman Region[2]	Bantul Region[1]	Gunungkidul Region[1]	Kulonprogo Region[1]
Collaboration intention		**Cronbach α 0.931**	**Cronbach α 0.852**	**Cronbach α b 0.852**	**Cronbach α 0.941**	**Cronbach α 0.851**
		Correlated item –Total Correlation				
1	You intend to take part in the collaborative activity	0.838	0.379	0.808	0.788	0.730
2	You will try to participate in the collaborative activity	0.871	0.489	0.571	0.825	0.662
3	You plan to take part in the collaborative activity	0.906	0.569	0.678	0.880	0.778
4	You are willing to participate in the collaborative activity	0.922	0.434	0.813	0.916	0.676
5	You wish to participate in the collaborative activity	0.913	0.471	0.660	0.789	0.444
Environmental Attitude		**Cronbach α 0.721**	**Cronbach α 0.711**	**Cronbach α 0.711**	**Cronbach α 0.797**	**Cronbach α 0.782**
		Correlated item –Total Correlation				
1	Environmental issues need to be a priority in business management.	0.598	0.466	0.408	0.591	0.561
2	Environmentally friendly behavior by the company can provide significant cost reductions.	0.7	0.584	0.375	0.431	0.615
3	The company's environmentally friendly behavior can help companies enter new markets.	0.876	0.401	0.559	0.711	0.459
4	Environmentally friendly behavior carried out by the company can lead the company to become a leader in the market.	0.75	0.683	0.572	0.601	0.822
5	Environmentally friendly behavior by the company can improve the company's image.	0.624	0.348	0.419	0.577	0.389
Commitment Management		**Cronbach α 0.844**	**Cronbach α 0.741**	**Cronbach α 0.741**	**Cronbach α 0.905**	**Cronbach α 0.784**
		Correlated item –Total Correlation				
1	All members of the organization/company (owner, manager, and employee) are committed to environmental management and policies.	0.8	0.349	0.408	0.723	0.483
2	Organizational/company culture supports environmental conservation activities	0.687	0.654	0.568	0.895	0.697
3	The organization/company directs and facilitates the implementation of environmental conservation activities	0.867	0.548	0.589	0.790	0.457
4	There are ongoing efforts to support environmental conservation activities	0.802	0.751	0.671	0.807	0.707
5	There is environmental related training for employees	0.796	0.507	0.312	0.611	0.425
Financial Benefits		**Cronbach α 0.899**	**Cronbach α 0.710**	**Cronbach α 0.710**	**Cronbach α 0.793**	**Cronbach α 0.892**
		Correlated item –Total Correlation				
1	Potential for financial assistance	0.898	0.664	0.466	0.463	0.774
2	Gaining economic benefits in the form of reducing costs while helping to protect the environment	0.903	0.608	0.308	0.406	0.806
3	Be more competitive by promoting achievements in the environmental field	0.791	0.516	0.596	0.683	0.578
4	Can survive in the market in the long term	0.76	0.343	0.542	0.589	0.757
5	Potential to get financial and technical management guidance	0.888	0.451	0.471	0.744	0.776
Government Support		**Cronbach α 0.959**	**Cronbach α 0.773**	**Cronbach α 0.773**	**Cronbach α 0.941**	**Cronbach α 0.852**
		Correlated item –Total Correlation				
1	The government needs to coordinate environmental conservation initiatives	0.866	0.682	0.728	0.826	0.696

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2	Government needs to increase funding for environmental conservation initiatives	0.928	0.616	0.316	0.903	0.707
3	The government needs to provide information and technical assistance to small and medium-sized enterprises related to environmental conservation.	0.948	0.707	0.503	0.837	0.469
4	The government needs to popularize knowledge about environmental management.	0.953	0.509	0.644	0.828	0.794
5	The government needs to build infrastructure to facilitate environmental conservation initiatives	0.944	0.782	0.613	0.802	0.667
	Competition Pressure	**Cronbach α 0.944**	**Cronbach α 0.808**	**Cronbach α 0.808**	**Cronbach α 0.909**	**Cronbach α 0.887**
		Correlated item –Total Correlation				
1	Competitors comply with environmental regulations	0.883	0.728	0.671	0.767	0.716
2	Competitors carry out environmental conservation activities	0.926	0.769	0.576	0.804	0.740
3	Competitors are committed to various stakeholders in environmental conservation activities	0.842	0.764	0.626	0.716	0.768
4	Competitors collaborate with professionals to support environmental conservation	0.907	0.564	0.520	0.694	0.697
5	Competitors set environmental standards for their products and operations	0.798	0.621	0.357	0.787	0.776
6	Competitors get new business opportunities when carrying out environmental conservation	0.812	0.574	0.331	0.637	0.474
7	Competitors promote successful implementation of environmental conservation	0.929	0.578	0.742	0.673	0.613

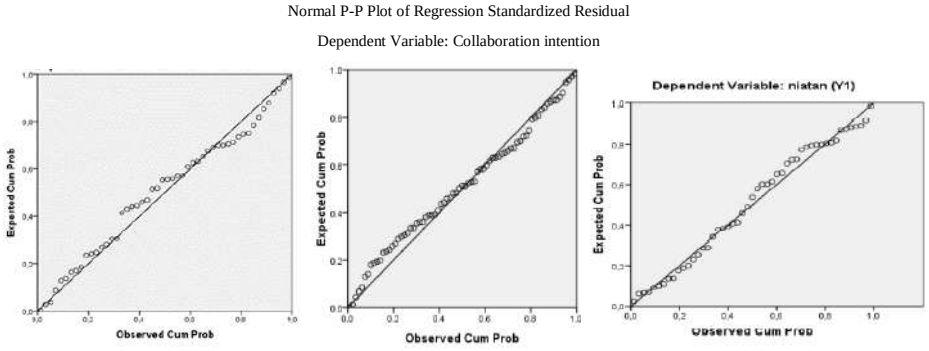
Note: 1. Validity test for the area of Yogyakarta City, Bantul Regency, Gunungkidul Regency, and Kulonprogo Regency using answers from 30 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 30-2=28. Based on the level of confidence and degrees of freedom, the R table value is 0.3061, so the questionnaire item is said to be valid if the calculated r value is greater than r table and is positive. 2. The validity test for the Sleman Regency area uses answers from 40 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 40-2=38. Based on the level of confidence and degrees of freedom, the R table value is 0.2638, so the questionnaire item is said to be valid if the calculated r value is more than r table and is positive.

Appendix II

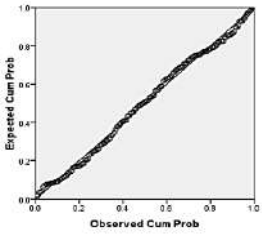
Classical assumption test results.

A2-1. Normality Test Results

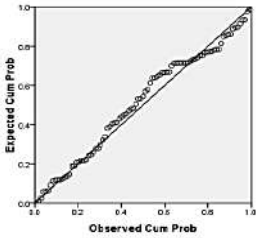
The results of the normality test are displayed in the form of a plot of residual data, which is shown in Figure A2-1 and the results of the Kolmogorov-Smirnov test in Figure A2-2. From Figure A2-1 it can be seen that the data plot is spread around the diagonal line, which means the model fulfill the assumption of normality. Moreover, from Figure A2-2 it is shown that the value of the Kolmogorov-Smirnov statistical test in the five research areas has a significance level greater than 0.05, so that the regression model in all regions meets the normality test.



Gunungkidul Regency (a) Bantul Regency (b) Kulonprogo Regency (c)



Sleman Regency (d)



Yogyakarta City (e)

Figure A2-1. Result of residual data plot from each region

One-Sample Kolmogorov-Smirnov Test		*One-Sample Kolmogorov-Smirnov Test*	
	Unstandardized Residual		Unstandardized Residual
Kolmogorov-Smirnov Z	0.631	Kolmogorov-Smirnov Z	0.678
Asymp. Sig. (2-tailed)	0.820	Asymp. Sig. (2-tailed)	0.748
a. Test distribution is Normal b. Calculate from data		a. Test distribution is Normal b. Calculate from data	
Gunungkidul Regency (a)		**Bantul Regency (b)**	
One-Sample Kolmogorov-Smirnov Test		*One-Sample Kolmogorov-Smirnov Test*	
	Unstandardized Residual		Unstandardized Residual
Kolmogorov-Smirnov Z	0.636	Kolmogorov-Smirnov Z	0.668
Asymp. Sig. (2-tailed)	0.813	Asymp. Sig. (2-tailed)	0.764
a. Test distribution is Normal b. Calculate from data		a. Test distribution is Normal b. Calculate from data	
Kulonprogo Regency (c)		**Sleman Regency (d)**	

One-Sample Kolmogorov-Smirnov Test	
	Unstandardized Residual
Kolmogorov-Smirnov Z	0.975
Asymp. Sig. (2-tailed)	0.298
a. Test distribution is Normal b. Calculate from data	
Yogyakarta City (e)	

Figure A2-2. Result of Kolmogorov-Smirnov test

A2-2. Multicollinearity Test Results

The results of the multicollinearity test are presented in Figure A2-3. From the figure, it can be seen that the tolerance value for all variables is greater than 0.1 and the Variance Inflation Factor (VIF) value for all variables is less than 10, in all research areas. Thus, it can be concluded that there is no multicollinearity between the independent variables.

Variable	**Collinearity Statistics**		**Variable**	**Collinearity Statistics**	
	Tolerance	**VIF**		**Tolerance**	**VIF**
Environmental attitude	0.766	1.306	Environmental attitude	0.776	1.289
Management commitment	0.530	1.887	Management commitment	0.727	1.375
Financial benefit	0.368	2.714	Financial benefit	0.564	1.772
Government support	0.740	1.383	Government support	0.723	1.383
Competitor pressure	0.337	2.967	Competitor pressure	0.413	2.442
Gunungkidul Regency (a)			Bantul Regency (b)		
Variable	**Collinearity Statistics**		**Variable**	**Collinearity Statistics**	
	Tolerance	**VIF**		**Tolerance**	**VIF**
Environmental attitude	0.700	1.428	Environmental attitude	0.851	1.175
Management commitment	0.588	1.699	Management commitment	0.900	1.111
Financial benefit	0.694	1.442	Financial benefit	0.800	1.250

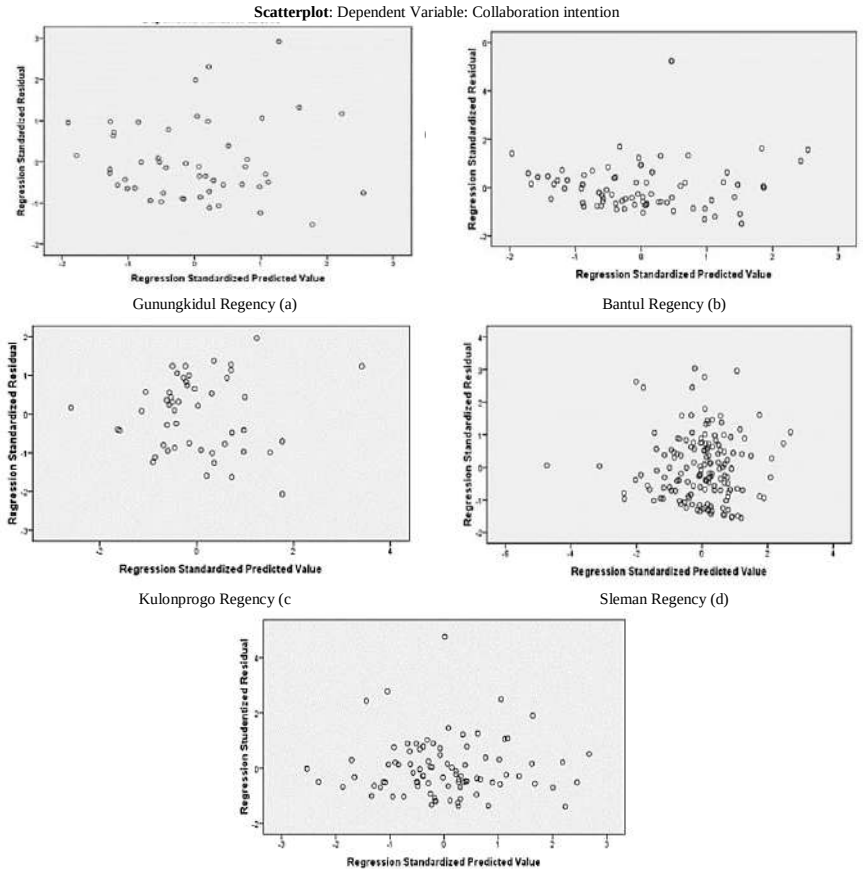
Government support	0.893	1.119	Government support	0.866	1.155
Competitor pressure	0.583	1.717	Competitor pressure	0.733	1.364
Kulonprogo Regency (c)			Sleman Regency (d)		

Variable	Collinearity Statistics	
	Tolerance	VIF
Environmental attitude	0.826	1.211
Management commitment	0.640	1.562
Financial benefit	0.622	1.608
Government support	0.757	1.322
Competitor pressure	0.686	1.458
Yogyakarta City (e)		

Figure A2-3. Result of multicollinearity test

A2-3. Heteroscedasticity Test Results

In this study, the heteroscedasticity test was carried out using the Park test. The results of the heteroscedasticity test are displayed in the form of a scatterplot which is presented in Figure A2-4. From the figure, it can be seen that the points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern. This means that there is no heteroscedasticity in the regression model.



Gunungkidul Regency (a)

Bantul Regency (b)

Kulonprogo Regency (c

Sleman Regency (d)

Yogyakarta City (e)

Figure A2-4. Result of heteroscedasticity test

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An Analysis of Driving Factors of Collaboration in Handling Used Cell Phones as a Waste Management Practice

Siti Mahsanah Budijati, I Nyoman Pujawan, Hayati Mukti Asih

Abstract

The handling of used cell phones in Indonesia is mostly carried out by informal actors, starting from second-hand market actors. However, the activities of the informal actors often endanger the environment and human health. To reduce the impact, some of the activities should be transferred to formal parties. This requires collaboration of both parties as a form of waste management, which previously has never been established. The objective of this study is to explore the driving factors of collaboration intention of informal actors in handling used cell phones with the formal ones. Data were collected using questionnaires distributed to second-hand market actors in five districts in the Special Region of Yogyakarta Province. In this study, three internal driving factors are considered, which are environmental attitude, management commitment, and financial benefits, as well as two external driving factors: government support and competitor pressure. The regression analysis in each region revealed that the most significant driving factors vary across different regions, such as government support in Gunungkidul, management commitment in Bantul, competitive pressure and government support in Kulonprogo, government support, management commitment, and financial benefit in Sleman, as well as environmental attitude and financial benefit in Yogyakarta City. From the structural equation modeling at the provincial level, it was found that financial benefit and government support were the most significant factors influencing the collaboration intentions of all informal actors. The results of this study can be used as a reference.

Doi: 10.28991/CEJ-2022-08-10-016

Full Text: PDF

Keywords

Collaboration Intention; Driving Factors; Used Cell Phone; Waste Management.

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An Analysis of Driving Factors of Collaboration in Handling Used Cell Phones as a Waste Management Practice

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Abstract

The handling of used cell phones in Indonesia is mostly carried out by informal actors, starting from second-hand market actors. However, the activities of the informal actors often endanger the environment and human health. To reduce the impact, some of the activities should be transferred to formal parties. This requires collaboration of both parties as a form of waste management, which previously has never been established. The objective of this study is to explore the driving factors of collaboration intention of informal actors in handling used cell phones with the formal ones. Data were collected using questionnaires distributed to second-hand market actors in five districts in the Special Region of Yogyakarta Province. In this study, three internal driving factors are considered, which are environmental attitude, management commitment, and financial benefits, as well as two external driving factors: government support and competitor pressure. The regression analysis in each region revealed that the most significant driving factors vary across different regions, such as government support in Gunungkidul, management commitment in Bantul, competitive pressure and government support in Kulonprogo, government support, management commitment, and financial benefit in Sleman, as well as environmental attitude and financial benefit in Yogyakarta City. From the structural equation modeling at the provincial level, it was found that financial benefit and government support were the most significant factors influencing the collaboration intentions of all informal actors. The results of this study can be used as a reference.

Keywords: Collaboration Intention; Driving Factors; Used Cell Phone; Waste Management.

1. Introduction

The number of mobile phone users in Indonesia, especially in the Special Region of Yogyakarta Province (DIY Province), is increasing. Data from the Central Bureau of Statistics (BPS) generally show that the percentage of the population using mobile phones has increased from 2012 to 2019. However, there has been a slight decline in 2020, possibly due to the COVID-19 pandemic. The increase in mobile phone users is shown in Figure 1.

The increase in the number of cell phone usage indicates that there is also an increase in cell phone waste, which is e-waste. The development of technology is followed by an increase in the amount and complexity of waste. Since the waste contains toxic materials that might have a negative impact on both human and environmental health, waste management requires accurate identification and an awareness of the risks involved [1]. Hazardous metals in e-waste are lead, cadmium, mercury, hexavalent chromium, and refractory materials [2–6]. In the long term, these hazardous metals can have an impact on human health and the environment. According to Robinson (2009) [7], in every 1 kg of e-waste, there is 180 mg of cadmium and 0.8 mg of mercury, especially in battery components. Furthermore, the BBC

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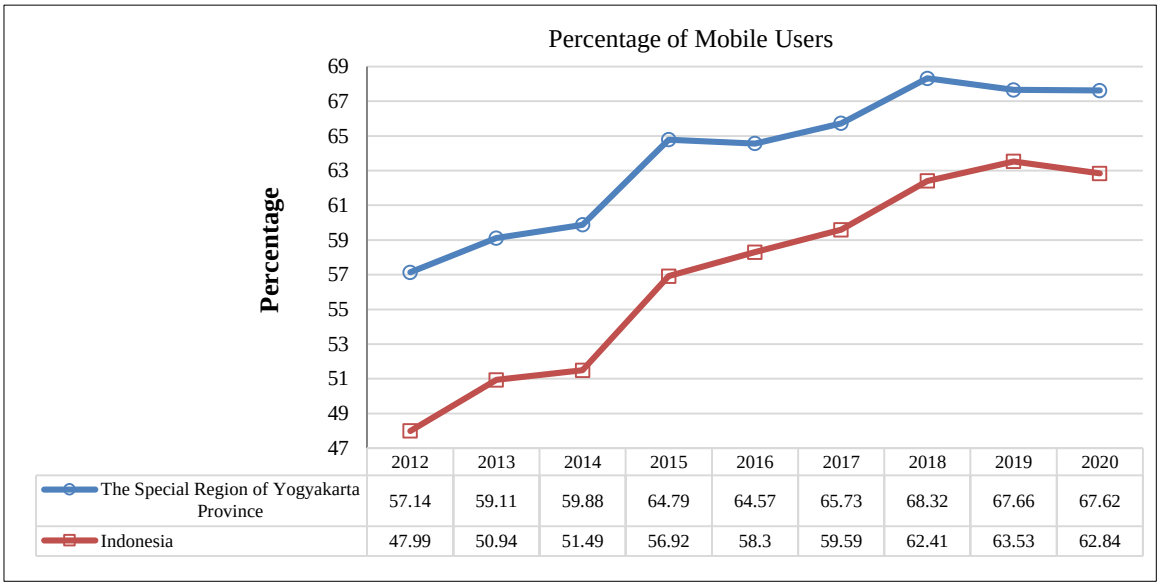
(2002) reported in Polak & Drápalová (2012) [8] described that cadmium from a cell phone battery can contaminate 600,000 litres of water. Research conducted by Robinson (2009) [7] in Guiyu City, Guangdong region, China, which is the largest e-waste recycling area in the world, found that dioxin contamination in Guiyu air resulted in the level of exposure to humans reaching 15–56 times the maximum standard recommended by WHO. Elevated levels of dioxins are found in breast milk, placenta, and hair, indicating that dioxins are acquired by humans from the air, water, or foodstuffs, at levels that pose a serious health risk. Children in Guiyu had significantly higher blood lead and cadmium levels than normal children. It was also reported that e-waste recycling workers from villages in the Jinghai region had chromosomal aberrations 20 times higher than villagers who were not exposed to e-waste. For this reason, it can be said that e-waste is a potential source of genetic mutations and can cause cytogenetic damage in the general population exposed to e-waste pollution. Furthermore, as Orlins & Guan (2016) [9] described, during the process of e-waste dismantling without adequate technology, the content of hazardous materials in e-waste will remain in the environment for a long time.



	2012	2013	2014	2015	2016	2017	2018	2019	2020
The Special Region of Yogyakarta Province	57.14	59.11	59.88	64.79	64.57	65.73	68.32	67.66	67.62
Indonesia	47.99	50.94	51.49	56.92	58.3	59.59	62.41	63.53	62.84

Figure 1. Data on the percentage of mobile phone users in the Special Region of Yogyakarta Province (DIY Province) and Indonesia in 2012-2020 *

Waste is generally defined as something that is no longer used and thrown away by its owner. Furthermore, Dadzie et al. (2020) [10] explain various definitions of waste. It is understood that all forms of waste must be managed and handled correctly not to burden the environment and disturb public health.

E-waste is waste from various electronic and electrical products. The definition and classification of e-waste depend on the regulation or standards that apply in each country. Gollakota et al. (2020) [11] present a detailed classification of e-waste based on several standards. Likewise, Shittu et al. (2021) [12] explained the definition of e-waste and its classification. In contrast to developed countries that explicitly define and classify e-waste and have standardized rules for its management, Indonesia has no specific rules regarding e-waste management. Generally, e-waste is classified as toxic and hazardous material regulated in Minister of Environment and Forestry Regulation No. 6 of 2021 concerning procedures and requirements for managing hazardous and toxic waste.

One of the activities that can be used to manage End of Life (EoL) or End of Use (EoU) products such as used cell phones is waste management. Waste management is a step or various strategies for managing and disposing waste. It can be done by disposing, destroying, processing, recycling, reusing, or controlling waste. Waste management aims to reduce unusable materials while preventing potential environmental damage and threats to human health. The management of used cell phones as electronic waste is known as e-waste management.

Several authors described effective e-waste management, including Isernia et al. (2019) [13] stated that the collection point is the key to e-waste management. The effectiveness of the collection process is influenced by the distribution of collection points in an area. Rautela et al. (2021) [14] stated that for effective implementation of sustainable e-waste management, government supervision is needed in the reciprocal relationship between manufacturers, producers, wholesalers, traders, consumers, and recyclers. Furthermore, Shittu et al. (2021) [12] suggested that one part that needs attention in effective e-waste management is to apply and enforce e-waste management rules for informal actors. As for e-waste management in developing countries, Ilankoon et al. (2018) [15] mentioned that it is necessary to apply a strict

* Source: Data of the year 2012-2018 were obtained from: (Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah, 2012-2018, 2020)- Data of the year 2018-2020 were obtained : (*Persentase Penduduk Yang Memiliki/Menguasai Telepon Seluler Menurut Provinsi Dan Klasifikasi Daerah 2018-2020*, 2020)

legislative framework to realize an e-waste management strategy. These regulations can be developed through modification of the EPR scheme, which provides an e-waste management system that is easy to adopt, provides benefits to all stakeholders, and is adapted to the local economy.

Several obstacles caused the implementation of e-waste management not to run optimally. Gollakota et al. (2020) [11] explained that effective e-waste management is not yet available in most developing countries, and the focal point of successful e-waste management is debatable. One of the shortcomings of e-waste management in developing countries is that the integration of the formal and informal sectors has not been integrated. In addition, there are several other factors, such as the unavailability of special rules for e-waste, the influence of socio-cultural aspects, and the lack of responsibility of producers and consumers. Meanwhile, Rautela et al. (2021) [14] stated that e-waste management in developing countries does not effectively run because e-waste is treated and managed informally in an illegitimate way. Moreover, the unavailability of policies, rules, and regulations, lack of law enforcement, and the implementation of the legal framework for EPR have not yet been maximized.

In Indonesia, mobile phone waste is mostly managed by informal actors, through the starting point of the second-hand market. Informal actors will obtain economic benefits from the activities of managing used cell phones. However, if used cell phone management activities are carried out without safe technology, the impact can affect the health of informal actors and damage the environment. Several researchers such as Chatterjee and Kumar (2009) [2], Chi et al. (2011) [3], Joseph (2007) [4], Li et al. (2011) [16], Kyere et al. (2018) [17], and Robinson (2009) [7] have elaborated the contamination of the environment due to e-waste management activities by informal parties. As Wilson (2007) [18] stated, one of the drivers of waste management is the remaining value of waste, which encourages people to use it as a source of income, especially in developing countries.

On the other hand, Original Equipment Manufacturers (OEMs) as formal actors have technological capabilities to handle used cell phones. However, the offer of a used cell phone return program in Indonesia is not carried out routinely and according to Budijati et al. (2015) [19], the program is not well known by the public, so that after cell phone usage, consumers sell the used mobile phones in the second-hand market, dispose, store, or give them to other people.

To reduce or eliminate the negative impact of the management of used cell phones by informal parties and still provide economic benefits for them, it is necessary establish collaboration in the management of used cell phones involving informal and formal parties. This collaboration aims to regulate the distribution of stages in the management of used cell phones to the disposal process that is safe for the environment and health.

Several authors have provided the definition of collaboration within the supply chain framework. Simatupang and Sridharan (2002) [20] define collaboration as two or more independent companies that work together to plan and implement supply chain operations in order to get a better success rate. Dung (2015) [21], Hudnurkar et al. (2014) [22], Soita (2015) [23], and Wu and Chiu (2018) [24] elaborated the definition of collaboration based on the definitions of other researchers. On the other hand, Maheswari (2019) [25] proposed an engagement model involving the government and intermediary businesses in handling e-waste problems in Indonesia that included empowerment, collaboration, and participation.

The potential or possibility of collaboration between informal and formal actors was conveyed by [26]. They reviewed the situation in several countries and proposed the integration of ISR (Informal Sector Recycling) into the formal sector by taking into account contexts and local conditions. Furthermore, Sasaki et al. (2014) [27] investigated the possibility of integrating the informal sector into formal waste management in Indonesia. Meanwhile, based on an analysis of the situation in four countries regarding informal sector business processes, Wilson et al. (2009) [28] stated that there was a clear potential for mutually beneficial cooperation between the formal and informal sectors. Furthermore, Li and Tee (2012) [29] suggested that to minimize the negative impact of informal channel activities, RL activities and the integration of IWS (Informal Waste Sector) into the formal sector are required.

To the best of the researchers' knowledge, no formal and informal forms of cooperation have been found in Indonesia in the handling of used cell phones. However, there are communities of second-hand market actors in some regions. This community has regular meetings to strengthen their relationship.

This study aims to explore the intention for collaboration of informal parties in managing used cell phones with the formal ones and the driving factors of the collaboration intentions. The intention of collaboration in this study is the intention to carry out management activities for used cell phones so that used cell phones can be returned to their origin point for the handling process or if the disposal is required, it does not damage the environment or endanger human health.

Factors driving collaboration intentions are based on factors that can encourage informal actors to carry out activities that lead to the prevention of environmental damage or environmental behaviours in general. Several researchers who explain the environmental behaviour of managers include Leszczynska (2010) [30] who examines the environmental awareness of managers and further investigates whether this awareness is related to socio-economic development. This study involved 200 managers in Australia and Ukraine and 250 managers in Poland. Lopez-Gamero et al. (2011) [31]

examined the environmental attitudes of hotel managers in Spain in the form of perceptions of the natural environment which are influenced by internal and external factors of the company. Next, Nambiar and Chitty (2014) [32] examined the views of business managers in India on the relationship between sustainability and the environment. Ye et al. (2013) [33] examined the attitudes of top managers in 209 companies in China regarding the implementation of reverse logistics in the form of product returns and product recovery. Therefore, the research objectives in this study are:

- To explore the collaboration intention of informal actors to manage used cell phones with formal actors so that cell phone waste remains safe for the environment and human health;
- To identify the driving factors of the collaboration intention of informal actors in handling used cell phones;
- To examine the influence of the driving factors on the collaboration intention of informal actors in handling used cell phones.

2. Literature Review and Hypotheses Development

This sub-section discusses the driving factors that can influence collaboration intentions for informal actors. This collaboration intention refers to the intention to behave in the environment. The driving factors for environmental behaviour comes from the internal or external. Internal driving factors are factors that come from individuals as part of the company or factors that describe the company's internal conditions. On the other hand, the external driving factors are factors that come from outside the company. The factors are outside the company's control but are able to affect the company's performance.

Fraj-Andrés et al. (2008) [34] stated that the environmental behaviour of firms depends on some internal and external forces. He et al. (2018) [35] also proposed the existence of internal and external pressures on corporate environmental behaviour in their study of 702 paper-making companies in China. Testa et al. (2016) [36]conducted a study to determine the effect of external pressure, internal factors, and environmental attitudes of entrepreneurs on a small and micro-scale company's proactive environmental strategy. Yen & Yen (2012) [37] explored internal and external motivations for green purchasing activities in electronic companies in Taiwan.

The factors considered in this research include internal and external factors, which consist of three internal factors (environmental attitude, management commitment, and financial benefits) and two external factors (government support and competitor pressure). These factors were determined based on a literature review of factors that can motivate environmental intentions and behaviour in a company and adjustments of the case studies in this research were done through field validation by asking several respondents in each research area whether the informal actors felt these factors involved.

The driving factors considered in this study are explained as follows.

2.1. Environmental Attitude

Environmental attitude in this study refers to the positive attitude of informal actors (second hand cellphone actors) towards the environment, commonly referred to as an environmentally friendly attitude. Janmaimool & Khajohnmanee (2019) [38] define environmental attitude as a person's belief in the relationship between humans and the environment. This belief also includes understanding the consequences when environmental damage occurs. Meanwhile, Chan et al., (2017) [39] stated that environmental attitude is often equated or interchanged with environmental concern. Arshad et al. (2022) [40] and Okumus et al. (2019) [41] explored environmental attitudes in environmental knowledge, awareness, and concern.

He et al. (2018) [35] showed that internal pressure could affect corporate environmental behaviour, where employees' and top management's environmental awareness are part of internal pressures. Then, Okumus et al. (2019) [41] proposed that the environmental attitude (in terms of environment concern) of hotel employees in Turkey is the best predictor of ecological behaviour. Furthermore, Arshad et al. (2022) [40] stated that employees with an excellent environmental attitude would encourage organizations to implement environmental management system policies. Moreover, Long et al. (2017) [42] examined the impact of attitude toward environmental behaviour on environmental innovation intention in 182 companies of various types in China. Then, Tariq et al. (2020) [43] examined the relationship between employees' environmental attitudes and employees' ecological behavior of employees in 65 small and medium-sized hotels operating in Pakistan's tourist areas. Next, Testa et al. (2016) [36] conducted a study to determine the effect of environmental awareness of managers to adopt a proactive corporate environmental strategy in 355 small and micro-scale businesses in Liguria, a region in central Italy. Then, Zientara & Zamojska (2018) [44] examined the relationship between environmental values or beliefs held by hotel employees in Poland with organizational citizenship behaviour for the environment (OCBE), and the results showed a positive relationship. From the previous studies reviewed, it is expected that someone with a high environmental attitude will show positive environmental behaviour. Therefore, the hypothesis of this research is as follows.

H1: Environmental attitude has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.2. Management Commitment

Management commitment is a form of responsibility and commitment from the owners and employees of the second-hand cell phone market to carry out activities that support the environment. In this case, it can be realized through collaboration in the management of used cell phones among formal parties so that the activities of handling used cell phones do not damage the environment or endanger workers' health.

In general, as stated by El-Kassar and Singh (2019) [45], management commitment is the encouragement given by a company to carry out environmentally friendly activities and to incorporate the ideas into the corporate culture. Yusliza et al. (2019) [46] argued that to achieve the successful implementation of green activities, top management must provide a high commitment so that the implementation of green activities can offer a competitive advantage for the company. In addition, Ates et al. (2012) [47] stated that organizational capability plays an important role in facilitating the implementation of the company's environmental strategy and impacts environmental performance, where one source of organizational capability is organizational commitment.

Ates et al. (2012) [47] demonstrated that organizational commitment positively impacts the extent to which firms adopt a proactive environmental strategy in manufacturing firms in Turkey. Ghazilla et al. (2015) [48] stated that management commitment is one of the drivers for implementing green manufacturing practices of SMEs in Malaysia. Likewise, Nordin et al. (2014) [49] showed that top management commitment is one of the main driving factors of sustainable manufacturing in manufacturing companies in Malaysia, involving respondents from operation managers, manufacturing managers, and the environmental, safety and health managers. In addition, He et al. (2018) [35] stated that internal and external pressure affects corporate environmental behaviour, where one form of internal pressure is commitment management. Tariq et al. (2020) [43] found that managers' environmental commitment strengthens the relationship between employees' environmental attitudes and their ecological behavior. Yen and Yen (2012) [37] show a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities in the electronics industry in Taiwan. Yusliza et al. (2019) [46] found that top management commitment influences various green human resource management (GHRM) activities, which include green analysis and job description of job position, green performance, green recruitment, green rewards, green selection, and green training in 400 Malaysian manufacturing and service organizations.

Furthermore, Bhatia and Jakhar (2021) [50] studied the effect of top management commitment (TMCO) on green product innovation (GPI) in Indian automotive manufacturing companies empirically. Burki et al. (2019) [51] examined the relationship between top management commitment and process innovation in the green supply chain (GSC), in the form of green process innovation and green managerial innovation in selected ISO 14000 certified Turkish exporting firms located in the Izmir region (Turkey). Meanwhile, Lee and Joo (2020) [52] investigated whether support from top management can significantly increase the level of environmental collaboration with participating companies in upstream and downstream green supply chains and their impact on environmental work in companies in manufacturing industries in South Korea.

It is necessary to have awareness from the internal parties in implementing environmental conservation activities. The management commitment factor explains organizational commitment from top management to employees in behaviour that supports environmental preservation. Therefore, related to this research, the proposed hypothesis is as follows:

H2: Management commitment has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.3. Financial Benefit

The financial benefit as a driving factor in this study is the potential benefits obtained when informal actors carry out environmental conservation activities in the form of collaboration in handling used cell phones. Maheswari, et al. (2020) [53] investigated that finance was one of the informal e-waste business performance measurements using a sustainable reverse logistics scorecard. Financial was one of the dimensions/driving factors that influenced the green supply chain collaboration [54] and green manufacturing practice in small medium enterprises [48].

Likewise, Nordin et al. (2014) [49] identified that one of the driving factors of sustainable manufacturing activity is economic benefit; the research was conducted in Malaysian manufacturing industries. Aside from the improper disposal, the challenges of the current EoL electrical and electronic equipment recycling program were the home storage and the informal actors. The reason is the lack of economic incentives for the proper return of used electronic equipment, especially for expensive and quickly obsolete products [55].

Henriques and Catarino (2016) [56] conducted a preliminary study on small and medium-sized companies in Portugal adopting energy efficiency improvements. One of the identified motivators is financial factor, which provide

benefits in strengthening capacity, providing financing, external parties for financial and technical guidance, access to capital, financial resources to develop bankable projects, and financial support for investment. Then, Kudlak (2017) [57] examined the drivers for implementing environmental management systems in companies in Poland. These drivers include efforts to reduce costs, increase sales, and increase market share. Next, Meath et al. (2016) [58] identified the key factors that motivate and hinder the design process of a voluntary energy efficiency program for SMEs in Queensland. Factors related to economic profit are one of the motivators, namely financial interests in the form of reducing energy costs, opportunities to obtain funding, and obtaining marketing opportunities due to the promotion of environmental performance achievements.

Testa et al. (2016) [36] examined managers' opinions about motivators in the adoption of proactive corporate environmental strategies. One of the motivators is the internal factor which is cost-saving. Meanwhile, Wang et al. (2018) [59] stated that one of the reasons companies support green supply chain management activities is the cost driver, where companies can reduce costs while helping environmental sustainability. This research was applied to plants in three industries: machinery, electronics, and transportation in various countries. It was found that the cost drivers significantly influence internal and external green practices. Referring to the results of previous studies, the hypothesis in this study is as follows:

H3: Financial benefit has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.4. Government Support

As one of the stakeholders in environmental control, the government plays a role in motivating environmental conservation. Government support in this study is the role of the government in supporting informal actors to reduce used cell phone management activities that are not safe for the environment and health. This support can be in the form of regulation, incentives provided, and facilities and infrastructure that informal actors can utilize in carrying out their activities.

The previous studies showed the government's role in encouraging companies to carry out environmental conservation activities. As stated by Lee (2008) [60], the involvement of local and central governments in green supply chain (GSC) initiatives is in the forms of coordinating the GSC initiatives, increasing funds for the activities, providing information and technical assistance to small and medium-sized firms, popularizing knowledge of environmental management, and build infrastructure for facilitating GSC initiatives. Meanwhile, Tatoglu et al. (2015) [61] examined the relative importance of each dimension of the Corporate Environmental Policies (CEP). One of the dimensions is stakeholder pressure, including government policies and regulations.

Several studies are related to an initial study on the importance of government support in environmental activities, including [48]. They conducted a preliminary study to determine the driving and inhibiting factors for applying green manufacturing practice in Malaysian SMEs. They found that the legislation factor in which there is a financial incentive from the government is one form of government support. Then, Henriques and Catarino (2016) [56] identified the situation in small and medium-sized companies in Portugal adopting energy efficiency improvements. Government policy is considered as a motivator, where government policies include the obligation of the state and government to develop effective energy programs and the need to design energy efficiency programs. There are government representatives in suppressing energy efficiency, providing fiscal subsidies, and providing grants for technology investment. Next, Moktadir et al. (2018) [62] identified the primary motivators in adopting sustainable manufacturing practices for the Bangladesh leather industry. One of the identified drivers is governmental support and legislation, which the government requires to provide funds to implement these activities smoothly.

Meanwhile, studies examining how government support influences corporate environmental activities include [35]. They examined government pressure which influenced corporate environmental behaviour, which consists of environmental defensive behaviour, environmental accommodative behaviour, and proactive environmental behaviour. Ye et al. (2013) [33] examined government pressure on the attitude of top managers to implement RL in the form of product returns and product recovery and found that government pressure had a significant effect on managers' attitudes.

From these previous studies, it is clear that government support is one of the driving factors of the company's environmental activities. For this reason, the hypothesis developed regarding government support is as follows:

H4: Government support has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

2.5. Competitor Pressure

According to Dai et al. (2018) [63], competitive pressure influences a company's response to aggressive environmental strategies. It is the key role in adopting small medium enterprises because it is sensitive to the competition they have [64]. The competitor pressure factor means competitor activities such as obeying existing regulations, being committed to environmental activities, and establishing cooperation in environmental conservation which will affect informal parties. The influence of competitor pressure related to environmental preservation will encourage informal actors to do the same.

Ghazilla et al. (2015) [48] considered competitor pressure as one of the business environments for implementing green manufacturing practices. Meanwhile, Tatoglu et al. (2015) [61] examined the relative importance of the Corporate Environmental Policies (CEP) dimension, where competitor pressure is part of the stakeholder pressure dimension. Weng et al. (2015) [65] examined the effect of competitor pressure in applying green innovation in manufacturing and service firms in Taiwan. This study found that competitor pressure had a positive and significant impact on the company's green innovation activities. Furthermore, Ye et al. (2013) [33] examined the effect of competitor pressure on the attitude of top managers to carry out RL activities in the form of product returns and product recovery. It was found that competitor pressure had a significant effect on the attitude of managers toward the implementation of the RL. From the previous research reviewed, the proposed hypothesis in this study is as follows:

H5: Competitor pressure has a positive and significant effect on the intention to collaborate with informal actors in handling used cell phones.

Based on the explanation of the factors that influence the intention of second-hand market actors to collaborate in handling used cell phones, the research model proposed in this study is shown in Figure 2.

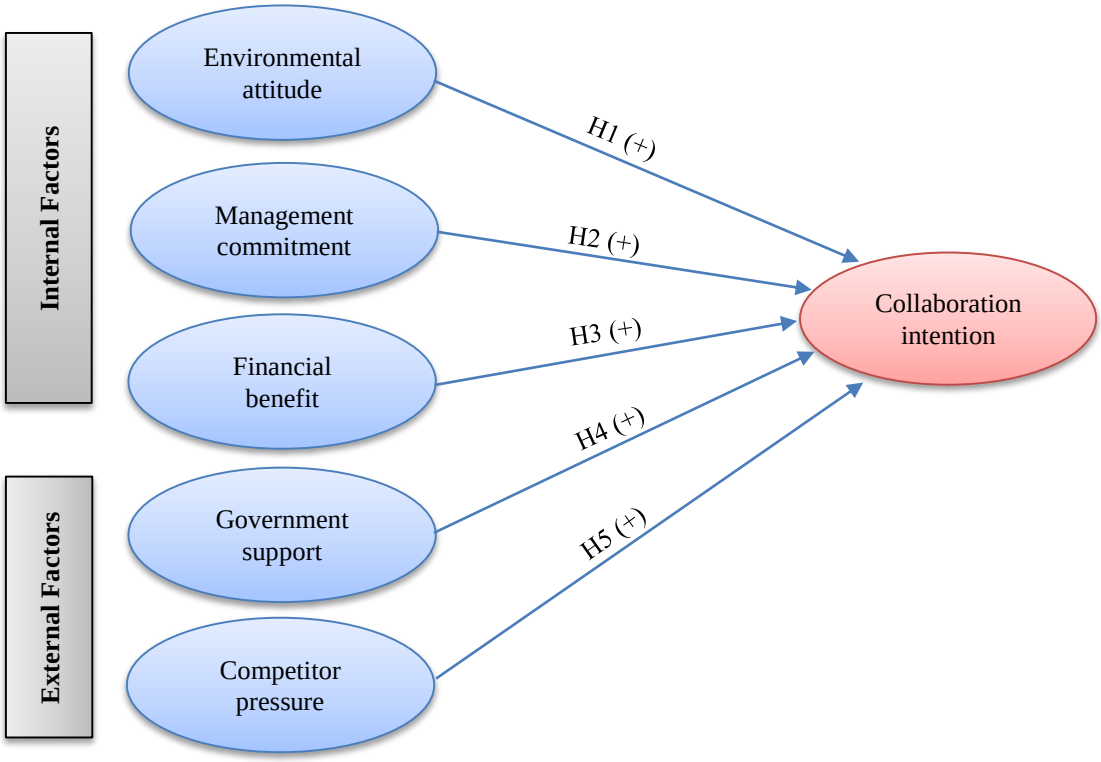


Figure 2. Conceptual model

3. Research Methodology

3.1. Research Object

The research object is the second-hand mobile phone market actors who are the initial players in the informal channel of handling used cell phones. This research started from the phenomenon of the rise of second-hand cell phone market actors in Indonesia who carry out selling, buying, and repairing used cell phones. It is because Indonesia has not obliged cell phones manufacturers to take back used cell phones that consumers no longer use. This condition is an opportunity for the informal sector to buy and sell used mobile phones that can provide economic benefits.

On the other hand, the activities of informal actors in handling used cell phones, such as burning, throwing the remaining components into the trash, and taking precious metals by chemical processes, can pollute the environment and endanger their health. To reduce the danger level due to informal actors' activities, it is necessary to propose management of mobile phone waste involving informal and formal actors. Based on these reasons, this research was conducted to identify the intentions of informal actors to collaborate in handling cell phones with formal actors.

The research respondents were market actors for second-hand mobile phones in five regencies/cities in the Special Region of Yogyakarta Province (DIY Province), consisting of the Regencies of Gunungkidul, Bantul, Kulonprogo, Sleman, and the City of Yogyakarta.

3.2. Measurement

The measurement of collaboration intention was conducted using questionnaire with a Likert scale of 1 to 5. The initial questionnaire consisted of 32 items. Those factors are adapted from the following previous studies:

- Environmental attitude was adapted from [36, 42].
- Management commitment was adapted from [47, 48].
- Financial benefit was taken from [49, 56, 58, 59].
- Government support was adapted from [56, 61].
- Competitor pressure was adapted from [48, 61, 65, 66].
- Collaboration intention 3 items adapted from Ajzen (2002) [67] and 2 items developed in this study.

The complete questionnaire items are shown in Appendix I.

3.3. Research Stages

The stages of the research included:

- Distribution of the initial questionnaire to the respondents;
- The validity and reliability test of the initial questionnaire using the SPSS software version 16;
- Distribution of the formal questionnaire to the respondents;
- Conducting a classic assumption test for data in each district/city using the SPSS software version 16;
- Performing regression analysis for data in each district/city using the SPSS software version 16;
- Conducting confirmatory factor analysis (CFA) using AMOS 25 for data in all areas of DIY Province;
- Developing structural equation modelling (SEM) development using AMOS 25 software for data in all areas of DIY Province; confirmatory factor analysis (CFA) used AMOS 25.

4. Result and Discussion

4.1. Demographic Characteristic

The questionnaire was distributed to second hand market actors (that includes buying and selling, cell phone service or cannibalization) in Yogyakarta province (424 respondents from September to October 2018). It consists of several regencies, such as Bantul with 75 respondents, Sleman with 160 respondents, Yogyakarta municipality with 90 respondents, Gunungkidul with 50 respondents, and Kulonprogo with 49 respondents. The respondents' characteristics are age, gender, household member, income, education level, marital status, position at work, and treatment of used components as shown in Figure 3 and 4.

The majority of respondents are male and 71% of the respondents is between 20 and 30 years old. Interestingly, 92% of respondents have senior high school background and above for education level; almost 55% of the respondents have an income of approximately 1-2 million per month.

In addition, as shown in Figure 4, the majority of the respondents are unmarried and the position at work is an employee. Almost 60% of the respondents save the used components. The reason is that the respondents often reuse those parts for other broken cell phones and repair those parts for resale.

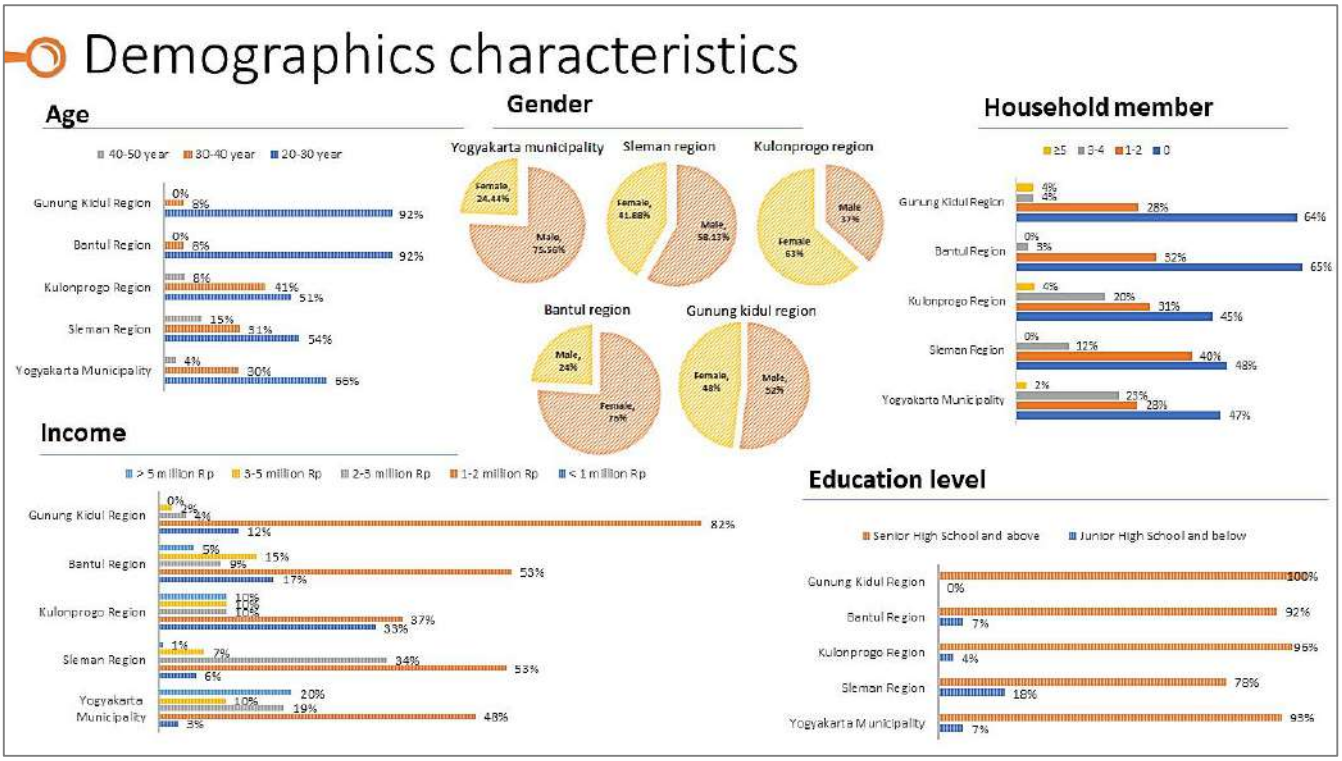


Figure 3. The demographic characteristics: age, gender, household member, income and education level

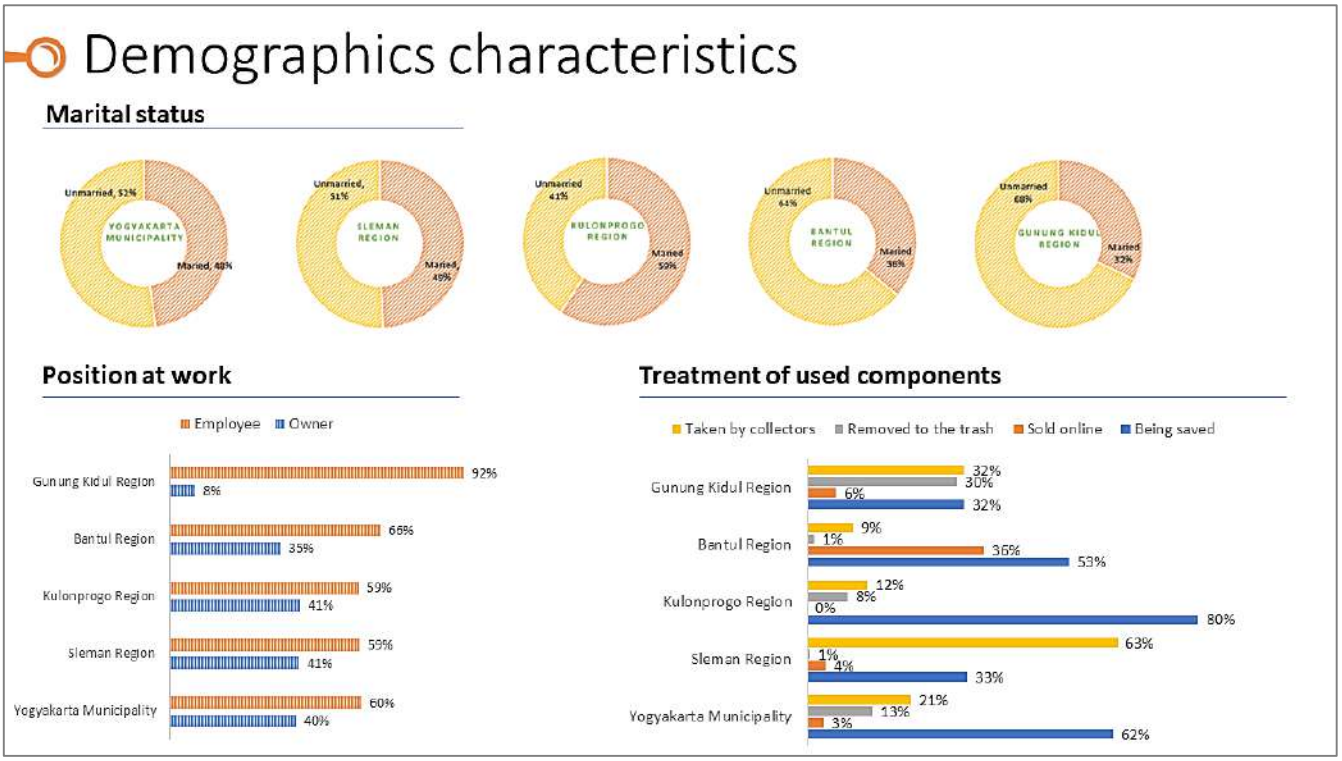


Figure 4. The demographic characteristics: marital status, position at work, and treatments of used components

4.2. The Location of Second-Hand Market Actors

Second-hand market actors as research objects are spread across five regencies/ cities within the DIY Province. DIY Province is one of the provinces in Indonesia, located on the South-Central side of Java Island. It is known as a Special Region because it is the territory of the Yogyakarta Palace. The location of the DIY Province is between 7.33-8.12 South Latitude and 110.00- 110.50 East Longitude, with an area of 3185.80 km^2 or 0.17% of the total area of Indonesia.

Figure 5 to 9 present the position of used cell phone second hand market actors based on snowball sampling in some regions of the Special Region of Yogyakarta Province.

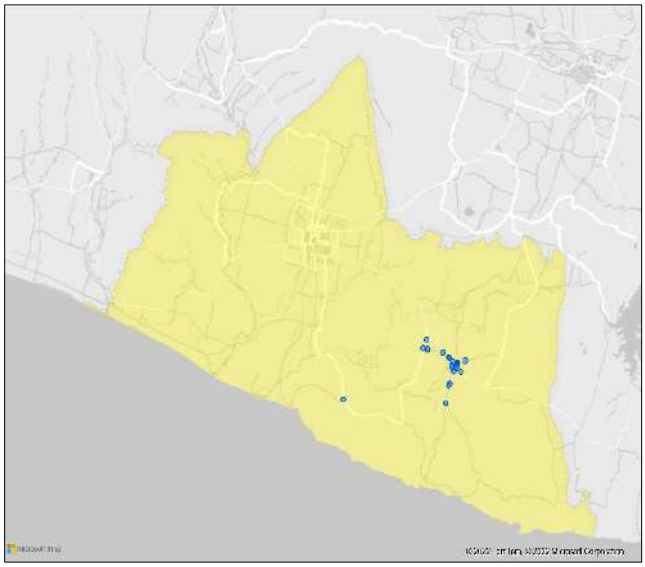


Figure 5. The position of used cell phone second-hand market actors in Gunungkidul Region

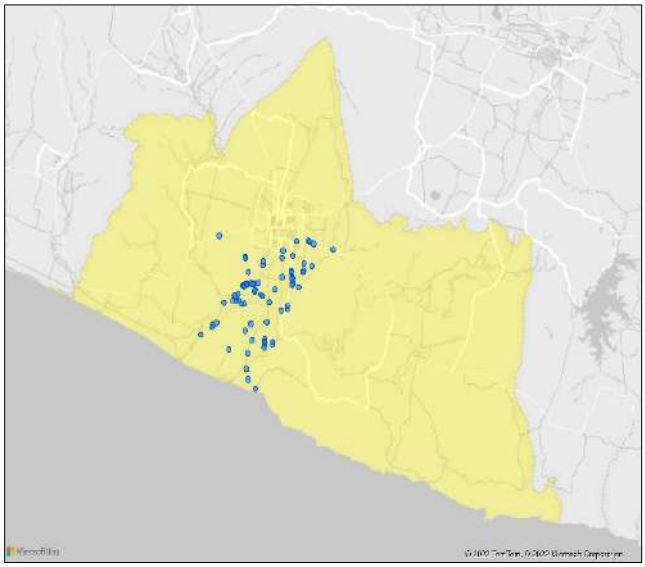


Figure 6. The position of used cell phone second hand market actors in Bantul Region

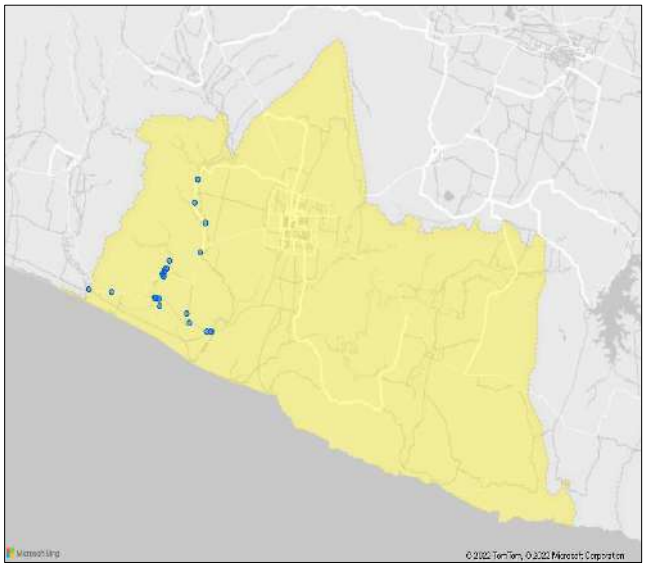


Figure 7. The position of used cell phone second hand market actors in Kulonprogo Region

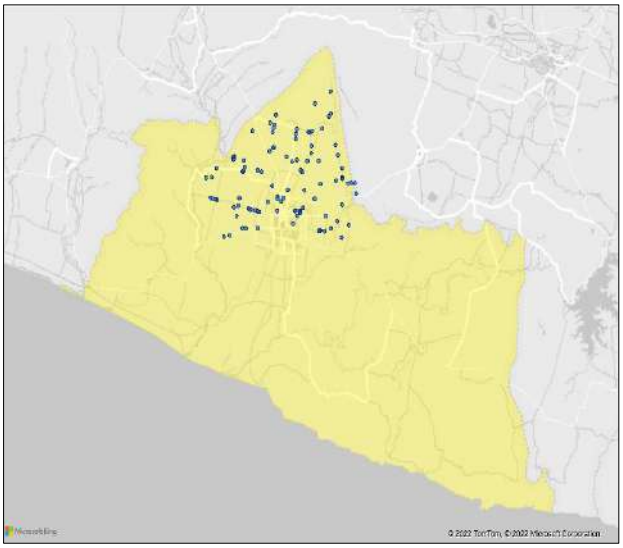


Figure 8. The position of used cell phone second hand market actors in Sleman Region

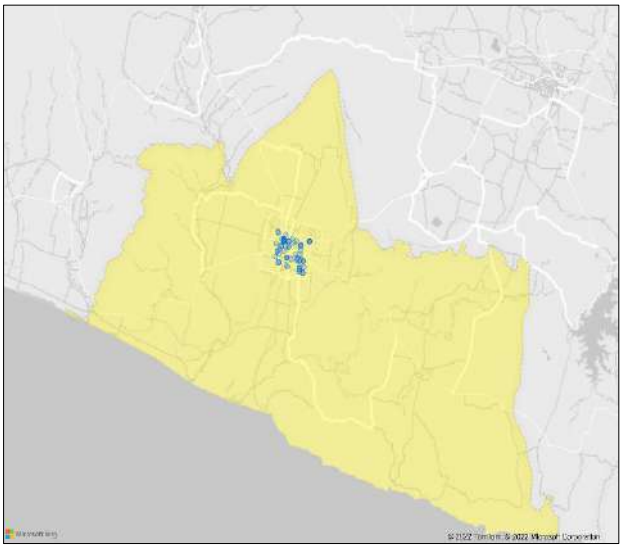


Figure 9. The position of used cell phone second hand market actors in Yogyakarta Municipality

Gunungkidul region has the position 007°46'00"-008°09'00" south latitude & 110° 21' 00"- 110° 50' 00" east longitude;the border on the north is Klaten region, the south is Indian Ocean, the west is Bantul region and Sleman region, and the east is Wonogiri region. It is the biggest area compared to other areas; it is about 1,431 km^2 [68]. Then, a total population about 747,161 per 2020 and population growth rate of 0.88% [69]. This region has 18 sub-districts, 144 villages, and 1,431 hamlets. Geographically, Gunungkidul region is located in the southeastern part of the Special Region of Yogyakarta. Gunungkidul Regency has neither inland nor remote areas. According to the geographical conditions, there are 18 coastal villages, 56 villages located on the slopes/ridges of the hills and 70 villages located on the plains. The capital of this region is Wonosari.

The position of Bantul region is 14º 04' 50" - 27º 50' 50" South Latitude and 110º 10' 41" - 110º 34' 40" East Longitude. This region is surrounded by Gunungkidul region on the east, Yogyakarta municipality and Sleman region on the north, Kulonprogo region and Indian Ocean are on the west and the south, respectively. The area is about 508.13 km^2 [68].Then, in 2020, the population was about 985,770. This region had the highest growth rate compared to other regions, which is 1.14% [69]. Bantul region has a plain area located in the middle and hilly areas located in the east and west, as well as a coastal area in the south. This region consists of 17 sub-districts divided into 75 villages and 933 hamlets [70]. The capital of this region is Bantul.

The position of Kulonprogo region is 007 º 38' 42" - 007 º 59' 3" South Latitude and 110 º 01' 37" - 110 º 16' 26" East Longitude. It is surrounded by Bantul region and Sleman region on the west; Magelang, Indian Ocean, and Purworejo are on the north, the south, and the west, respectively. Not much different from Bantul region, the area of Kulonprogo region is 586 km^2 [68]. In 2020, the population was about 436,395 with the growth rate at about 0.99% [69]. This region consists of 12 sub-districts and 88 villages [71]. The capital city of this region is Wates.

The position of Sleman region is 110º 33' 00" and 110º 13' 00" East Longitude, 7º 34' 51" and 7º 47' 30" South Latitude. It is surrounded by Boyolali region and Central Java on the north; Yogyakarta municipality, Bantul region, and Gunungkidul region on the south; Kulonprogo region and Magelang region on the west; and Klaten region and Central Java on the east. The area of the Sleman region is about 574 km^2 [68]. Compared to other regions, Sleman region has the highest population which is about 1,125,804 with the growth rate of 1.06% [69]. It consists of 17 sub-districts with 86 villages and 1212 hamlets [72]. The capital of this region is Sleman.

The position of Yogyakarta municipality is 110º 24' 19" to 110º 28' 53" East Longitude and 7º 15' 24" to 7º 49' 26" South Latitude with an average elevation of 114 m above sea level. The borders are Sleman region and Bantul region on the north and the south, respectively. Then, Bantul region and Sleman region are both on the west and the east. Compared to other regions, Yogyakarta municipality has the smallest area which is about 32.50 km^2 [68]. Even though the total population was about 373,589 people and the growth rate was 1.06%, this region is the most densely populated area [69]. There are fourteen districts and 45 villages [73]. The capital of this region is Yogyakarta city.

4.3. Regression Analysis Result

This section discusses the results of collaboration intention and regression analysis of driving factors on handling the collaboration of used cell phones for the second-hand market actors. Before the regression analysis was applied, the reliability and validity tests were carried out on the questionnaires distributed in each region. The tests for the city of Yogyakarta, Bantul, Gunungkidul, and Kulonprogo districts used 30 initial respondents' answers, while for Sleman Regency used 40 respondents' answers. Reliability tests were conducted to measure the consistency of the questionnaire which is an indicator of the variables. A questionnaire is said to be reliable if a respondent's answers to the questions are consistent from time to time. According to Barr and Gilg (2007) [74], the questionnaire is said to be reliable if the value of Cronbach α is more than 0.6. The test results for each region showed that the Cronbach α coefficient of six variables was more than 0.6, which means that all the factors were reliable.

In addition, the validity test was required to show the extent to which the questionnaire items used in a study were able to measure what it aimed to measure. Validity test was used to measure the validity of questionnaire items. The validity test in this study was carried out by comparing the total Pearson correlation value with the R table value (n= 30, df=28, so the R table value=0.3061 and for n=40, df=38, so the R table value=0.2639). Questionnaire items are declared valid if the Pearson correlation value is greater than the R table value. Tests of reliability and validity were conducted by employing SPSS statistical software. Appendix I presents the results of both tests. It shows that all the data collected were reliable and valid.

4.3.1. Gunungkidul Region

Respondents in Gunungkidul were 50 informal actors. From the respondents' answers, the average value of each factor studied and the value of collaboration intentions were obtained, which is presented in Table 1. The calculation shows that the collaboration intention of informal actors in the Gunungkidul region is 3.46, which means the informal actors argue that they are neutral and tend to collaborate.

Table 1. Results of descriptive analysis of respondents' answers in Gunungkidul Regency

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.46	3.00	3.40	3.40	3.40	3.70

Before performing regression analysis, it is necessary to test the classical assumptions. The purpose of classical assumption testing is to provide certainty that the regression equation obtained is accurate in estimation, unbiased, and consistent. This classic assumption test is a prerequisite test that is carried out before carrying out further analysis of data collected. Classical assumption test in this research consists of normality test, multicollinearity test, and heteroscedasticity test. The summary of classical assumption tests is displayed in Table 2. The classical assumption test results for each region are presented in Appendix II. It can be seen that for Gunungkidul area, all classical assumption tests are met.

Table 2. The summary of classical assumption test for Gunungkidul Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.766), management commitment (0.530), and financial benefits (0.368), government support (0.740) and competitor pressure (0.337)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.631	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.306), management commitment (1.887), and financial benefits (2.714), government support (1.352) and competitor pressure (2.967)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in Gunungkidul region is presented in Table 3. It can be seen that the government support is the most significant driving factor compared to others.

Table 3. The regression result for Gunungkidul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.700	0.572		1.328	0.191
Environmental attitude	-0.084	0.120	-0.089	-0.702	0.486
Management commitment	0.212	0.147	0.218	1.436	0.158
Financial benefits	0.071	0.181	0.71	0.390	0.699
Government support	0.376	0.125	0.388	3.018	0.004
Competitor pressure	0.187	0.186	0.191	1.005	0.320

Factors that affect collaboration intentions are seen if the significance value is smaller than 0.05. Therefore, these factors affect collaboration intentions in handling used cell phones. In Gunungkidul region, one factor influences collaboration intentions in handling used cell phones that is government support with a significance value of 0.004. It was also found that management commitment had a moderate effect on collaboration intentions with a significance value of 0.158. Based on the results of multiple determination (R^2) of 0.462 (see Table 4), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 46.2% while 53.8% is influenced by other factors outside the model.

Table 4. The R^2 result for the driving factors of collaboration intention for Gunungkidul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.680	0.462	0.401	0.61640

4.3.2. Bantul Region

In Bantul area, 75 informal actors were involved as respondents. The average value of each factor and the value of collaboration intentions, based on the respondents' answers, are presented in Table 5. The results show that the value of collaboration intentions of informal actors in Bantul Regency is 3.87, meaning that informal actors have the intention to collaborate.

Table 5. Results of descriptive analysis of the respondents' answers in Bantul region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.87	4	3,8	3,8	4.2	3.8

As this research uses regression analysis, it is preceded by the classical assumption test. The results of classical assumption tests is displayed in Table 6. The classical assumption test results in detail are shown in Appendix II. The results of the classical assumption test for the Bantul region show that it is fulfilled for all types of tests.

Table 6. The summary of classical assumption test for Bantul Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.776), management commitment (0.727), and financial benefits (0.564), government support (0.723) and competitor pressure (0.413)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.678	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.289), management commitment (1.375), and financial benefits (1.772), government support (1.383) and competitor pressure (2.422)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Bantul region is presented in Table 7. It can be seen that the management commitment is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in Bantul region is 3.87.

Table 7. The regression result for Bantul region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.756	0.728		1.038	0.303
Environmental attitude	0.195	0.135	0.168	1.441	0.154
Management commitment	0.334	0.125	0.321	2.665	0.010
Financial benefits	0.090	0.120	0.103	0.755	0.453
Government support	0.092	0.130	0.086	0.707	0.482
Competitor pressure	0.080	0.160	0.0802	0.498	0.620

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In Bantul region, one factor influences collaboration intentions in handling used cell phones, which is management commitment with a significance value of 0.010. Also, a factor that has a moderate influence on collaboration intentions, namely environmental attitude with a significance value of 0.154, was obtained. Based on the results of multiple determination (R^2) of 0.270 (see Table 8), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27% while 73% is influenced by other factors outside the model.

Table 8. The R^2 result for the driving factors of collaboration intention for Bantul region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.501	0.270	0.217	0.41717

4.3.3. Kulonprogo Region

In the Kulonprogo area, there are 49 informal actors involved as respondents. Table 9 shows the average value of respondents' answers for each factor and collaboration intention. The value of collaboration intention is 3.783, meaning that informal actors in Kulonprogo Regency intend to collaborate in handling used cell phones with formal actors.

Table 9. Results of descriptive analysis of respondents' answers in Kulonprogo region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.783	4.097	3.963	4.021	4.438	3.982

Classical assumption test needs to be done before performing regression analysis. The summary of classical assumption tests for Kulonprogo region is displayed in Table 10. The complete results of the classical assumption test are presented in Appendix II. For Kulonprogo region, all classical assumption tests are fulfilled.

Table 10. The summary of classical assumption test for Kulonprogo Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.700), management commitment (0.588), and financial benefits (0.694), government support (0.893) and competitor pressure (0.583)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.636	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.428), management commitment (1.699), and financial benefits (1.442), government support (1.229) and competitor pressure (1.717)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Kulonprogo region is presented in Table 11. It can be seen that the competitors' pressure is the most significant driving factor compared to other factors. The calculation shows that the collaboration intention of informal actors in the Kulonprogo region is 3.783.

Table 11. The regression result for Kulonprogo region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.154	0.811		0.190	0.851
Environmental attitude	0.102	0.161	0.092	0.632	0.531
Management commitment	-0.122	0.150	-0.129	-0.814	0.420
Financial benefits	0.092	0.148	0.091	0.626	0.535
Government support	0.384	0.152	0.326	2.533	0.015
Competitor's pressure	0.414	0.160	0.413	2.593	0.013

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In Kulonprogo region, one factor influences collaboration intentions in handling used cell phones that is competitor pressure with a significance value of 0.013 and government support with significance of 0.015. Based on the results of multiple determination (R2) of 0.364 (see Table 12), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 36.4% while 63.6% is influenced by other factors outside the model.

Table 12. The R^2 result for the driving factors of collaboration intention for Kulonprogo region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.603	0.364	0.290	0.46400

4.3.4. Sleman Region

Respondents in Sleman Regency were 160. The average value of the respondents' answers about the five factors studied and the average value of collaboration intentions are presented in Table 13. It can be seen from the table that the value of collaboration intentions of informal actors in Sleman is 4,008. This value is the highest intention value compared to other regions. That means they really intend to collaborate.

Table 13. Results of descriptive analysis of respondents' answers in Sleman region

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	4.008	3.904	3.979	3.983	4.019	4.009

Before performing regression analysis, it is necessary to test the classical assumptions. The results of classical assumption tests for Sleman region is displayed in Table 14. The complete results of the classical assumption test are shown in Appendix II. The results of the classical assumption test for the Sleman region show that it is fulfilled for all types of tests.

Table 14. The summary of classical assumption test for Sleman Regency

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.851), management commitment (0.900), and financial benefits (0.800), government support (0.866) and competitor pressure (0.733)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.668	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.175), management commitment (1.111), and financial benefits (1.250), government support (1.155) and competitor pressure (1.364)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Sleman region is presented in Table 15. It can be seen that the government support is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Sleman region is 4.008.

Table 15. The regression result for Sleman region

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	2.408	0.406		5.938	0.000
Environmental attitude	0.029	0.048	0.049	0.603	0.547
Management commitment	0.142	0.069	0.163	2.066	0.040
Financial benefits	0.137	0.071	0.161	1.926	0.056
Government support	0.218	0.069	0.254	3.160	0.002
Competitor pressure	-0.125	0.085	-0.128	-1.466	0.145

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In the Sleman region, one factor influences collaboration intentions in handling used cell phones that is government support with a significance value of 0.002, followed by management commitment and financial benefit significance level of 0.040 and 0.056. Based on the results of multiple determination (R^2) of 0.141 (see Table 16), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 14.1% while 85.9% is influenced by other factors outside the model.

Table 16. The R^2 result for the driving factors of collaboration intention for Sleman region

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.375	0.141	0.113	0.34253

4.3.5. Yogyakarta Municipality

For the Yogyakarta city area, 90 informal actors were involved as respondents. Table 17 presents the average value of each factor and the value of collaboration intention, which was obtained from the answers of the respondents. It can be seen that the value of collaboration intention is 3.60. This means that the level of collaboration intention of informal actors in the city of Yogyakarta is neutral and close to agreeing to collaborate.

Table 17. Results of descriptive analysis of respondents' answers in Yogyakarta municipality

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.60	4,00	3.75	3.70	4.21	3.86

The summary of classical assumption test that was carried out before the regression analysis is shown in Table 18. The detailed results of the classical assumption test are shown in Appendix II. The results for all types of tests are fulfilled for the Yogyakarta city area, so it can be continued with regression analysis.

Table 18. The summary of classical assumption test for Yogyakarta Municipality

The result of normality test	The result of multicollinearity test	The result of heteroscedasticity test
Residual data plot spread around the diagonal line	Tolerance value for all variables is greater than 0.1, consisted of: environmental attitude (0.826), management commitment (0.640), and financial benefits (0.622), government support (0.757) and competitor pressure (0.686)	The points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern
Kolmogorov-Smirnov statistical test has a significance level greater than 0.05 namely 0.975	The Variance Inflation Factor (VIF) value for all variables is less than 10. consisted of: environmental attitude (1.211), management commitment (1.562), and financial benefits (1.608), government support (1.322) and competitor pressure (1.458)	

The regression result of driving factors on handling collaboration of used cell phones for second-hand market informal actors in the Yogyakarta municipality is presented in Table 19. It can be seen that the environmental attitude is the most significant driving factor compared to others. The calculation shows that the collaboration intention of informal actors in the Yogyakarta municipality is 3.60.

Table 19. The regression result for Yogyakarta municipality

Model	Unstandardized coefficients		Standardized coefficients		Sig.
	B	Std.	Beta	t	
Constant	0.866	0.618		1.403	0.164
Environmental attitude	0.396	0.118	0.343	3.372	0.001
Management commitment	-0.011	0.143	-0.009	-0.075	0.940
Financial benefit	0.292	0.121	0.282	2.408	0.081
Government support	0.014	0.106	0.014	0.135	0.839
Competitor pressure	0.010	0.115	0.010	0.089	0.929

Factors that affect collaboration intentions are seen if the significance value of α is smaller than (0.05). Then, these factors affect collaboration intentions in handling used cell phones. In the Yogyakarta municipality, one factor influences collaboration intentions in handling used cell phones, which is environmental attitude with a significance value of 0.002 and financial benefit has a moderate impact with a significance level of 0.081. Based on the results of multiple determination (R^2) of 0.274 (see Table 20), all predictors (independent variables) of collaboration can explain the variation of collaboration intention by 27.4% while 72.6% is influenced by other factors outside the model.

Table 20. The R^2 result for the driving factors of collaboration intention for Yogyakarta municipality

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.524	0.274	0.232	0.57013

The most influential factors on the intention to collaborate in each region are presented in Figure 10. From the figure, the position of one region compared to other region in the Special Region of Yogyakarta Province can be seen.

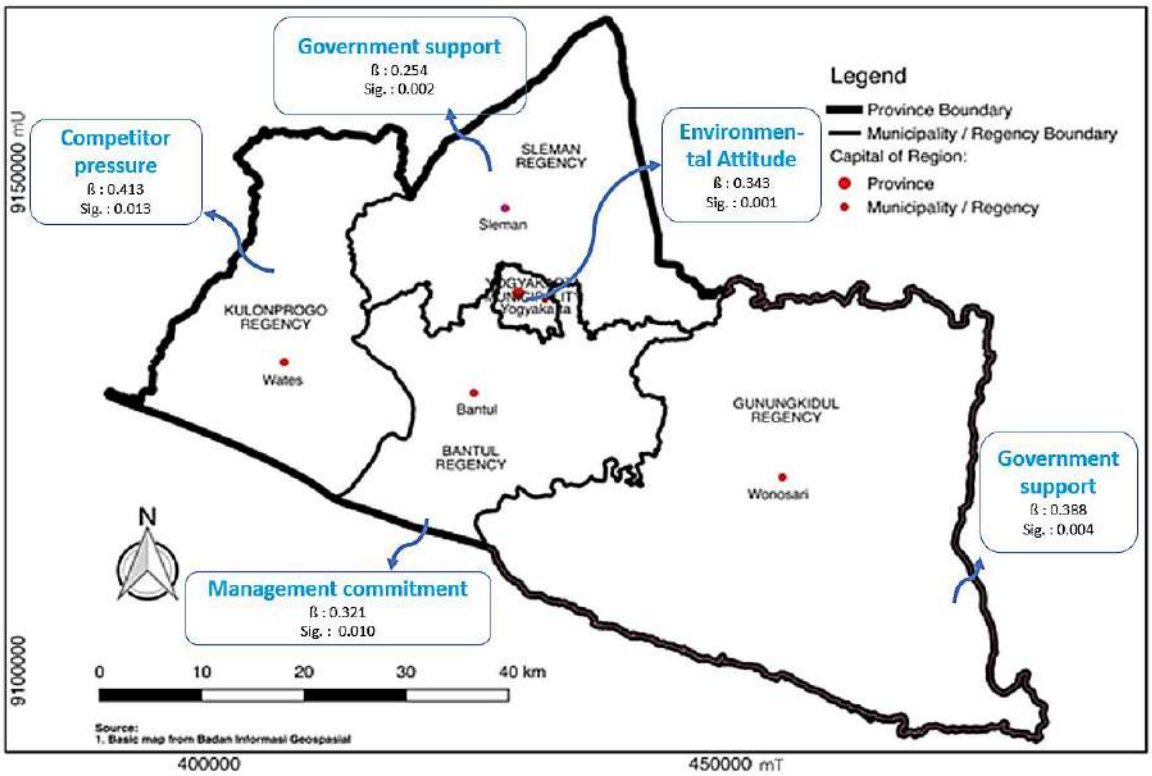


Figure 10. The most significant driving factors in each region in The Special Region of Yogyakarta Province, Indonesia

4.3.6. The Special Region of Yogyakarta Province

The results for the Special Region of Yogyakarta Province were obtained by processing the data from five regions, which included 424 respondents. The value of this collaboration intention for all actors was 3.744. It means that generally the respondents had the collaboration intention in handling used cell phones with formal actors. The values for each factor at the provincial level, which were obtained from the average values of the five regions, are shown in Table 21.

Table 21. Results of descriptive analysis of respondents' answers in Special Region of Yogyakarta Province

Factor	Collaboration intention	Environmental Attitude	Management commitment	Financial benefit	Government support	Competitor pressure
Average value	3.744	3.800	3.778	3.781	4.113	3.810

Next, to obtain the factors that influence the collaboration intentions of all actors at the province level, the Structural Equation Modelling (SEM) approach was used. Before the structural model was formed, the CFA (Confirmatory Factor Analysis) was conducted on exogenous variables. For endogenous variables, CFA is not necessary, because there is only one variable. CFA is intended to check whether all questionnaire items can be used. There is no general rule in determining the cut-off value for loading factor (Doll et al., 1995). This paper specified the loading factor as more than 0.5. In the exogenous CFA, the fit model was achieved with the p-value=0.665, $\chi 2$=210.536, GFI=0.960, AGFI=0.931, and RMSEA=0.000. Based on the value of the loading factor, there were two items deleted; the first item was the government support factor and the sixth item was competitor pressure.

The structural model result is shown in Table 22. The structural fit model was obtained with p-value=0.051, $\chi 2$=343.389, GFI=0.945, AGFI=0.915, and RMSEA=0.019. It shows that the most significant driving factors in the Special Region of Yogyakarta Province is financial benefit and government support with the influence values of 0.231 dan 0.150, respectively and the significance levels are 0.014 and 0.041, respectively.

Table 22. Structural model result

			Estimate	S.E.	C.R.	P	Label
Collaboration intention	←	Environmental attitude	-0.049	0.033	-1.491	0.136	par_20
Collaboration intention	←	Management commitment	0.148	0.141	1.050	0.294	par_21
Collaboration intention	←	Financial benefit	0.231	0.094	2.463	0.014	par_22
Collaboration intention	←	Government support	0.150	0.073	2.048	0.041	par_23
Collaboration intention	←	Competitor pressure	0.113	0.093	1.216	0.224	par_24

The coefficient of determination is 0.284, shown in Table 23, meaning that the five factors considered in this study describe collaboration intentions of 28.4%, and other factors form 71.6% of collaboration intentions.

Table 23. Squared Multiple Correlations

Variable	Estimate
Collaboration intention	0.284

4.4. Discussion

The results of each factor influencing collaboration intentions and their managerial implications are discussed as follows.

4.4.1. Environmental Attitude

The environmental attitude factor is the dominant factor influencing the intention to collaborate with informal actors in the Yogyakarta municipality and a moderate driving for informal actors in the Bantul Region. This factor is related to the attitude of informal actors towards the environment. It means that informal actors with high environmental attitudes will also show high collaboration intentions.

The result shows that the average environmental attitude of informal actors in both Yogyakarta municipality and Bantul Region is 4, which means that the actors have a high environmental attitude. Furthermore, in terms of the level of education, the education background of informal actors in Yogyakarta is high school with 93.3%, while in Bantul, it is 92%. According to Latif et al. (2012) [75], education level has a significant impact on pro-environmental intention and behaviour. As Wenshun et al. (2011) [76] demonstrated, the difference in the education level correlates with environmental behaviour. Yin et al. (2014) [77] stated that differences in the education level will result in differences in the desire to carry out environmentally friendly behaviour. Thus, the higher a person's education level, the higher his concern for the environment.

The results of this study are in line with Arshad et al. (2022) [40], where environmental concern significantly affects the ecological behaviour of employees in small and medium hotels in Pakistan. According to Chan et al. (2017) [39], environmental concern was positively related to ecological behaviour of international tourist hotel employees in Hong Kong. Likewise, He et al. (2018) [35] showed that employee and top management environmental awareness could affect

corporate environmental behaviour. In addition, Long et al. (2017) [42] demonstrated the positive and significant impact of the attitude toward environment factors on the environment. Still related to the influence of environmental attitude, the results of Okumus et al. (2019) [41] showed that the environmental concern of hotel employees in Turkey is the best predictor of ecological behaviour. Then, Testa et al. (2016) [36] showed that environmental awareness has a positive and significant effect on proactive environmental strategy. This also aligns with Zientara and Zamojska's (2018) [44] research which demonstrated that environmental values were positively related to organizational citizenship behaviour for the environment (OCBE).

The managerial implication of this study is that to maintain environmental attitudes, informal groups of actors should often hold discussions on environmental issues so that the understanding of the environment becomes even and equal among the actors. Through the Department of Trade and Cooperatives, the government can also provide information about the environment and its relation to used cell phones. In addition, the formal actors should conduct their social responsibilities, such as coaching informal actors to understand how to handle used cell phones so that they are safe for the environment and human beings.

4.4.2. Management Commitment

Management commitment in this study refers to the commitment of owners and employees in carrying out pro-environmental activities, in this case, collaborating with formal parties in managing used cell phones. The results showed that the management commitment factor strongly influences the intention to collaborate of informal actors in Bantul and Sleman regions. As for the Gunungkidul Region actors, this factor has a moderate influence. The value of management commitment in the three regions is 3.8; 3.979; and 3.4 for Bantul, Sleman, and Gunungkidul, respectively. It can be seen that the management commitment of informal actors in Bantul and Sleman Regions is higher than that of the informal actors in Gunungkidul, so it can be said that it is in line with the level of influence.

The strong influence of management commitment is in line with the research of Ates et al. (2012) [47], which showed that organizational commitment has a positive impact on the adoption of a proactive environmental strategy. It is also in line with the research of He et al. (2018) [35] which stated that one of the internal pressures in the form of commitment management affects corporate environmental behaviour. Research by Tariq et al. (2020) [43] found that a manager's environmental commitment strengthens the relationship between employees' environmental attitude and employees' ecological behavior. Yen and Yen (2012) [37] showed a positive and significant effect of top management commitment on environmental collaboration with suppliers and green purchasing activities. In addition, Yusliza et al. (2019) [46] found that top management commitment positively and significantly affects various green human resource management (GHRM) activities. Lee and Joo (2020) [52] show that top management is an essential factor which influences the level of collaboration between suppliers and customers in a green supply chain.

Meanwhile, Burki et al (2019) [51] found that top management commitment has a positive and significant effect on green process innovation, while its influence on green managerial innovation is moderate. In contrast, the results of Bhatia and Jakhar (2021) [50] are not in line with this study, where top management commitment (TMCO) has no significant effect on green product innovation (GPI).

With the results found in Bantul, Sleman, and Gunungkidul Region, the managerial implication that can be emphasized is that informal actors with a high level of management commitment need to be maintained, so that owners and employees of informal actors are always committed to carrying out activities that support environmental conservation. This commitment can be transmitted to other informal actors through meetings held in informal actors' associations in several areas so that owners and employees will understand the importance of being committed to environmental conservation. Local and central governments and formal actors can also contribute to fostering and enhancing this management commitment factor by providing additional information and education related to environmental problems and their handling.

4.4.3. Financial Benefit

The strong influence of financial benefits on the collaboration intention occurred in informal actors in the Sleman Region and studies at the provincial level. It means that informal actors will intend to collaborate in managing used cell phones if they feel there are economic benefits for them. The effect of moderate financial benefits was found in actors in the Yogyakarta municipality area.

The average value of the respondents' answers regarding the financial benefit factor was 3.983 for actors in Sleman Regency, and 3.781 for all provinces, which is the average value of financial benefits in all regions. The value of financial benefits to actors in the Yogyakarta municipality area is 3.7. The value of financial benefits that has a strong impact is more significant than those with a moderate influence.

The results of this study are in line with the results of Wang et al. (2018) [59] found that cost factor significantly influences internal and external green practices. In addition, the used cell phones are usually sold through the informal

sector for cashback [55]. For managerial insight, the financial benefits for informal actors are one of the most important reasons for running their business. However, the role of these informal actors has not received adequate attention. Therefore, the formal actors should support the informal ones to collaborate in handling used cell phones.

4.4.4. Government Support

There are three regions and a study at the provincial level. It was found that the government support factor had a strong influence on the intention to collaborate in Kulon Progo, Sleman, and the Gunungkidul Region. Meanwhile, there was no moderate influence of the government support factor for actors in any region. The value of the government support factor in each region is 4.438, 4.019; and 3.7 for Kulonprogo, Sleman, and Gunungkidul, respectively. Meanwhile, the value of government support for actors in all provinces is 4.113.

The government support questionnaire items show that the actors expect the government to support the implementation of pro-environment activities. It will encourage the actors to intend to collaborate in handling used cell phones with formal parties. Therefore, by looking at the value of government support from the Kulon Progo and Sleman regions, as well as at the provincial level, it seems that this value is very high. So, it can be interpreted that these actors expect the government to condition, provide information and technical assistance, popularize environmental management, and provide infrastructure for facilitating environmental activities.

The result of the study is that government support significantly encourages collaboration intentions, which is in line with studies by Lee (2008) in which government involvement plays an important role in the willingness of suppliers to participate in the green supply chain. Also, in the research of He et al. (2018) [35], government pressure influenced corporate environmental behaviour. Ye et al. (2013) [33] showed that government pressure has a significant effect on managers' attitudes to RL implementation. Next, Nguyen et al. (2018) [78] investigated that laws and regulations play the most significant impacts on recycling behavioural intention, compared to environmental awareness and attitude toward recycling, social pressure, the cost of recycling, and the inconvenience of recycling.

Furthermore, the management implication of this result is that the government is authorized to provide support for collaboration between formal and informal actors. This support can be in the form of rules, policies, facilities, resources, and information. So far, regulations related to e-waste in Indonesia can be found in [25]. However, these regulations, namely Government Regulation no. 101 of 2014, do not explicitly mention e-waste, but the waste in question is hazardous and toxic material waste in general. Thus, there are no specific regulations regarding e-waste management in Indonesia.

4.4.5. Competitor Pressure

The results show that the competitor pressure factor strongly influences informal actors in the Kulon Progo Region only and is also not seen as a moderate driving factor. It means the informal actors in Kulon Progo will be encouraged to do collaborative activities in handling used cell phones when their competitors carry out activities related to the environment.

The value of competitor pressure for informal actors in the Kulon Progo Region is 3.982, which means this value is relatively high and higher than the value of competitor pressure in all provinces. From the number of informal actors in Kulon Progo, there are fewer informal actors compared to the other regions, and they are not spread throughout the region, so there is a possibility that the level of competition between informal actors will be high.

The results of research related to competitor pressure are in line with the study of Weng et al. (2015) [65], which found that competitor pressure had a positive and significant effect on the company's green innovation activities. This is also in line with Ye et al. (2013) [33], where competitor pressure significantly affects managers' attitudes toward RL implementation. This finding is supported by previous research conducted by Riva and Gani (2020) [79], demonstrating that competitor pressure also positively affects the environmental performance of upscale hotels. Competitor initiatives and strategies guide the hotels to adopt green marketing practices. The managerial implication of this research is the need for the government and formal actors to provide counseling and training to upgrade the knowledge and skills of informal actors.

Generally, the results of this study can be considered by stakeholders who may be involved in handling e-waste, mainly used cell phones in Indonesia. For the government as part of the policymakers, these results can be used as input for setting rules, providing information, providing assistance, funding assistance, etc., for the safe management of used cell phones. For formal actors such as mobile phone manufacturers, the results of this study can be considered in redesigning and promoting a program to take back used cell phones from consumers as a form of corporate social responsibility. In the end, informal actors' handling of used cell phones will not harm health and the environment but still provides economic benefits for informal actors.

Taking into account the results of the coefficient determination in each region and the study at the provincial level, which is below 50%, it is still necessary to explore other factors that can motivate players in the second-hand cell phone market to collaborate in cell phone management. Furthermore, it is also essential to study the factors that can hinder

informal actors from collaborating with formal actors in handling used cell phones. Understanding the factors driving and inhibiting collaboration intentions among informal actors will make it easier to design policy-making and appropriate forms of collaboration.

5. Conclusions

Based on the analysis of collaboration intentions among informal actors, it was found that:

- Informal actors intend to collaborate with formal actors in managing used cell phones, with an average intention value of 3.744.
- The factors that have the most significant effect on collaboration intentions, including the environmental attitude, are the most substantial driving factor for informal actors in Yogyakarta Municipality, with a value of 0.343 and a significance level of 0.001. The management commitment has a strong impact in two areas, namely Bantul with a value of 0.321 and a significance level of 0.010, and Sleman Region with a value of 0.163 and a significance level of 0.040. The financial benefit strongly influenced the second-hand market players in the Sleman Region of 0.161 with a significance value of 0.056, while the actors in the Yogyakarta municipality were 0.282 with a significance value of 0.081. Furthermore, the government support strongly encouraged collaboration among informal actors in Sleman, Kulon Progo, and the Gunungkidul Region with influence values and significance levels of, respectively, 0.254 and 0.002; 0.326 and 0.015; and 0.388 and 0.004. The competitor pressure only appears as a positive and significant encouraging factor for informal actors in the Kulon Progo Region, with a value of 0.413 and a significance level of 0.013.
- The structural equation modelling as the study for the provincial level showed that the two main factors that encourage all informal actors are financial benefits of 0.231 with a significance level of 0.014, while government support is 0.150 with a significance level of 0.041.
- There is no form of collaboration between informal and formal actors in Indonesia in handling used cell phones. The results of this study can be used as a consideration for policymakers to regulate e-waste management, which mainly used cell phones.
- Formal actors can also use the results of this study to promote the take-back program of used cell phones as a form of waste management through corporate social responsibility and collaboration with informal actors.

6. Declarations

6.1. Author Contributions

Conceptualization, S.M.B. and I.Y.P.; methodology, S.M.B.; formal analysis, S.M.B; data curation, S.M.B.; writing—original draft preparation, S.M.B. and H.M.A; writing—review and editing, S.M.B., I.Y.P., and H.M.A.; visualization, H.M.A.; supervision, I.Y.P; funding acquisition, S.M.B. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

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6.5. Conflicts of Interest

The authors declare no conflict of interest.

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Appendix I

The results of the reliability and validity test of the research questionnaire.

Table A1-1. Reliability and validity test results

		Yogyakarta municipality[1]	Sleman Region[2]	Bantul Region[1]	Gunungkidul Region[1]	Kulonprogo Region[1]
	Collaboration intention	**Cronbach α 0.931**	**Cronbach α 0.852**	**Cronbach α b 0.852**	**Cronbach α 0.941**	**Cronbach α 0.851**
		Correlated item –Total Correlation				
1	You intend to take part in the collaborative activity	0.838	0.379	0.808	0.788	0.730
2	You will try to participate in the collaborative activity	0.871	0.489	0.571	0.825	0.662
3	You plan to take part in the collaborative activity	0.906	0.569	0.678	0.880	0.778
4	You are willing to participate in the collaborative activity	0.922	0.434	0.813	0.916	0.676
5	You wish to participate in the collaborative activity	0.913	0.471	0.660	0.789	0.444
	Environmental Attitude	**Cronbach α 0.721**	**Cronbach α 0.711**	**Cronbach α 0.711**	**Cronbach α 0.797**	**Cronbach α 0.782**
		Correlated item –Total Correlation				
1	Environmental issues need to be a priority in business management.	0.598	0.466	0.408	0.591	0.561
2	Environmentally friendly behavior by the company can provide significant cost reductions.	0.7	0.584	0.375	0.431	0.615
3	The company's environmentally friendly behavior can help companies enter new markets.	0.876	0.401	0.559	0.711	0.459
4	Environmentally friendly behavior carried out by the company can lead the company to become a leader in the market.	0.75	0.683	0.572	0.601	0.822
5	Environmentally friendly behavior by the company can improve the company's image.	0.624	0.348	0.419	0.577	0.389
	Commitment Management	**Cronbach α 0.844**	**Cronbach α 0.741**	**Cronbach α 0.741**	**Cronbach α 0.905**	**Cronbach α 0.784**
		Correlated item –Total Correlation				
1	All members of the organization/company (owner, manager, and employee) are committed to environmental management and policies.	0.8	0.349	0.408	0.723	0.483
2	Organizational/company culture supports environmental conservation activities	0.687	0.654	0.568	0.895	0.697
3	The organization/company directs and facilitates the implementation of environmental conservation activities	0.867	0.548	0.589	0.790	0.457
4	There are ongoing efforts to support environmental conservation activities	0.802	0.751	0.671	0.807	0.707
5	There is environmental related training for employees	0.796	0.507	0.312	0.611	0.425
	Financial Benefits	**Cronbach α 0.899**	**Cronbach α 0.710**	**Cronbach α 0.710**	**Cronbach α 0.793**	**Cronbach α 0.892**
		Correlated item –Total Correlation				
1	Potential for financial assistance	0.898	0.664	0.466	0.463	0.774
2	Gaining economic benefits in the form of reducing costs while helping to protect the environment	0.903	0.608	0.308	0.406	0.806
3	Be more competitive by promoting achievements in the environmental field	0.791	0.516	0.596	0.683	0.578
4	Can survive in the market in the long term	0.76	0.343	0.542	0.589	0.757
5	Potential to get financial and technical management guidance	0.888	0.451	0.471	0.744	0.776
	Government Support	**Cronbach α 0.959**	**Cronbach α 0.773**	**Cronbach α 0.773**	**Cronbach α 0.941**	**Cronbach α 0.852**
		Correlated item –Total Correlation				
1	The government needs to coordinate environmental conservation initiatives	0.866	0.682	0.728	0.826	0.696
2	Government needs to increase funding for environmental conservation initiatives	0.928	0.616	0.316	0.903	0.707
3	The government needs to provide information and technical assistance to small and medium-sized enterprises related to environmental conservation.	0.948	0.707	0.503	0.837	0.469

4	The government needs to popularize knowledge about environmental management.	0.953	0.509	0.644	0.828	0.794
5	The government needs to build infrastructure to facilitate environmental conservation initiatives	0.944	0.782	0.613	0.802	0.667
	Competition Pressure	**Cronbach α 0.944**	**Cronbach α 0.808**	**Cronbach α 0.808**	**Cronbach α 0.909**	**Cronbach α 0.887**
		Correlated item –Total Correlation				
1	Competitors comply with environmental regulations	0.883	0.728	0.671	0.767	0.716
2	Competitors carry out environmental conservation activities	0.926	0.769	0.576	0.804	0.740
3	Competitors are committed to various stakeholders in environmental conservation activities	0.842	0.764	0.626	0.716	0.768
4	Competitors collaborate with professionals to support environmental conservation	0.907	0.564	0.520	0.694	0.697
5	Competitors set environmental standards for their products and operations	0.798	0.621	0.357	0.787	0.776
6	Competitors get new business opportunities when carrying out environmental conservation	0.812	0.574	0.331	0.637	0.474
7	Competitors promote successful implementation of environmental conservation	0.929	0.578	0.742	0.673	0.613

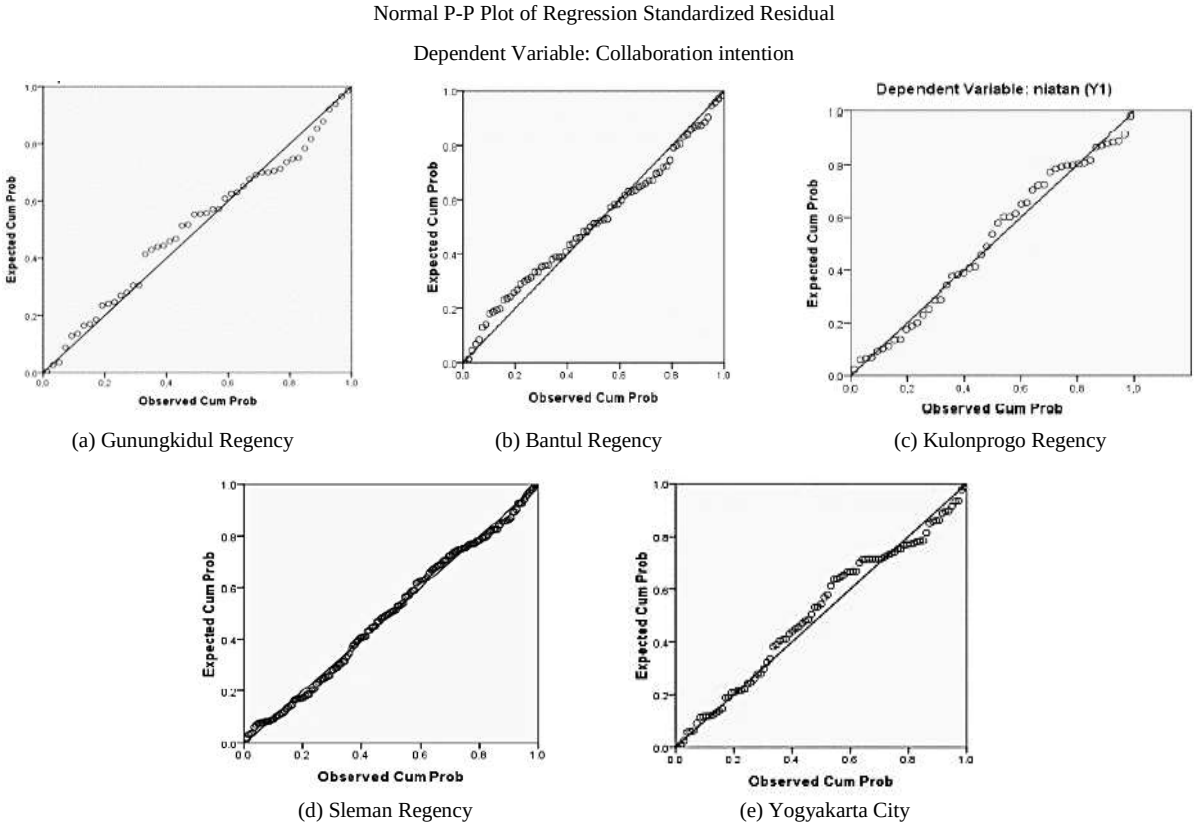
Note: 1. Validity test for the area of Yogyakarta City, Bantul Regency, Gunungkidul Regency, and Kulonprogo Regency using answers from 30 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 30-2=28. Based on the level of confidence and degrees of freedom, the R table value is 0.3061, so the questionnaire item is said to be valid if the calculated r value is greater than r table and is positive. 2. The validity test for the Sleman Regency area uses answers from 40 respondents. The validity test uses a 95% confidence level (α=5%) with degrees of freedom (df)=n-2, which means 40-2=38. Based on the level of confidence and degrees of freedom, the R table value is 0.2638, so the questionnaire item is said to be valid if the calculated r value is more than r table and is positive.

Appendix II

Classical assumption test results.

A2-1. Normality Test Results

The results of the normality test are displayed in the form of a plot of residual data, which is shown in Figure A2-1 and the results of the Kolmogorov-Smirnov test in Table A2-1. From Figure A2-1 it can be seen that the data plot is spread around the diagonal line, which means the model fulfill the assumption of normality. Moreover, from Table A2-1 it is shown that the value of the Kolmogorov-Smirnov statistical test in the five research areas has a significance level greater than 0.05, so that the regression model in all regions meets the normality test.



(a) Gunungkidul Regency (b) Bantul Regency (c) Kulonprogo Regency

(d) Sleman Regency (e) Yogyakarta City

Figure A2-1. Result of residual data plot from each region

Table A2-1. Result of Kolmogorov-Smirnov test

One-Sample Kolmogorov-Smirnov Test		*One-Sample Kolmogorov-Smirnov Test*	
	Unstandardized Residual		Unstandardized Residual
Kolmogorov-Smirnov Z	0.631	Kolmogorov-Smirnov Z	0.678
Asymp. Sig. (2-tailed)	0.820	Asymp. Sig. (2-tailed)	0.748
a. Test distribution is Normal b. Calculate from data		a. Test distribution is Normal b. Calculate from data	
(a) Gunungkidul Regency		**(b) Bantul Regency**	
One-Sample Kolmogorov-Smirnov Test		*One-Sample Kolmogorov-Smirnov Test*	
	Unstandardized Residual		Unstandardized Residual
Kolmogorov-Smirnov Z	0.636	Kolmogorov-Smirnov Z	0.668
Asymp. Sig. (2-tailed)	0.813	Asymp. Sig. (2-tailed)	0.764
a. Test distribution is Normal b. Calculate from data		a. Test distribution is Normal b. Calculate from data	
(c) Kulonprogo Regency		**(d) Sleman Regency**	

One-Sample Kolmogorov-Smirnov Test	
	Unstandardized Residual
Kolmogorov-Smirnov Z	0.975
Asymp. Sig. (2-tailed)	0.298
a. Test distribution is Normal b. Calculate from data	
(e) Yogyakarta City	

A2-2. Multicollinearity Test Results

The results of the multicollinearity test are presented in Table A2-2. From the figure, it can be seen that the tolerance value for all variables is greater than 0.1 and the Variance Inflation Factor (VIF) value for all variables is less than 10, in all research areas. Thus, it can be concluded that there is no multicollinearity between the independent variables.

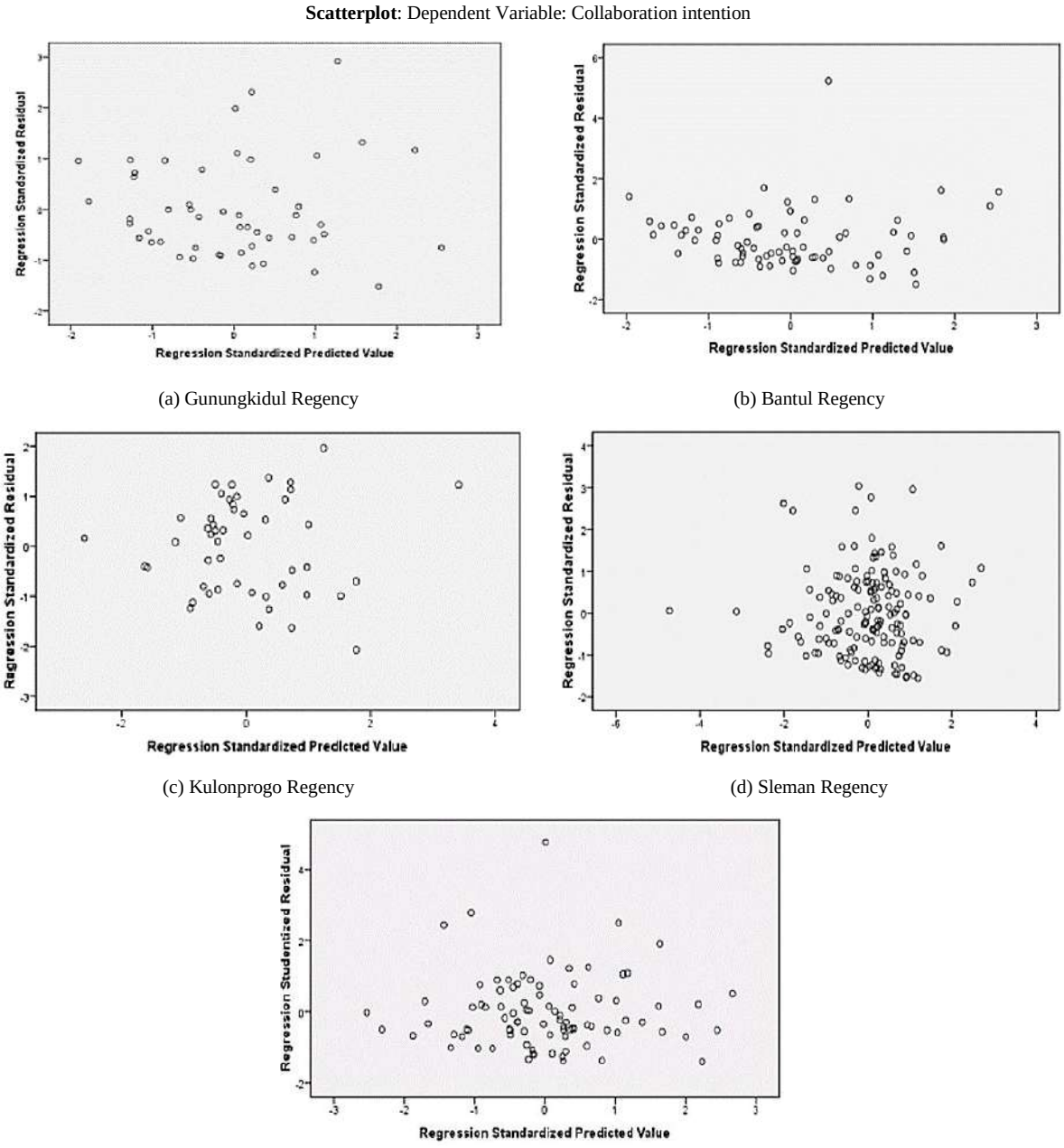
Table A2-2. Result of multicollinearity test

Variable	**Collinearity Statistics**		**Variable**	**Collinearity Statistics**	
	Tolerance	**VIF**		**Tolerance**	**VIF**
Environmental attitude	0.766	1.306	Environmental attitude	0.776	1.289
Management commitment	0.530	1.887	Management commitment	0.727	1.375
Financial benefit	0.368	2.714	Financial benefit	0.564	1.772
Government support	0.740	1.383	Government support	0.723	1.383
Competitor pressure	0.337	2.967	Competitor pressure	0.413	2.442
(a) Gunungkidul Regency			**(b) Bantul Regency**		
Variable	**Collinearity Statistics**		**Variable**	**Collinearity Statistics**	
	Tolerance	**VIF**		**Tolerance**	**VIF**
Environmental attitude	0.700	1.428	Environmental attitude	0.851	1.175
Management commitment	0.588	1.699	Management commitment	0.900	1.111
Financial benefit	0.694	1.442	Financial benefit	0.800	1.250
Government support	0.893	1.119	Government support	0.866	1.155
Competitor pressure	0.583	1.717	Competitor pressure	0.733	1.364
(c) Kulonprogo Regency			**(d) Sleman Regency**		

Variable	**Collinearity Statistics**	
	Tolerance	**VIF**
Environmental attitude	0.826	1.211
Management commitment	0.640	1.562
Financial benefit	0.622	1.608
Government support	0.757	1.322
Competitor pressure	0.686	1.458
(e) Yogyakarta City		

A2-3. Heteroscedasticity Test Results

In this study, the heteroscedasticity test was carried out using the Park test. The results of the heteroscedasticity test are displayed in the form of a scatterplot which is presented in Figure A2-2. From the figure, it can be seen that the points are scattered randomly above and below the number 0 (zero) on the Y axis and does not form a certain pattern. This means that there is no heteroscedasticity in the regression model.



(a) Gunungkidul Regency

(b) Bantul Regency

(c) Kulonprogo Regency

(d) Sleman Regency

(e) Yogyakarta City

Figure A2-2. Result of heteroscedasticity test

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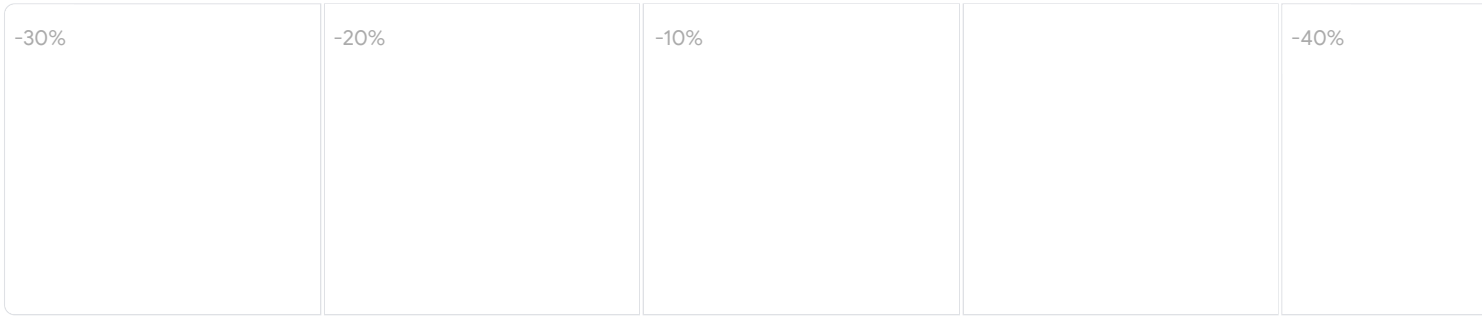

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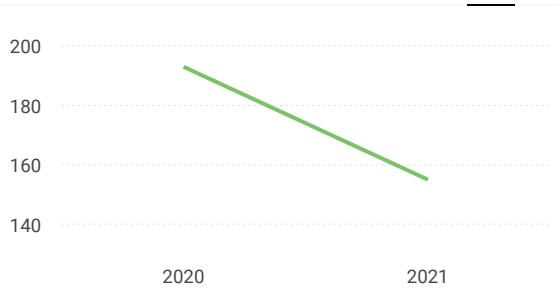

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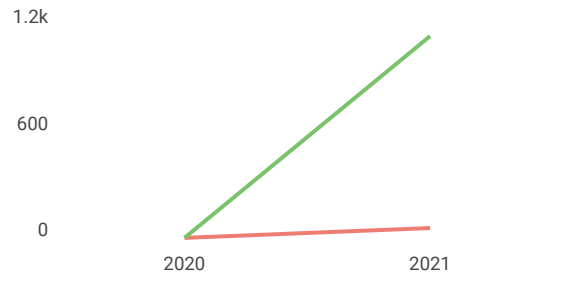

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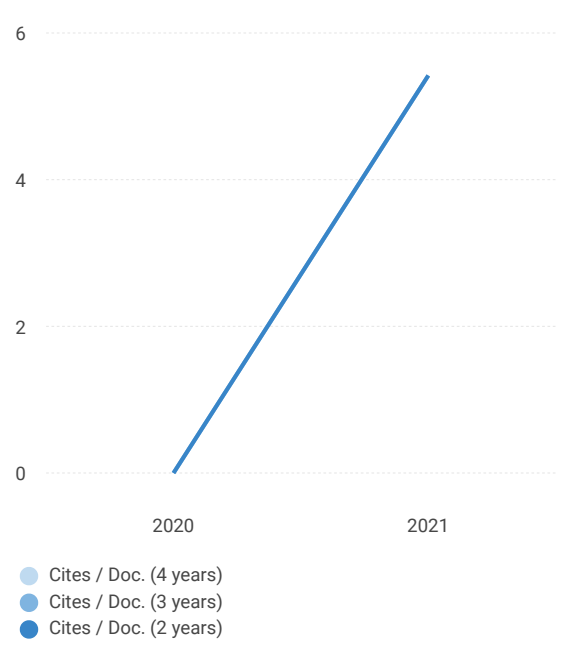

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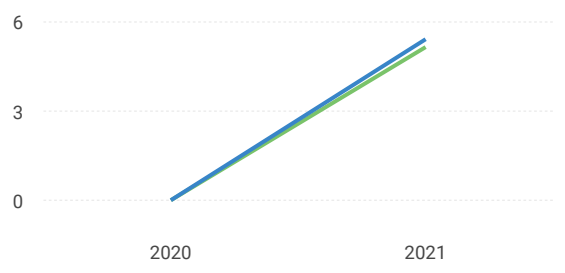

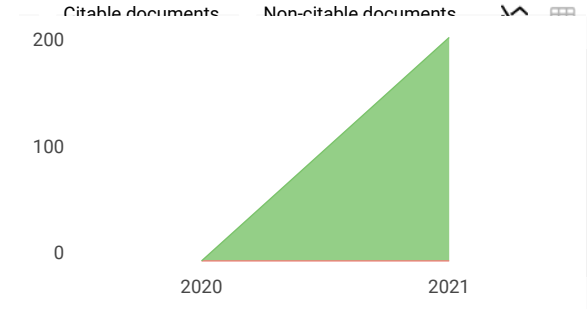

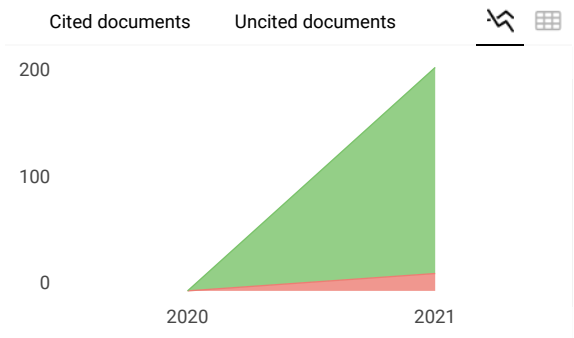

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