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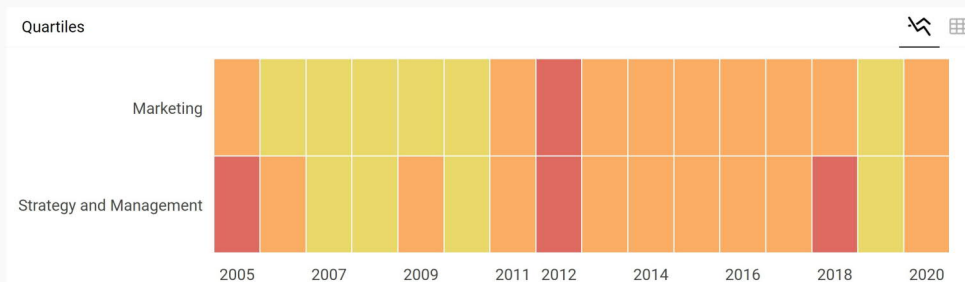
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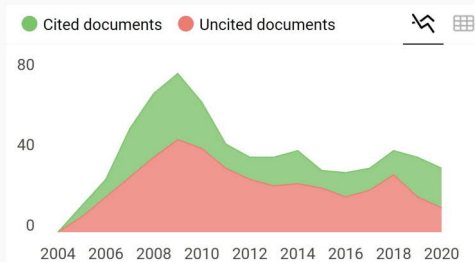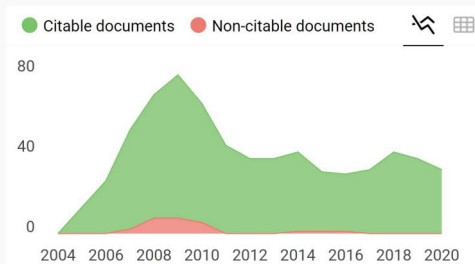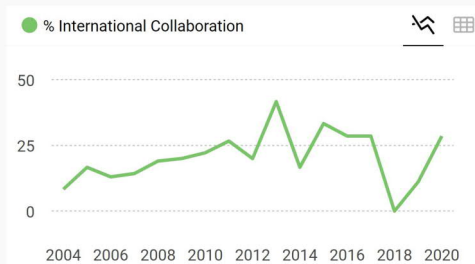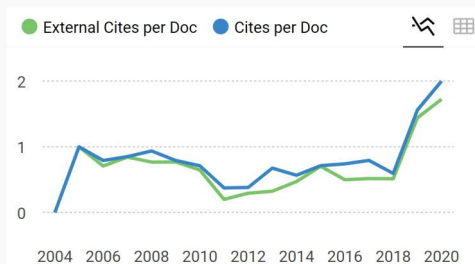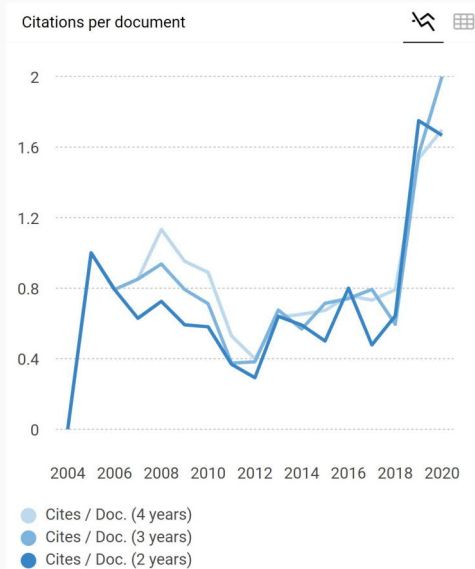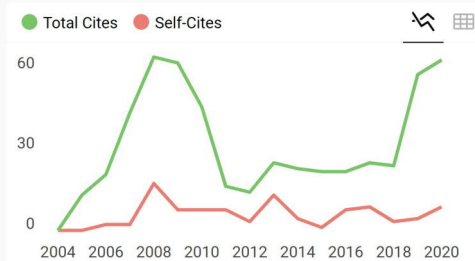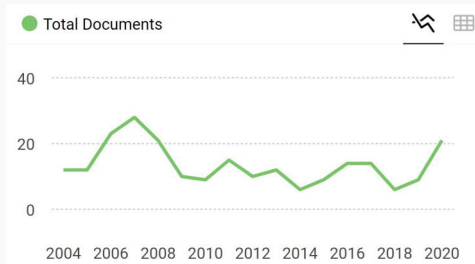
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Drivers and barriers of consumer purchase intention of remanufactured mobile phones: a study on Indonesian consumers

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Abstract: Remanufacturing is widely practiced because it reduces landfill, saves energy, and conserves natural resources. Little effort is given to exploring the acceptance of remanufactured products, especially the short life-cycle ones. Indonesia, the fourth-largest mobile phone users, needs to tackle the vast WEEE deriving from obsolete mobile phones. This study investigates drivers and barriers of consumer purchase intention for remanufactured mobile phones. Thirteen respondents were interviewed, representing different age groups, genders, and social classes. The key drivers are the affordable price, upgraded specification, and product warranty, while the regulatory concern, trend concern, and obsolescence concern are the main barriers. Perceived quality and quality assurance can be both drivers and barriers, depending on the level. This study recommends remanufacturers to focus on providing upgraded specification at an affordable price and providing information about the remanufacturing process. This study also argues the urgency for the government to enforce rigorous regulation against counterfeit products.

Keywords: remanufacturing; mobile phone; short life-cycle product; case study; Indonesia.

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1 Introduction

Remanufacturing develops into a very big business in the USA and some European countries (Gaur et al., 2015; Parker et al., 2015). However, it is still in its embryonic stages in many emerging and developing countries. Several studies are conducted to identify driving factors and barriers of remanufacturing business. Environmental consciousness level, individual values, and socio-cultural norms are identified to be the major drivers of consumer purchase intentions for remanufactured products (Gaur et al., 2015). van Weelden et al. (2016) identify misconception of remanufactured products, lack of awareness, lack of availability, and lack of the thrill of newness to be the barriers for remanufactured mobile phones to be considered for purchase consideration. Mobile phone experiences end-of-use after 18 months or less because of functional and psychological obsolescence (Franke et al., 2006; Guide and Van Wassenhove, 2009). Indonesia has the fourth-largest mobile phone users in the world (Central Intelligence Agency, 2016). While studies indicate that the biggest opportunity for remanufacturing is for high added-value, durable, and technologically stable products (Chapman et al., 2010; Lund, 1984), the rapid generation of WEEE caused by the usage of mobile phone presents a challenging problem. While Indonesia is not known as an environmentally-conscious society, it is critical to investigate the prospect of mobile

phone remanufacturing business in Indonesia. This study aims to investigate the drivers and barriers of consumer purchase intention of remanufactured mobile phones in Indonesia. The rest of the paper is organised as follows. Literature review on the closed-loop supply chain (CLSC), remanufacturing of mobile phones, and consumer acceptance of remanufactured products is provided in Section 2. Section 3 describes the research methodology for this research. Section 4 provides results and discussion of key findings. Finally, Section 5 presents conclusions, limitations, and recommendations for future research.

2   Literature review

2.1   Closed-loop supply chain

The increased use of mobile phones creates a vast production of WEEE. At the end-of-use, a mobile phone can go through an open-loop supply chain or CLSC. Thus, in the open-loop supply chain, mobile phones can be either landfilled or incinerated. In a CLSC, mobile phones are taken back and reused as products, components, parts, and materials. Lund (1984) classifies efforts to retain the value of products into five categories, as illustrated in Figure 1. Throughout this paper, the following definitions provided by Ijomah et al. (1999) and Lund (1984) are used.

- *Repair:* a process of bringing a damaged product back to a functional condition by the same user.

- *Reuse:* a process of using a functional product by another user after the product no longer satisfies the first user.

- *Refurbishing/reconditioning:* a process of restoring a product to a satisfactory state that is not necessarily the same as the new product.

- *Remanufacturing:* a process of restoring a product to its original specification or better and provided with a warranty that is comparable with the warranty of the new product.

- *Recycling:* a process of recovering material value by transforming the product into a material with the same quality or lower.

CLSC gains its popularity after governments in developed countries enforce take-back regulation because of growing concern over some environmental issues. Coupled with the escalation of customers' environmental awareness, this regulation effectively drives manufacturers to reduce the amount of waste. In addition to the take-back program, manufacturers acquire end-of-use or end-of-life products through several other channels such as off-lease or off-rent return, broken product return, and buy-back program (Thierry et al., 1995).

Indonesia is a developing country that needs to solve many environmental issues. Most of the Indonesian residents do not have enough awareness of environmental problems such as global warming, ozone layer depletion, water pollution, and acid rain (Sudarmadi et al., 2001). Even though reconditioning and remanufacturing businesses become popular among small and medium-sized enterprises (SMEs) in Indonesia (Fatimah et al., 2013), their main motivation is merely short-term profit. Kamigaki et al.

(2017) report that companies are more interested to do reconditioning business compared to remanufacturing, although remanufacturing business is more profitable and more environmentally friendly. The value of remanufactured photocopiers is two and a half times more than the refurbished ones. The reason behind this situation is that reconditioning business offer faster turnover than remanufacturing business.

Figure 1 The five categories of CLSC
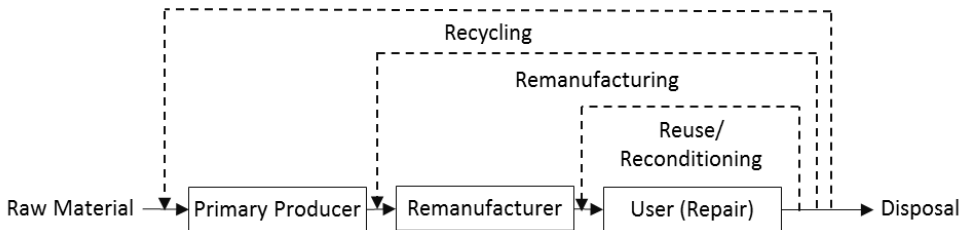
2.2 *Remanufacturing of mobile phones*

Remanufacturing gets a lot of attention from researchers and academia because of its unique characteristics. Reuse is limited to a functional phone, while refurbishing or reconditioning can only be done on handsets that need little processing such as replacement of worn or damaged parts, resurfacing and repainting (Rathore et al., 2011). The simple operations make refurbishing business attractive for resellers, not OEMs (Geyer and Blass, 2010). Therefore, refurbished mobile phones do not usually come with a warranty. In addition, refurbished mobile phones have diverse qualities because of the nature of the operations and refurbishing operators. These conditions limit the distribution of refurbished mobile phones. On the other hand, remanufacturing is performed by OEMs and independent remanufacturers (Parker et al., 2015). The fact that remanufactured products come with a warranty and have gone through a stricter process causes remanufactured products can be distributed in a wider market, even in the overseas market (Chapman et al., 2010). In developing and emerging countries where remanufacturing is still in the embryonic stage, confusion between remanufacturing and refurbishing often occurs. Gaur et al. (2015) identify two characteristics that distinguish remanufacturing from refurbishing. First, the disassembly level of remanufacturing is at the component level, while it is at the module level for refurbishing. Second, remanufactured mobile phones come with a warranty, which refurbished ones do not have.

2.3 *Consumer acceptance of remanufactured products*

Several studies have explored the consumer acceptance of remanufactured products. Two indicators that are often used to indicate consumer acceptance are willingness-to-pay (WTP) and purchase intention. Some authors conduct studies on the WTP for remanufactured products. Guide and Li (2010) identify that WTP for remanufactured products is less than that for the new products both for consumer and commercial products. Atasu et al. (2010) argue that WTP for remanufactured consumer products are 15% lower than that for the new products, while the WTP for

remanufactured commercial products is only 10% less than that for the new ones. However, Michaud and Llerena (2011) find that the lower WTP for remanufactured products only happens when the consumers are not informed about the environmental benefits of the remanufactured products. Once they are informed about the environmental benefit, the consumers are willing to pay the same price as that for the new products. Atasu et al. (2010) classify the market into three consumer groups, i.e., newness-conscious consumers, functionality-oriented consumers, and green consumers. Consumers that are newness-conscious will not consider remanufactured products unless they are offered at a very low price compared to the new ones. Functionality-oriented consumers will choose remanufactured products if they are offered at a slightly lower price. This consumer group perceives the value of remanufactured products is very similar to that of the new ones. On the other hand, green consumers will prefer remanufactured products even though the price is more expensive because they are more environmentally-friendly (Atasu et al., 2010). Yet, Michaud and Llerena (2011) do not identify the existence of consumers who are willing to pay a premium for environmentally-friendly products.

Purchase intention for remanufactured products has been studied by some researchers. Wang et al. (2013), conducting empirical studies on remanufactured automobile parts, identify that purchase intention is directly influenced by purchase attitude, perceived behavioural control, subjective norm, and product knowledge. They find an anomaly in the negative impact of product knowledge on purchase intention. In addition, they indicate that purchase intention for remanufactured automobile parts is also influenced indirectly by perceived benefit, perceived risk, and product knowledge. Jimenez-Parra et al. (2014) conduct a study to investigate factors that affect purchase intention for remanufactured laptops. They identify that purchase attitude, subjective norm, price, environmental factors, design, and brand reputation are positively influenced by the purchase intention for remanufactured laptops. Gaur et al. (2015) identify six motives that influence the purchase intention for remanufactured products, i.e., environmental consciousness, individual values and attitudes, utilitarian buying behaviour, hedonistic buying behaviour, nature of the product, and socio-cultural norms. Wang and Hazen (2016) argue the importance of product knowledge that consists of quality knowledge, cost knowledge, and green knowledge on the purchase intention for remanufactured products. They identify that both perceived value and perceived risk are predominantly influenced by quality knowledge, followed by cost knowledge, while green knowledge only contributes to improving the perceived value of the products. The trade-off between perceived value and perceived risk decides how much intention the consumer has to purchase the remanufactured product. Sharma et al. (2016) conduct a survey to identify drivers and roadblocks for remanufacturing business. They find competitive pricing, the best way of product recovery, and positive societal concerned image to be the main financial, environmental, and social driver, respectively. Quality concern due to lack of standardisation, awareness, and availability becomes the key barrier for remanufacturing business in India (Sharma et al., 2016). A recent survey conducted by these authors on mobile phone consumers indicates that purchase intention is directly influenced by product knowledge and purchase attitude (Wahjudi et al., 2018). Purchase intention is indirectly influenced by perceived benefit and perceived risk through purchase attitude (Wahjudi et al., 2018).

3   Research methodology

This study used a case study method to explore the drivers and barriers of consumer purchase intention for remanufactured mobile phones. A case study protocol was developed to guide the interview. The protocol consisted of questions about demographic information of respondents, the familiarity with remanufactured products, personal preference on mobile phones, perceived benefits, perceived risks, and their purchase intention for remanufactured mobile phones.

Respondents interviewed in this study were selected using the purposeful sampling technique (Coyne, 1997). Demographic factors such as social class, age, and gender were suspected to affect the purchase intention because of the very people-related characteristics of this study (Sandelowski, 1995). Therefore, it was desired to have several samples from every social class, age, and gender group. The diversity of background was designed to provide a more diverse perspective in this case study. Thirteen respondents were interviewed to represent different genders, age groups, and social classes. It was realised that it would be more ideal to conduct interviews in different locations in Indonesia. However, instead of conducting the interviews in a different location in Indonesia, we interviewed respondents from different urban and rural areas in Indonesia that lived in Surabaya. Each interview took about 30 to 40 minutes. The resulted audio record was transcribed and coded. In this study, we cannot interview actual remanufactured mobile phone buyers because there are no remanufactured mobile phones available in Indonesia. To resolve this problem, the respondents were given a short description of what remanufactured mobile phone is, especially to those who never hear about remanufactured products. Table 1 provides the demographics of respondents.

Table 1   Demographics of respondents

Respondent	Age	Gender	Social class
C1	≤22 years	Male	*Middle*
C2	≤22 years	Female	*Middle*
C3	≤22 years	Male	*Upper middle*
C4	≤22 years	Female	*Upper middle*
C5	>22 years	Female	*Middle*
C6	>22 years	Male	*Lower middle*
C7	>22 years	Male	*Upper middle*
C8	>22 years	Male	*Middle*
C9	>22 years	Male	*Middle*
C10	≤22 years	Male	*Lower middle*
C11	≤22 years	Female	*Lower middle*
C12	>22 years	Female	*Poor*
C13	>22 years	Female	*Upper middle*

4   Results and discussion

The transcribed record was coded by one research team member using NVivo 10 software to identify recurring themes. To improve the reliability of the study the resulted codes were presented to and discussed with other research team members in the research group meeting. Eighteen codes were discovered and classified into four driving factors and three inhibiting factors. The driving factors with their supporting codes and respective quotations are given in Table 2. Table 3 gives the list of inhibiting factors with their supporting codes and respective quotations.

4.1   Drivers of purchase intention of remanufactured mobile phones

Four driving factors are identified in this study, i.e., environmental benefit, financial benefit, quality, benefit, and social benefit. Nearly every respondent mentions affordable prices as the main driver to consider purchasing remanufactured mobile phones. In addition to driving the purchase intention of remanufactured mobile phones, the affordable price also provides stronger market competition to control the ever-increasing price of new mobile phones. Quality benefit has four coded themes, i.e., upgraded specification, perceived quality, quality assurance, and product warranty. Together with affordable price, the upgradeable specification is the main appeal for purchasing remanufactured mobile phones. Positive perceived quality and quality assurance improve the purchase intention, while product warranty can be considered as a basic factor as in the Kano model (Kano et al., 1984). The existence of a product warranty is important to ensure service reliability amid a lack of confidence in the product quality.

Mobile phone remanufacturing provides a social benefit because it allows consumers from the middle to lower middle classes to buy top brand mobile phones.

> "It creates a chance for the middle to lower middle classes to buy the top brand mobile phones."

These consumer segment usually looks for cheap mobile phones that have good features and performance. In addition, most respondents indicate that remanufactured mobile phones are suitable for Indonesia that has a vast population and the majority of its population is from the middle and lower-middle classes. All respondents confirm the environmental benefit that comes from the reduction of e-waste and conservation of natural resources.

4.2   Barriers of purchase intention of remanufactured mobile phones

Financial risk, quality risk, and social risk are the three risks identified in this study. Financial risk comes from obsolescence concern and regulatory concern. Some respondents argue that remanufactured mobile phones may become obsolete quickly. This situation will cause scarcity of replacement parts when their remanufactured mobile phones need repair and replacement of parts. The other concern deals with respect to poor legal consumer protection. In the absence of adequate legal protection, consumers may receive used mobile phones instead of remanufactured ones, especially when they purchase from online stores and unauthorised retailers.

Table 2   List of drivers with their respective codes and quotations

Drivers	Codes	Quotation from interviews
Environmental benefit	Eco-consciousness	Remanufacturing reduces electronic waste.
		There are uniqueness and pride in using remanufactured products.
	Natural resources concern	Remanufacturing does not exploit the nature excessively.
		It conserves the environment sufficiently.
		It supports the promotion of green products.
Financial benefit	Affordable price	The price is more affordable.
		The price is very low.
		We can have it at a cheap price, but it has the features of new phones.
		The price is affordable, but the performance is almost the same as the new ones.
	Market competition	It's good for business competition because mobile phones' price is increasing.
Quality benefit	Upgraded specification	The specification can be upgraded; performance is better than the used ones.
		The specification is the most important.
		It has good features.
		It has features of new phones at a cheap price.
	Perceived quality	The quality is still good, not much different from the new one; the outside case is flawless.
		In terms of durability, it isn't much different from the new ones.
		Other people cannot distinguish remanufactured [mobile phones from the new ones].
	Quality assurance	The product is repaired by a professional, so it can be trusted.
		There is a quality inspection, so it is more trusted.
		The remanufacturing is done by the factory and it comes with a warranty, so it is trusted.
		It has been officially fixed so it's should be reliable.
	Product warranty	It is reliable because it comes with a warranty.
Social benefit	Social expectation	Very accommodating and suitable for Indonesian people who are looking for cheap mobile phones that have good features and performance.
		In Indonesia people are prioritizing prices rather than trends.
		It is suitable for consumptive people who often change mobile phones.
		It creates a chance for the middle to lower middle classes to buy the top brand mobile phones.
		It is suitable for Indonesia because it has many middle to lower-middle-class people.

Quality risk consists of quality assurance, perceived quality, and lack of OEM's support. Several respondents expressed their doubts about the quality assurance of remanufactured mobile phones. This is reinforced by the lack of support from mobile phones' producers. Respondents are also afraid that remanufactured mobile phones do not have the promised quality, which is as good as new products. This situation may be caused by the fact that remanufacturing is still not widely known to many Indonesians.

Table 3   List of barriers with their respective codes and quotations

Factors	Codes	Quotation from interviews
Financial risk	Obsolescence concern	Replacement parts are unavailable because of obsolescence.
	Regulatory concern	Fear of buying used mobile phones, not the remanufactured ones.
		I do not know the components inside, good or not, original or counterfeit.
		Online stores may sell counterfeit products.
		I am afraid to buy it from an unauthorized retailer.
Quality risk	Quality assurance	I am not convinced of the quality. Perhaps used mobile phone has better quality.
		There is no trust in remanufactured products.
		I am afraid there is a broken part that is not replaced by the new one, but it is repaired partially.
		I am afraid there is unrepaired damage.
	Perceived quality	I am afraid that the mobile phone fails, and I need to go to the service centre frequently.
		The product may fail again and unrepairable.
		Product quality is not as expected.
		Not every part can be upgraded.
		Electronic products have a limited lifespan.
	Lack of OEM's support	There is no statement from the manufacturer that they support remanufacturing.
Social risk	Prestige concern	There is a sense of shame to buy a remanufactured mobile phone.
		It is more prestigious to buy new mobile phone, even the cheap one.
		Indonesian people tend to buy new HP and pursue prestige.
		Indonesian people tend to be consumptive and brand-conscious.
	Subjective norm	There isn't any friend that recommends remanufactured mobile phone.
	Public opinion	The society's viewpoint and public confidence in remanufactured mobile phones is still low.
	Trend concern	The model is outdated.
		Middle to upper-middle-class people tend to follow the new model in terms of phone weight, size, etc.
		Later model is much slimmer, the older model is bulkier.
		People tend to follow the trend, models of mobile phone change quickly.

The third kind of risk is a social risk. Several respondents indicated that remanufactured mobile phone is not a prestigious product. They argue that middle and upper-middle-class consumers tend to be consumptive and very brand-conscious to show their prestige. Furthermore, the lack of a recommendation from friends and other influential people around them will prohibit them from purchasing remanufactured mobile phones. The fact that a mobile phone not only serves as a communication device but also serves as a fashion item, encourages mobile phone users to change their mobile phones frequently to follow the trend. Guide and Van Wassenhove (2009) claim that mobile phone users change their devices every year.

Table 4   Mapping of respondents with their purchase attitude, purchase intention, and their reasons

Respondent	Purchase attitude	Purchase intention	Reasons
C1	Interested	No	Quality assurance, regulatory concern
C2	Interested	Yes	Upgraded specification, affordable price, perceived quality
C3	Interested	Yes	Affordable price, upgraded specification
C4	Interested	No	Perceived quality, quality assurance
C5	Interested	No	Perceived quality, obsolescence concern
C6	Interested	Yes	Upgraded specification, perceived quality
C7	Interested	No	Perceived quality, regulatory concern
C8	Interested	Yes	Upgraded specification, affordable price, perceived quality, quality assurance
C9	Not interested	No	Quality assurance, trend concern
C10	Interested	Yes	Affordable price, perceived quality, product warranty
C11	Interested	No	Regulatory concern, perceived quality
C12	Interested	No	Perceived quality, regulatory concern
C13	Not interested	No	Perceived quality, quality assurance, regulatory concern

Table 4 presents the mapping of each respondent with their purchase attitude, purchase intention, and the reasons. Out of 13 respondents, only eleven of them have the interest to purchase remanufactured mobile phones. The reasons why two respondents do not have the interest to purchase are low perceived quality, low trust on quality assurance, trend concern, and regulatory concern. Respondent C9 is still unsure of the quality of remanufactured products because he is not familiar with this product. He also thinks that remanufactured mobile phones are outdated because of the fast-changing trend of mobile phone models. Respondent C13 is afraid to purchase a remanufactured mobile phone because:

> "Remanufactured mobile phones may fail again at any time and unrepairable."

She also expresses concern about the quality assurance of process, whether the defective parts will be replaced by new parts or partially repaired. The other concern is regarding the product regulation. She fears about buying used mobile phones, instead of the remanufactured ones.

Among respondents that express positive purchase attitude towards remanufactured mobile phones, only five of them have purchase intention when remanufactured mobile phones become available. Upgraded specification, affordable price, and product warranty improve the consumer purchase intention, while the regulatory concern, trend concern, and obsolescence concern diminish the purchase intention. Perceived quality and process quality assurance can improve or reduce consumer purchase intention. If respondents have a high perceived quality level and high trust in the quality assurance of process, they will have strong purchase intention, and vice versa.

4.3   Discussion of findings

This study aims to investigate drivers and barriers of consumer purchase intention of remanufactured mobile phones in Indonesia. The drivers can be categorised into the financial benefit, quality benefit, social benefit, and environmental benefit, while the identified barriers are the financial risk, quality risk, and social risk. The main financial benefit is the affordable price of remanufactured mobile phones. The main quality benefit that improves consumer purchase intention is upgraded specification. However, the contribution of the above benefits will be inadequate if the perceived quality and consumers' trust in the process quality assurance are low. Furthermore, respondents indicate a regulatory concern, trend concern, and obsolescence concern are the main barriers for consumer purchase intention of remanufactured mobile phones. Even though respondents acknowledge the environmental benefit of remanufacturing, this benefit does not play a significant impact on purchase intention.

Familiarity with remanufacturing, especially with remanufacturing of mobile phones plays a crucial role in developing purchase intention. In this study, there is a big discrepancy among respondents in terms of perceived quality and trust, which results in some respondents have adequate purchase intention and other respondents do not have the intention to purchase remanufactured mobile phones. This finding is in line with the finding of van Weelden et al. (2016) that claims product familiarity reduces perceived risk in purchasing remanufactured mobile phones. In addition, they claim users that have less confidence in their own judgment about the product quality tend to perceive a higher level of risk. On the other hand, van Weelden et al. (2016) identify warranty and service to be key determinants of the perceived risk-benefit balance when considering a remanufactured mobile phone. Our study indicates product warranty play a minor role in purchasing decision. This difference may be caused by the different settings between our study and their study. Their study is conducted in the Dutch market, where consumers can find real remanufactured products, while our study is conducted in Surabaya, Indonesia, where most people do not know what remanufactured product is.

The attractiveness of affordable price in this study is also in line with the study of van Weelden et al. (2016). Their study indicates that cheap price may have a detrimental impact as well, in that the consumers equate cheap price with low quality. In our study, affordable price does not have a strong impact on a certain group of consumers, especially those that focus on the trend. The other finding that is not identified by van Weelden et al. (2016) is the impact of the upgraded specification. Most of our respondents identify upgraded specification, besides affordable price, as the main appeal of remanufactured mobile phones. This difference may be caused by the fact that remanufactured phones available in Dutch market do not have upgraded features. This study also identifies the importance of strict and clear regulation that can protect the

rights of consumers. This factor is not really emphasised in the study of van Weelden et al. (2016). Perhaps the fear of counterfeit products is not as critical as in the Indonesian market.

5 Conclusions, implications, and recommendations for future research

This study aims to identify drivers and barriers of consumer purchase intention of remanufactured mobile phones. Through in-depth interviews with thirteen respondents, our study identifies upgraded specification, affordable price, and product warranty to be the drivers of consumer purchase intention of remanufactured mobile phones, while the regulatory concern, trend concern, and obsolescence concern diminish the purchase intention. High perceived quality and high trust in the process quality assurance can improve consumer purchase intention and vice versa. This study also indicates that remanufactured mobile phones have a strong appeal to consumers that focus on affordable price and upgraded features. Consumers that focus on product newness will not be interested to purchase remanufactured mobile phones.

The managerial implication of this study is that remanufacturer should focus on providing phones with upgraded specification at an affordable price. The other important thing for phone remanufacturer is to provide information on how the remanufacturing process is done to their prospective consumers. The more familiar the consumers with the process, the smaller their perceived risk will be, which in turn it will increase their purchase intention. It is very urgent that the government impose strict regulation that protects consumers' rights. Otherwise, the remanufacturing business will not flourish in Indonesia.

There are two research limitations that we identify. First, this study was not conducted in the real market setting as in van Weelden et al. (2016). This is due to the unavailability of real remanufactured mobile phones in Indonesia. Second, we do not claim that the list of drivers and barriers is exhaustive because we did not collect enough respondents until the list saturates.

Our recommendation for future research is to continue this study with a survey to identify the contribution of each factor to the purchase intention.

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