HECARE: Sustainability Start-Up Innovation Based on Circular Economy Through Processing Food Waste into Products with High Use Value

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Abstract: Indonesia become a country with the largest food waste producer in ASEAN in 2021 with the amount of waste reaching 20.9 tons per year and will increase every year, which has a significant impact on the environment. Food waste produces methane and carbon dioxide gas compounds which result in decreased oxygen levels in the earth's atmosphere. Therefore, it is necessary to have a solution to the food waste problem, which is relevant to the implementation of the SDGs goals to manage the climate change. Green startups can become one of the solutions, as these kinds of startups are part of the digital economy, which contributes 4% of GDP. Therefore, it is necessary to understand how green startups run the business. This study is a qualitative study that involves respondents based on purposive sampling. Data collection was carried out using question guidelines and in-depth interviews. In addition, the study also used secondary data. Data validity was analyzed using qualitative methods through credibility, member checks, transferability, and dependability tests. After that, qualitative data were analyzed using qualitative descriptive methods. The results show that information and opinions gathered from data collection are useful for startup planning, the influence and role of HECARE in sustainable development goals, and strategies for building consumer brand awareness in supporting startup sustainability. This study focuses on how information and opinion of stakeholders utilizes to develop a circular economy-based startup.

Keywords: circular, economic, startup, sustainability, waste

Abstrak: Indonesia menjadi negara penghasil sampah makanan terbesar di ASEAN pada tahun 2021 dengan jumlah sampah mencapai 20,9 ton per tahun. Jumlah sampah makanan ini akan terus meningkat setiap tahunnya yang dampak signifikan terhadap kerusakan lingkungan. Limbah makanan menghasilkan senyawa gas metana dan karbon dioksida yang mengakibatkan menurunnya kadar oksigen di atmosfer bumi. Oleh karena itu, perlu adanya solusi khusus terhadap sisa makanan dengan mendirikan usaha yang relevan dengan tujuan SDGs untuk mengelola perubahan iklim. Green startup bisa menjadi salah satu solusinya, karena startup seperti ini merupakan bagian dari ekonomi digital yang menyumbang 4% terhadap PDB. Oleh karena itu, perlu dipahami bagaimana green startup menjalankan bisnisnya. Penelitian ini merupakan penelitian kualitatif yang melibatkan responden berdasarkan





purposive sampling. Pengumpulan data dilakukan dengan pedoman pertanyaan dan wawancara mendalam. Selain itu, penelitian ini juga menggunakan data sekunder. Validitas data dianalisis dengan metode kualitatif melalui uji kredibilitas, *member check, transferability*, dan *dependability*. Setelah itu, data kualitatif dianalisis dengan menggunakan metode deskriptif kualitatif. Hasilnya menunjukkan bahwa informasi dan opini yang dikumpulkan dari pengumpulan data berguna untuk perencanaan usaha rintisan, pengaruh dan peran HECARE dalam tujuan pembangunan berkelanjutan, dan strategi untuk membangun kesadaran merek konsumen dalam mendukung keberlanjutan usaha rintisan. Penelitian ini difokukans penggunaan informasi dan opini para pemangku kepentingan untuk mengembangkan startup berbasis ekonomi sirkular.

Kata Kunci: sirkular, ekonomi, startup, keberlanjutan, sampah

INTRODUCTION

Indonesia is one of the countries with the largest food waste in ASEAN. The amount of food waste production reaches 20.9 tons per year. Food waste is a problem that is difficult to deal with because its production continues to increase every year. The impact of food waste affects several things including the environment, health, and climate. This is because every food that is wasted produces greenhouse gas emissions. When food waste decomposes in the trash, it produces methane gas, which is more harmful than CO2 gas. Apart from decomposition, methane gas is also produced during the production and transportation of food. Methane gas can cause oxygen levels in the atmosphere to decrease. This can certainly interfere with human health conditions and also disrupt the balance of the environment. There are costs involved in wasted food, which could have been used for something more useful.

To avoid the increase of food waste in the future, food waste management is necessary, for example through wise and smart shopping, taking food gradually in sufficient quantities when eating, storing leftovers, managing food storage properly, and composting food waste (Akalili, 2023). However, to apply this idea in the community is not easy, as this requires high awareness of people behavior of avoiding food waste. Food waste management is relevant to the implementation of the 13th SDG, to avoid and reduce the impact of climate change. There are several agencies and companies, which their operations aim to prevent food waste, but in these institutions are less innovative to create economic added value (Hermanu, 2022). One of alternatives to handle food waste is through processing the food waste and utilizing this as an opportunity to develop the economy of community. This is in line with SDG's goals no. 8 as a pillar of economic development, and no.17 namely partnerships to achieve common goals (Tampubolon & Wulandari, 2021).

Based on the explanation above, there is a need to establish a forum that can accommodate the community in reducing and processing food waste. So, the establishment of HECARE startup in 2022 was aimed to create and develop innovation, especially product(s) from food waste. The development of HECARE as a startup is consistent with the 8th SDG's goal, which is to promote sustainable and inclusive economic growth, to open employment opportunity and decent work for all by managing this institution sustainably based on a circular economy. Circular economy itself is an industrial model that focuses on reducing, reusing, and recycling which leads to the reduction of primary resource consumption and waste production (Crush & Riley, 2017). Through a more effective resource and material utilization and extended material life, it is expected that this startup can reduce waste by implementing the circular economy concept. Furthermore, this startup can contribute to a more sustainable future by reducing the amount of waste that ends up in landfills (Dwi, 2023).

A startup refers to a company that has only recently begun operations (Yusian & Aulia, 2021), wants to sell the product(s) and or service(s), and develop the business for the benefit of its stakeholders (Pietro et al, 2017; Cleanomic, 2019). Startup has some characteristics, such as limited parties involved in their business operation, whose are mainly the founder(s) and promising startup usually invite investors to help grow the business significantly (Rode & Vallaster, 2005; Stock & Seliger, 2016). Startups usually want to grow the business substantially within a very short time; however, the business environment is very challenging, beand it is commonly the target customers do not trust the idea of the business (Rode & Vallaster, 2005; Stock & Seliger, 2016; Wismiarsi, et al., 2020). Adrianto & Hidayat (2022) found that there are several Indonesian startups that have experienced a decline and also rapid growth during the COVID-19 pandemic. These startups are part of the digital economy which

contributes 4% of GDP, and they have the ability to survive and drive the Indonesian economy during the pandemic, while their counterparts, which are larger and older in various economic sectors decline.

The circular economy does not only focus on waste management but also encompasses several economic interventions such as resource efficiency and carbon gas emission reduction (Oswaldo, 2023). As has been explained in the previous paragraph, HECARE has its main objectives to reduce food waste, and its negative impact on the climate. This company aims to process food waste into more useful products. As a start-up, HECARE experienced various obstacles and challenges to grow and run effectively and efficiently. This study examines information and opinions from various stakeholders, especially customers, business owners and experts to support this green startup business planning, strategy development and brand awareness building.

LITERATURE REVIEW

Green Startup as Innovation Advocating for a Circular Economy

Climate change has various impact on the environment and humans, such as excessive hot weather, extreme cold weather, and the growth of water-related diseases. One of the causes of climate change is greenhouse gas emissions caused by the process of degeneration of the waste from industry and human activities that evaporate to the environment (Oswaldo, 2023). This gives negative challenges not only to the environment, but also to the economy and human health, and the sustainability of future generations and the current generation whose has already experienced the impact. Sustainable development is very necessary at this time as an effort to overcome the threat of danger due to climate change (Malihah, 2022). Therefore, green startup is needed to provide solutions and innovations to ecological problems. Green startups are needed to process waste into much more useful products (Siaputra et al., 2019). The idea of green startup business is to minimize the use of materials and natural resources while encouraging a product to be used as long as possible by returning the remaining production and consumption processes to the production cycle (Suchek et al., 2021). Therefore, green startups can help encourage the growth of a circular economy which is believed to be a solution in reducing waste problems on earth, one of which is caused by food waste (Bergset & Fichter, 2015). There are three categories of green startup, namely transportation, agricultural technology and waste management (Xue, 2020). As this research focuses on waste management, then this study discusses a startup in waste management,

Sustainable Food Waste Management in Green Startup

Food waste is a global problem that is widely discussed today. It is one of the causes of our environment problems. People's lifestyles that often leave food behind are a problem that causes a lot of food waste. Moreover, food waste that is not managed properly and ends up in landfills contribute to the live environment degradation (Paritosh et al., 2017). To maintain a balance between global economic growth, sustainable food production and consumption practices are needed. There are at least three SDGs goals which are related to the prevention and management of food waste, i.e., goals number 8, 11 and 17. First, SDGs number 8, namely decent work and economic growth, which aims to increase inclusive and sustainable economic growth, productive and comprehensive employment opportunities, and decent work for all (Rai et al., 2019). Secondly, goal number 11, which focuses on sustainable cities and settlements, for the purpose of creating inclusive, safe, resilient and sustainable cities and settlements. Finally, goal number 17, namely partnerships to achieve goals to strengthen the implementation facilities and revitalizing global partnerships for sustainable development (Stahel, 2016). The development of green startups is a step to reduce food waste through reprocessing food ingredients that have been used and also processing these ingredients in a sustainable manner through business entities. Life Cycle Analysis (LCA) is an accepted approach to analyze the sustainability of

food waste reduction strategies, and it is useful for green start up to manage its operation. Through the application of this concept, green startup can assess environmental impacts, identify recycling stages that have important impacts, and identify areas related to the recycled products (Mouat, 2022). In the LCA process, the main activity that needs to be considered is how green startup manage the supply chain.

Food waste supply chain management is a combination of food waste processing into supply chain management and the surrounding natural and industrial ecosystems. This supply chain refers to supply chain management for food waste that can be carried out systematically and relevant to the existing industrial supply chain. A recent study in circular supply chain management (CSCM) explained that supply chain management and natural and industrial ecosystems around it should count the circular thinking (Soleimani et al., 2023). In CSCM, technical materials are recovered automatically, and biological materials are regenerated through extensive innovation in business models and supply chain operations (Rai et al., 2019). Meanwhile, in food waste supply management, the circulation of food waste occurs until the waste returns to nature and is reused as product(s) in the beginning of the production process. Furthermore, in the process of distribution of goods to the markets, where consumers will later buy them, the food waste from the consumers' activities is not immediately thrown into nature but is sent to the waste collection community, recycled and remanufactured at HECARE Green Startup. Therefore, through HECARE, products that are plant based and carbon offset are created. The remaining final product are products which are easy to decompose and degrade in nature. Hence, it is only after the final process, that food waste based products will be returned to nature.

RESEARCH METHODOLOGY

This research applies a case study approach, which involves in-depth interviews as the method for data collection (Yin, 2014). Meanwhile, according to Creswell (2014) in (Priya, 2021), a case study defines as a qualitative design that aims to explore in-depth an event by collecting detailed information using data collection procedures. Data collection uses a qualitative method in which primary data was collected using in-depth interview, while secondary data are also used (Priya, 2021). Interview is a method of collecting data that aims to support and address research objectives. Interviews consist of two parts, namely structured interviews, and unstructured (and in-depth) interviews. In this research, in-depth interviews with key informants were conducted. Interviews with students, lecturers and environmental and economic activists were conducted at Bakrie University. Secondary data collection was done through literature study to collect information from scientific publications and other sources on the internet related to food waste, start-up development, and other related topics.

Data collected from interviews and publications were analyzed using qualitative methods. Descriptive qualitative method is a method to examine a phenomenon through the analysis of qualitative data and then information collected is told through a descriptive chronology (Rusandi & Rusli, 2021). Then the validity data was analyzed through credibility, transferability, dependability, and confirmability tests (Creswell & Miller, 2000; Sugiyono, 2019). Credibility test or trustworthiness test aims to ensure the suitability of facts in the field seen from the views of the sources in the research. Credibility test can be done through triangulation strategies, member checking, and negative case analysis (Creswell & Miller, 2000). According to the authors, triangulation refers to the development of themes or categories in research through the utilization of different sources of information and using different methods of data collection (such as interviews, observations, publications). Member checking is a validity technique which involves participants to confirm the data taken by researchers through reviewing the research findings. Negative case analysis or disconfirming evidence refers to validity

procedure to find data or evidence that are inconsistent or disconfirm with the themes or categories in a study.

In addition to the credibility test in this study, the transferability test was also carried out as an external validity test in qualitative research. This test is carried out as a data generalization test to determine the extent to which the results of research on a particular group can be used in general in other groups (Tobin & Begley, 2004). The same authors explain that the dependability test is carried out or known as the reliability test in qualitative research where the test is carried out by means of an audit by an independent auditor or supervisor of this research activity to revise the whole. Finally, the confirmability test is achieved when credibility, transferability, and dependability are all achieved (Guba & Lincoln, 1989).

Number	Questions for Lecturer	Questions for Students
1	What do you think about the circular economy?	What do you know about circular economy and sustainable development?
2	In developing a start-up based on circular economy, what are the things that need to be considered?	Do you know that it also relates to food waste generated from the production process or from consumers themselves?
3	What do you think about start-ups that can support sustainable development?	What do you think if there is a start-up that focuses on processing food waste into goods with economic value?
4	If our team wants to develop a start-up based on food waste processing so that it has a use value so that in addition to reducing environmental impacts it also supports sustainable development, what is your opinion regarding this?	Would you be interested in getting objects from food waste processing with useful value and affordable prices?
5	In your opinion, how important is brand awareness in building a start-up? Then what are the strategies that can be done to support start-up development?	What are your expectations regarding food waste processing start-ups? And what types of products made from food waste are you interested in?
6	Do you have any advice and input on start-up development?	How much are you willing to pay to get the product? And what would be the considerations in choosing a product?

RESULTS AND DISCUSSION Result

Test Credibility with Time Triangulation

Based on the triangulation of interviews conducted, it is stated that the information provided by respondents is consistent from the initial interview to the end, so it can be concluded that the answers from respondents are credible and can be used in this research.

Informant's	Position -	Interview Date and Time			Dlasa
mormant's		Ι	II	III	- riace
Expert 1	Production Manager Nutrifood	10-3-2023 (09.35)	10-3-2023 (13.50)	10-3-2023 (19.00)	Zoom Meeting
Expert 2	Initiator of the Hero for Zero Program	13-3-2023 (08.30)	13-3-2023 (12.15)	13-3-2023 (21.30)	Bakrie University Chemistry Lab
Expert 3	Head of Innovation and Transformation Laboratory	29-3-2023 (09.00)	29-3-2023 (14.30)	29-3-2023 (17.00)	Bakrie University Business Incubator Room
Source Person 1	Student Interest in Sustainability	06-3-2023 (07.45)	06-3-2023 (12.30)	06-3-2023 (16.00)	Student Lounge UBakrie
Source Person 2	The member of Hero for Zero Program	07-3-2023 (09.53)	07-3-2023 (14.30)	07-3-2023 (18.00)	UBakrie Classroom

Table 2. Test Credibility with Time Triangulation

Test Credibility with Member Check

Referring to the interview data revealed by the researcher and in accordance with the circumstances in the field, the respondents provide an assessment of some issues stated in the form of a checklist. If it was in accordance with the conditions, then the respondents answer yes, and if not, the respondents answer no. The results of the member checks show that five of the respondents answered yes to all the validation components given, and none of them answered no. After the data was mutually agreed upon, the respondents gave their assessment in the form of a checklist. Once the data was mutually agreed upon, the respondents signed the member check sheet to make it more authentic and as evidence that the researcher had conducted the member check.

Transferability Test

The transferability test aims to ensure that the results of this research can be transferred or applied to other research objects that have similarities with HECARE. In the transferability test, the degree of accuracy of the test results carried out on the research object should be consistent. There are aspects and characteristics related to Start-Up Development Based on Circular Economy which were obtained from the interviews (Table 3). These results can be used for this study and further research.

Aspects	Characteristics			
	• Knowing what a startup is and what the circular economy is			
	• Knowing the prospects and advantages of circular economy-			
	based startups			
	• Knowing the expectations about green startups from the			
Start-Up Development Based	younger generation and lecturers.			
on Circular Economy	• Knowing how to create brand awareness for a new startup in			
	the field of food waste management.			
	• Knowing how startups that focus on food waste management			
	systems work.			
	• Knowing how to make startup development planning			

Table 3. Result of Transferability Test

Dependability Test and Confirmability Test

Confirmability checking is carried out by validating and auditing the research findings. In this study, confirmability was assessed by comparing the results. The results of this study are data collected through interviews, and these data are consistent with the data collected from research process by controlling the context that changes during the study. Therefore, this allows researchers to collect and analyze data from interviews to be used in the study.

Data from Interviews

An interview is a way to collect data through a question and answer between two parties (Salmaniah Siregar, 2002). Interviews were conducted at Bakrie University both offline and online with 5 (five) resource persons. These five resource persons work at Bakrie University and are from different professions. Three of them are professionals while working as lecturers. First, a production manager who is also a lecturer of a study program in which the students are professionals or employees at various companies. Secondly, a lecturer in Food Science and Technology, who runs the Hero for Zero program to reduce hunger and emphasize food waste reduction, and thirdly, a lecture in management study program, who is also a youth facilitator and motivator who work for his own business.

In addition, in-depth interviews were also conducted with students as one of the targeted market segments of this start-up which aims to find out consumer awareness of the circular economy and sustainable development and expectations of the start-up to be developed. Table 1 shows questions given to students and lecturers. Questions given to lecturers focused on exploring the potential for business development based on expert perceptions, while questions to students were asked to gather ideas on products expected by consumers. The data collected from the interviews showed that the interviewees were interested in the existence of a HECARE startup that focuses on sustainable development and carries out circular economy principles. All respondents said that HECARE has a great potential to grow to support sustainable development and help improve the environment and people's welfare. Consumer interest is shown through the expectations given regarding the sustainability and products developed by this startup. The research findings can benefit this startup to develop its business plan, which is based on circular economy, find its role and influence on sustainable development, and define its strategy to build consumer brand awareness on sustainable or green startup.

Discussion

Data which are collected from the interview are discussed into three different contributions for HECARE startup – planning of the startup, the role and influence of the startup in sustainable development, and strategy to build brand awareness of HECARE.

Planning for HECARE Start-up based on circular economy

The results of data analysis found that customer awareness of sustainable development influences the growth of circular economy-based startups. When the awareness is high, the potential business growth is also high. This allows the startups to offer their targeted customers with products that provide benefits to them and also to the environment. Developing a startup needs a specific and thorough analysis. The analysis includes identification of food waste origin and loss to determine when additional management and processing are required. In addition, the types of food waste should be identified, before it is processed and produced as products that needs to be manufactured and marketed. Through interviews with target consumers, it was also found that commodities that can be an option for product development are products that are often used in everyday life and products that will be produced should be packaged into different sizes so that there are various price options according to product size. According to key informants, HECARE has promising opportunities in the market if it is managed appropriately and targeted at the right customers. Furthermore, information and expectations from them are useful for startup product development and business growth.

Start-up planning should take into account how to manage the human resources involved in each production system. The involvement of various parties who have similar interests such as not-for profit organization and non-formal community will support the growth and sustainability of this start-up. Therefore, this start-up could become a pioneer in the community that will work together to deal with food waste. The community might concentrate on collecting food waste from homes, small businesses, and industries. This involvement of various parties will provide positive impact on the sustainable development, as it will enhance the economy and also processing the waste effectively and efficiently. The planning of a circular economy-based startup must consider LCA (life cycle assessment) to ensure its management runs in a circular manner and longer product life or product usage. Hence, the development of this startup must be prioritized to provide solutions for the environment or our planet, pay attention to all human resources involved in the system, and generate profit and benefit for the company and its stakeholders. This will be the main reason for the existence of the startup and its product. Small businesses that involve the community are easier to manage to become circular economy-based businesses, because they are easier to control.

The influence and role of HECARE in sustainable development plans.

The results from data analysis also found that the existence of this green startup will influence sustainable development goals, both directly and indirectly. The impact that will be achieved depends on the focus of this green start-up development and its benefits in accordance with SDG number 8, 11 and 17. In addition, this startup will have a positive influence on the 3Ps, namely planet, people and profit, because its existence provides a solution to managing food waste which is still one of the big problems in the environment. Therefore, this start-up will be beneficial for many people, both consumers and human resources involved in the start-up development process. Another influence that is no less important is the company profit. Company profits should not only be regarded as profit per se, but as benefits for various aspects of life, which provide a unique value for this startup. The awareness of many parties involved in this start-up, both as consumers and parties who provide input to its management, can become an indicator of the importance of this business to achieve sustainable development goals.

Strategies to build consumer brand awareness in supporting startup sustainability

Information obtained from data analysis can be used to build brand awareness. Brand awareness should be carried out through a market approach, both traditional for developing limited reach of brand awareness, and through online techniques to obtain a wider reach. To be well known in the market,

providing an understanding of the brand is very important, because this can facilitate the brand to develop brand awareness and communicate the products offered. The startup should communicate the philosophy of the brand name. Understanding of the brand name will facilitate customer to remember the brand name. Effort to communicate the startup can be done through social media content management. The more often people hear the brand, the more aware the public is of its existence. Apart from that, the involvement of consumers in the system developed at the startup can attract customers to purchase and use HECARE's products. Building brand awareness needs to be done in several stages. It depends on the startup resources and capabilities, especially its financial resources.

CONCLUSION

HECARE, a green start-up which is in the development stage, faced significant challenges because of limited awareness of the community regarding the environment, especially food waste. To support this green startup business development, this study focuses on collecting and analyzing information and opinions related to business opportunities and market needs. The data were collected through a qualitative approach using in-depth interviews with key resource persons -the stakeholders of the business, which include students as potential customers, business owner, and experts who have interest in the environment issues. Furthermore, data were analyzed and used as the foundation for the startup plan, emphasize the influence and role of the business in sustainable development, and create brand awareness strategy. It was found that information and opinions gathered from this study were beneficial for HECARE's business growth. This green startup will provide solution to the food waste, has influence and role in sustainable development goals as it pays attention to the planet, people, and not only profit for the business. The information gathered is also used to help this startup build its brand awareness, so that it can reach its target market and give understanding of the brand and the products. In addition, brand awareness development will emphasize the usefulness and value of the start-up. Therefore, it will help customers understand and remember the brand and the products.

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