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Guam and the Circular Economy: Is the Island Ready? A look at the Phase I (Discovery Phase) Results of an Organization Development Action Research Study

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Abstract: This study presents the preliminary findings of a Phase I, qualitative investigation into the feasibility of implementing a circular economy (CE) model in Guam, a Small Island Developing States (SIDS). The purpose of this organization development (OD) research project is to discern the level of interest and receptivity toward the concept of a CE in Guam's unique island setting. With 44 participants ($n = 44$) from the local business community and the general population, this study employed interviews and focus groups as part of a qualitative research approach. The research design aimed to gather insights and perspectives on the interest in a CE in Guam. The findings indicate a significant level of enthusiasm and interest in the CE among both the local business community and the general population in Guam. Stakeholders recognize the potential economic, environmental, and social benefits associated with transitioning to a CE framework, as revealed through the interviews and focus groups conducted. This discovery research represents a vital first step in understanding the readiness of Guam to embark on a CE journey. The positive response from the participants underscores the importance of further OD research and initiatives in this direction. The study highlights the need for policymakers, businesses, and communities to collaborate and explore the implementation of CE principles to maximize the sustainability and resilience of Guam's economy. It also emphasizes the significance of promoting sustainable economic development in Guam and other SIDS facing similar challenges.

Keywords: circular economy, qualitative analysis, organization development, SIDS, Guam, solid waste, United Nations

1. Introduction

Cradle-to-cradle, linear economy, sustainability, and zero waste, all of these terms and more, are associated with the concept of circular economy (CE) [1–3]. Conceptually, CE is fairly new; however, it has begun to embed itself throughout the world: Europe [4, 5], North America [6], Asia-Pacific [7–9], South America [10], and Africa [11]. CE is making its way into the vernacular of all organizations, the public sector, the private sector, and non-profits and for-profit entities [12, 13]. It has emerged as a key principle for all sectors to embrace if we want to live in a sustainable, environmental, social, and governance (ESG) centric world [14].

Scholars and practitioners have shown immense interest in the concept of CE. However, what exactly CE is – a definition – is still opaque. The need for clarity of this term becomes increasingly important as the concept and use of the vernacular gains prominence in the global environment. In 2014, approximately 30 articles were written on the topic in academic journals; in 2016, that number rose significantly to over 100 [15, 16]. Discussions about the topic vary widely, where some estimates claim that implementing a CE could

generate \$1 trillion USD in the United States alone by 2025 [17] and some [18] say that we live today in an age of “sustainababble,” which combines the terms sustainable with babble to convey the elevated status the precept of sustainability, a core element of the CE, enjoys in popular culture today.

Conceptually, CE is touted as a regenerative system that utilizes the concepts of reengineering and building in longer-lasting designs, maintenance and repair cycles, and the reduction of energy loops, and resource waste as well as the minimization of emissions [15]. Providing further clarity, Esposito et al. [3] posit the objective of a CE model is built on a foundation of five fundamental traits: design out waste, build resilience through diversity, work toward energy from renewable sources, think in systems, and think in cascades. Lacy and Rutqvist [19] claim that CE can unlock \$4.5 trillion in additional economic output by 2030.

2. CE and Business

For firms contemplating the integration of CE into their business model, the term circular business model (CBM) is used to describe the new model. A CBM often requires significant transformation and can create numerous challenges. One of the most important challenges is how value will be created [20]. When new forms of service, especially performance-based services, are considered, a firm's core value proposition will more than likely need to change as well [21].

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Customers' expectations and perceptions of a firm's value proposition are often significantly different when purchasing a product versus buying a function or when revenue from material-intensive up-front product sales is replaced with monthly earnings from providing a product [22].

In the manufacturing and production realm, three prominent business strategies currently exist for circularity. These strategies will usually involve a combination of the following: retain product ownership – products are rented or leased to customers rather than sold; product life extension – products are designed to last longer; and design for recycling – products are manufactured for maximum recoverability for use in new products [23, 24].

In support of this realm, Lacy et al. [25] suggest there are five CBMs, where three of the models are primarily focused on production, while the other two focus on consumption and the relationship between the product and the consumer. The three production-focused models are

1. Circular inputs, where businesses should leverage using renewable energy, bio-based/recyclable materials;
2. Product use extension, this is where the product life cycle is extended through repair, reprocessing, upgrading, and resale;
3. Resource recovery, the recovery of usable resources of energy from waste or by-product [26].

As a point of reference, production (industrial, manufacturing) is considered a secondary sector with regard to CE, whereas agriculture, mining, or raw material suppliers are primary sector providers; service-based solutions are considered to sit in the tertiary sector due to their intangible exchange of material [27].

Traditionally, the service sector holds activities in the following areas: food, hospitality, tourism, education, healthcare, and banking to name a few [28]. Estimates made by Deloitte [29] state that the service industry accounts for approximately 70% of the world's GDP. Due to its unique positioning between manufactures and customers, the service industry holds a significant place toward the shift to the CE [30].

3. Small Island Developing States

Sitting in the middle of the Pacific Ocean, sandwiched in between the Northern Marianas Island chain and the Federated of States of Micronesia, Guam is a 549 km² organized, unincorporated territory (island) of the United States in the Micronesia subregion of the western Pacific Ocean. With a population of just over 153,000 inhabitants [31], and a GDP of \$5.84B USD [32] that is primarily based on US federal assistance, US military spending, and tourism [33], Guam is listed as a non-United Nations Members, Associate Members of the Regional Commissions Small Island Developing States (SIDS) [34]. An important fact that is central to this research is that the services industry in Guam accounts for close to 40% of its GDP [35]. Guam (USA) is a small island that may not be conducive to linear manufacturing, given its status as a net importer of goods (Bureau of Economic Analysis, 2023); however, its location in the Western Pacific makes it an ideal tourist destination.

Rising public awareness of ESG-related risks is rapidly pushing ESG investment and regulatory change [36]. On September 25, 2019, the Guam legislature passed Executive Order No. 2019-23: Relative to Creating the Guam Green Growth Working Group whose scope and vision are to ensure that Guam, through the work of the University of Guam's Centre for Island Sustainability (CIS), advances the United

Nations' Sustainable Development Goals with long-term sustainable development, climate, and resilient commitments [37].

Like most other SIDS, Guam, boundedness, isolated from markets, possessing limited land area, and higher costs of infrastructure must make it a point to focus on sustainable development. SIDS are predominantly dependent upon the oceans, beaches, and the maritime environment around their communities for survival [38]. Understanding their unique placement on earth, the need to embrace sustainability, and to be in alignment with the UN's 17 Sustainable Goals, the Guam Green Growth (G3) initiative's action framework was signed into effect on 23 Sep 2020 [39].

4. Research Study

An important factor to take into consideration when talking about CE is how businesses will react to, embrace, or reject this concept. Schumann [40] outlines the challenges that CE faces in Guam. In discussions with CIS Director, Dr. Austin Shelton, Schumann [40] outlines a three-pronged approach for CE on Guam: (1) develop a strategy to expand CE education to reach the island's stakeholders; (2) growth in the development of a business incubator; and (3) creation of a maker space to allow for a shared venue to produce locally made value-added products.

Led by the author, Cohort 17 of the University of Guam's (UOG) School of Business and Public Administration (SBPA), Professional Masters of Business Administration (PMBA), conducted a first-of-its-kind study of CE on Guam in 2022 for their Capstone project: Phase I, Discovery. Under the title of "Behavior Change for the Circular Economy on Guam," Cohort 17 set in motion the first of several research-led initiatives to discover if Guam's business community is prepared to embrace the CE [41]. This project begins to address Step 1 raised by Schumann's outlined above, developing a strategy to expand CE education to reach the island's stakeholders.

The researcher's long-term strategic vision is to conduct a longitudinal organization development (OD), mixed-method, action research (MMAR) project in order to learn more about CE in Guam and conduct behavioral change interventions [42]. Building upon previous MMAR projects [43], this project posits to use OD, action research, and OD interventions to build knowledge of what CE is and how it may be effective in Guam.

This initial research phase sought to investigate the relationship between Guam's population and the CE. The research aimed to gain an entry-level (discovery) understanding of the community's knowledge and behavior toward the CE and sustainability on Guam [41]. The following research questions (RQs) were explored:

- RQ1: What is the current perspective of the people of Guam regarding CE development?
- RQ2: What role does consumer behavior change play in a CE?
- RQ3: How will Guam's residents deal with specific barriers to CE implementation, such as a lack of representation in the industry, a lack of public awareness, limited land and resources, and a lack of recycling centers?
- RQ4: Why has the population of Guam not established more CE initiatives?

5. Methodology

5.1. Research design

The primary goal of this research was to assess the interest in and raise awareness of the circular economy concept in Guam, which is why this phase is referred to as Phase I, the Discovery (Assessment)

Phase. This study, along with its future phases, will use a mixed design of both quantitative and qualitative means. Braun and Clarke [44] provided a very simple yet important distinction between qualitative and quantitative research when they stated that quantitative research uses numbers as data and analyzes data using statistical techniques collected and analyzed in a variety of ways, whereas qualitative research uses words as data.

5.2. Purposive sampling

The goal of qualitative research is not necessarily to provide copious amounts of observable (quantifiable) data but to provide enough rich data (data containing complexities and the richness of what is being studied) so that the reviewer of the work clearly understands the phenomena that took place and that there is clarity of what transpired during the research [45].

Purposive selection should be used when it is imperative that the researcher will substantially learn from the phenomenon being studied doing so through choosing people or documentation for the research. Patton [46] makes a claim:

“The logic and power of qualitative purposeful sampling derives from the emphasis on in-depth understanding of specific cases: information-rich cases. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the inquiry, thus the term purposeful sampling” (p. 53).

5.3. Research instruments, tools, data collection

Qualitative data gathering was conducted in four tranches that consisted of focus groups ($n=31$) and semi-structured interviews ($n=13$) for an overall total of 44 participants taking part in the qualitative portion of this study ($n=44$). The focus group interviews were held on 19 March and 03 April 2022, and the semi-structured interviews were held on 26 March and 02 April 2022.

Focus groups were administered in four sessions and conducted at the UOG's SBPA building. Sessions 1 and 3 had a total of 19 participants ($n=19$) selected from the general public of Guam. Sessions 2 and 4 consisted of 12 participants ($n=12$) chosen from the local business sector due to their management experience and expertise. Each session lasted 1 hour with continuous conversations about CE, behavior change, and consumer behaviors.

The semi-structured interviews were administered through in-person, face-to-face interviews or Zoom call interviews. Similar to the focus groups, the interviewees were a mix of business personnel ($n=6$) and people from the general population ($n=7$). Each session lasted 1 hour or less with continuous conversations about CE, behavior change, and consumer behaviors.

5.4. Qualitative inquiry

The power of qualitative research rests in its ability to explore and explain the phenomena that occurred. The thematic approach is particularly effective in contributing to and advancing the analytical process of qualitative research [47, 48]. The reason for this is that the thematic approach looks for themes or patterns that surface in the data and then categorizes the themes in order to effectively evaluate the data [49].

In the inductive approach, the themes that emerge are a result of and linked to the data collected throughout the research process [44]. Researchers gather these data and build their theories, concepts, and hypotheses in an intuitive manner derived from conducting observations in the field [50]. Boyatzis [51] states that the inductive approach consists of five steps:

1. A label

2. A definition describing the theme concerns (its characteristics/issues)
3. A description explaining how to know when the theme occurs (“flags”)
4. A description of qualifications and/or exclusions associated with the themes
5. Examples (positive or negative) to aid in identifying the themes.

5.5. Analytical software support

Because transparency is important to research [52] and because of the increased interest in using qualitative analysis software [53, 54], the researcher chose to use NVivo 11 Pro as the platform in order to enhance transparency. Qualitative data were imported into NVivo 11 Pro to assist in generating the various themes and groups of thematic patterns in the study.

An analysis query was designed and employed to determine the thematic recurrence. This generated clusters of the analyzed words and themes that reoccurred from the various one-on-one interviews that were conducted and the focus groups.

The Appendix contains the various word clusters or “word clouds” that were generated using NVivo 11 Pro. Each of the word clouds displayed at the Appendix supports the various tables provided in Section 6.

A word cloud, also known as a tag cloud, refers to visual representations displaying a collection of words or tags, wherein characteristics of the text, such as size, boldness, or color, are utilized to indicate attributes (such as frequency) of the corresponding terms [55, 56].

6. Results

The main purpose of this report is to publish the initial phase results (Phase I), the ‘discovery phase’ (assessment) of what will be a longitudinal OD study of the CE in Guam (USA). This study seeks to examine the behavior change surrounding the introduction of CE in a SIDS location and understand the community's perception, especially the business community's perception of CE and sustainable initiatives in Guam. The qualitative data collected during Phase I were collected and analyzed to identify any barriers and evaluate potential behaviors that need to be changed to successfully implement certain facets of the CE and sustainable actions on the island.

Qualitatively, a mix of semi-structured interviews, along with focus groups were conducted. In all, 13 interviews were conducted ($n=13$) and four focus groups were held where 31 locals were interviewed ($n=31$) for a total of 44 participants ($n=44$). The interviewees consisted of a mixture of participants from the local business population and the general population of Guam. All local business personnel selected had some level of management experience.

6.1. Analysis and interpretation of qualitative findings (RQ analyses)

6.1.1. Business thematic framework

The following RQs were explored; analyses of each RQ are provided.

- RQ1: What is the current perspective of the people of Guam regarding CE development?

From the vantage point of individuals endowed with managerial acumen within the business domain, a discerning analysis has unveiled a prevailing sentiment that Guam presently finds itself inadequately prepared to embrace the tenets of a CE paradigm. Nonetheless, a glimmer of optimism emanates from the recognition that incremental strides may pave the way for transformative change.

Through the use of focus groups and in-depth interviews, a comprehensive panorama of insights coalesced, underscoring Guam's unpreparedness attributable to a trifecta of factors: paucity of knowledge, conspicuous patterns of overconsumption, and economic constraints. Much work must be done in order for Guam to be ready for the seamless incorporation of the CE ethos. Despite this discernible unpreparedness, a clear undercurrent of motivation endures, fueling aspirations to explore this path.

Table 1 contains salient feedback, selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ1 (See Appendix, Figure A1, for the word cloud generated for this table):

Table 1 Selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ1	
Interview direct quotes:	<ul style="list-style-type: none">- We segregate all of our waste depending on the type of waste it is. Depending if it's recyclable we send it to be processed in Guam's recycling facilities- We've made a big commitment to sustainability. We are investing significantly in alternatives such as fuels- We try to keep up the most up-to-date information that we have access to. We also have to also keep in mind efficiency in operation, and cost- I feel like people care, but I don't think they care enough.
Focus group direct quotes:	<ul style="list-style-type: none">- It's not a matter of accepting or rejecting. It's a really good ideal. It's the practicality of the matter. Is it really going to happen on this small island- I honestly don't know what circular economy is, but I know it deals sustainability- A reasonableness must be taken into development and care. I believe it can happen together- We recycle all around the island, getting green waste, and we turn them into something new... but we want to go further than that

- RQ2: What role does consumer behavior change play in a CE?

Consumer behavior remained implicit throughout the sessions, with explicit attention directed towards attitudes, mindsets, and lifestyles. Participants articulated a collective concern over conspicuous overconsumption and profligate waste among Guam's residents. Synthesizing these insights, the present study posits that the delineated factors, encompassing attitudes, mindsets, knowledge, education, awareness, and lifestyle patterns represent cogent barometers of prospective shifts in consumer behavior.

As one would envision, the business community shares an intricate symbiosis with Guam's consumers, as their financial sustenance hinges upon consumer engagement. The nexus between consumers and the CE paradigm is pivotal, given that consumers drive the consumption of items such as bottled products while concurrently contributing to the environmental burden through their disposal. Consequently, the consumers of Guam wield unparalleled influence over the trajectory of CE adoption, both as consumers and inadvertent polluters.

Table 2 contains salient feedback, selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ2 (See Appendix, Figure A2, for the word cloud generated for this table):

Table 2 Selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ2	
Interview direct quotes:	<ul style="list-style-type: none">- We have to understand exactly what the mission of circular economy is before the implementation of it- Be committed to the education that comes out and taking in that information- A case study is a perfect world this is how it should be on the island of Guam and this will envision how it will work- Hands-on training will be beneficial for people with a tough schedule- We're not going to just take something and dispose of it and put it in the landfill. We would like to dispose of it in a manner that it is disposed properly- It's just not easy... a hand full of the community thinks it is bs... how do you win those guys over? We need to reach out to everybody or else we are not doing our job- If your heart is not there, people will easily turn away and they will not care. It's about how you perceive it and choose to go about it.
Focus group direct quotes:	<ul style="list-style-type: none">- The concept needs to be sensible and make sense to the operations that we are working with- We have the opportunity to filter downwards into the home level of all the people that work for us and as a business we can also share our learnings with other businesses and get them too- Our biggest problem on Guam is the economies of scale. What the video shows would be applicable in the mainland but in a smaller island, it is probably going to be challenging- I do not think Guam is ready for a circular economy. It really is a great idea, it can help our future generations but honestly our culture, it is not a growth mindset

- RQ3: How will Guam's residents deal with specific barriers to CE implementation, such as a lack of representation in the industry, a lack of public awareness, limited land and resources, and a lack of recycling centers?

The adoption of the CE paradigm on the island of Guam is a nuanced and intricate undertaking, beset by numerous challenges. The stakeholders in this study provided a spectrum of actionable strategies and measures aimed at surmounting these challenges. Foremost among these strategies is the advocacy and dissemination of CE principles, which holds the potential to foster a groundswell of support and awareness within the community. Additionally, participants emphasized the pivotal role of education, with a focus on engaging family and friends, as a means of instilling a nuanced understanding of the CE ethos.

Table 3 contains salient feedback, selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ3 (See Appendix, Figure A3, for the word cloud generated for this table):

- RQ4: Why has the population of Guam not established more CE initiatives?

Foremost among these rationales is the island's perceived size limitations, which renders the effective processing and recycling of waste a formidable logistical challenge. Furthermore, affordability

Table 3**Selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ3**

Interview direct quotes:
<ul style="list-style-type: none"> - At the end of the day all of this boils down to dollars and cents - I think a huge part of it is that there isn't a lot of information or knowledge for people to be aware and that is why we do not see it as much - Yes there is the notion we want to do things that are going to make our island a better place and it's not always about the money... but certainly the financial cost in engaging in a circular economy needs to be weighed in the decision making process - It all goes back to understanding the concept. I really won't initiate anything, if I don't understand where its coming from and if there's a cause and effect. It all depends on convenience
Focus group direct quotes:
<ul style="list-style-type: none"> - We're already thinking that far ahead as far as repurposing the raw materials and creating new products, similar products so it is sort of a circular model - It is not feasible on Guam - Guidance, awareness, and knowledge is required for the community and our businesses to make a difference - A challenge would be that other businesses in our same industry are not ready yet. It's going to be a negative effect on us, why are we doing this if not everyone is ready - Another challenge is limited resources. If we wanted to recycle certain things there's not many places to recycle plastics

concerns loom large as a prevailing impediment, casting a shadow over the feasibility of circular economic models on the island. Additionally, a conspicuous dearth of knowledge surrounding the CE and sustainability principles pervades the community, exacerbating the challenges of implementation.

Recognizing the pivotal roles of governance and the business sector in catalyzing change, respondents advocate for a concerted effort on the part of the Government of Guam and local businesses to exert influence and champion the cause of CE adoption.

Table 4 contains salient feedback, selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ4 (See Appendix, Figure A4, for the word cloud generated for this table):

6.1.2. General population thematic framework

- RQ1: What is the current perspective of the people of Guam regarding CE development?

Collectively, the gathered insights affirm Guam's readiness for CE adoption, contingent upon a symbiotic partnership between businesses and government entities. Participants underscored the indispensable roles of these stakeholders in preparing, educating, guiding, and providing support to the populace. The premise is that Guam's successful transition to a CE hinges upon robust investments by businesses and government in the requisite infrastructure, technologies, and products to meet burgeoning demand while simultaneously fostering accountability and compliance among the general population.

Table 5 contains salient feedback, selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ1 (See Appendix, Figure A5, for the word cloud generated for this table):

- RQ2: What role does consumer behavior change play in a CE?

Consumer behavior remained implicit in the sessions, with focused attention directed toward attitudes, mindsets, and lifestyles.

Table 4**Selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ4**

Interview direct quotes:
<ul style="list-style-type: none"> - I don't think it's a matter of if your lifestyle would allow it, but a matter of personal choice and mindset. You have to be the one to decide if it is something you want to follow - I am ashamed to say I have not (heard of circular economy), enlighten me - I don't know where I heard it or where I read it... maybe in a training or at work - I have not heard of circular economy
Focus group direct quotes:
<ul style="list-style-type: none"> - We recycle all around the island, getting green waste, and we turn them into something new. But we want to go further than that - It's cost, culture, we talk about education - We bring in so much and where does it go at the end

Table 5**Selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ1**

Interview direct quotes:
<ul style="list-style-type: none"> - Based on my understanding, circular economy is all about a product that is being produced in a particular community, and then it will be transformed into several things - I've never heard of the concept - Have not heard much. For Guam, business would have to share one common denominator that is sustainable for themselves and the island - I'm just trying to do my part to reduce waste; I haven't heard much about it. Little to none. Little talks. I really don't understand - I'm not too familiar with the term circular economy
Focus group direct quotes:
<ul style="list-style-type: none"> - Not heard about it. I guess recycling and growing more local stuff, you think of the recycling logo. - But on Guam we've been using our indigenous knowledge. As Chamorros we've been able to live off the land and survive for many generations. - The concept is taking something we already have or creating a value-added product based on that or using local businesses or local producers the end product user will be local and it really eliminates as much outside influences - You really try to create something using count husk as a fire starter. I can start gathering that and selling that to other people on our island - The money stays here and the products stay here and is used locally - I've never heard of it. This is the first - First I've heard of this concept, likes the idea, I feel the same, trash being recycled is a wonderful idea. Educate from the grade school level, involve people. - Gaining understanding, market gives incentives to reuse products instead of scrapping them.

Participants notably highlighted the issue of wastefulness among Guam's consumers. The synthesis of these insights underscores the confluence of factors, including attitudes, mindsets, knowledge, education, awareness, and lifestyle patterns, which serve as leading indicators of potential shifts in consumer behavior.

Table 6 contains salient feedback, selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ2 (See Appendix, Figure A6, for the word cloud generated for this table):

- RQ3: How will Guam's residents deal with specific barriers to CE implementation, such as a lack of representation in the industry, a lack of public awareness, limited land and resources, and a lack of recycling centers?

Table 6
Selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ2

Interview direct quotes:
<ul style="list-style-type: none">- Feels like can't do anything at the moment- Try to look for ways to transform these raw materials into a value added products. Starting with this, the concept of circular economy will grow within the island- Instead of using lightbulbs we use LED lights. Used to recycle. Our building is supposed to be environmentally friendly- I can't identify anything. To reduce the amount of waste that I use. I have to change my behavior
Focus group direct quotes:
<ul style="list-style-type: none">- It could be realistic. But we have to start small. I see a lot of brands that recycle closely. It's possible but we just need to smart small- But is it profitable for the vendor to make it? For smaller companies it's harder for bigger companies that have bigger budgets they can take the hit for me it's a little bit difficult. I think it's definitely realistic.- The more we support those kinds of businesses the more we can think of other ways to do business on Guam.- A lot of greed in the economy, wanting most profit in business. Never going to get 90% of businesses to adopt a business model.- Treating as a finite thing, profitable, starts with changing attitude first.- People want to make money, don't change costs if it impacts profit- Mindset is very important and starts with that. Investment is the second part. Agree to invest and the long term of it. It's possible but a linear economy has been that way for a while- Takes a community to come together, but everyone needs the money. Everyone can brainstorm how each of us can build this to make it a reality- We need this. Yes and no, definitely realistic. Don't think we'll ever know unless we try, give it a try

Within this complex landscape, participants in the study proposed actionable strategies and interventions striving to surmount these challenges. Foremost among these strategies is the imperative to propagate advocacy for the CE concept, thereby fostering awareness and garnering support within the community. This collective action extends to the grassroots level, where participants emphasized the importance of educating family and friends about the concept, thereby catalyzing a cascading effect of awareness and commitment.

Moreover, individuals expressed a collective resolve to cultivate heightened awareness regarding sustainable businesses and products. This conscientious consumer stance, it is envisaged, would serve as a catalyst for demand-driven change.

Table 7 contains salient feedback, selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ3 (See Appendix, Figure A7, for the word cloud generated for this table):

- RQ4: Why has the population of Guam not established more CE initiatives?

There are a numerous reasons why Guam's population has not embraced established CE initiatives. Foremost among these requisites is the need for a fundamental shift in the island's willingness to embrace the CE concept. Participants stressed the significance of cultivating a collective attitude oriented toward change as an essential precursor to adoption. Affordability, perceived as a pivotal stumbling block, emerged as a central theme, casting shadows over the feasibility of circular models within Guam. Participants articulated the necessity for the concerted involvement of both the Government of Guam and local businesses to exert influence and provide the necessary impetus for CE adoption.

Table 7
Selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ3

Interview direct quotes:
<ul style="list-style-type: none">- Lack of natural resources- Inconvenience, you have to reach out to people, get everyone to do it . . . it would be more beneficial- Challenges: getting everyone else to accept it . . . getting started, how do you start, continue it, and maintain- Getting all the companies on board . . . money is a factor- Not enough resources . . . no manufacturing facilities or company that is big on recycling
Focus group direct quotes:
<ul style="list-style-type: none">- Biggest challenge is acceptance from consumers, businesses, government- Put into law, we have to react- The government needs to be involved . . . it could be acceptable everywhere if we have some public incentive- Government and businesses need to take initiative and reduce. Meet with action by those with power and resources. Not just individuals but businesses responsibility as well.- Agree with another . . . everyone in the business and government need to be responsible, and take ownership . . . take part in circular economy- Business community needs to take initiative to build those resources so the public can go and contribute to circular economy- Starts at home, but also starts at level of businesses and government

Table 8 contains salient feedback, selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ4 (See Appendix, Figure A8, for the word cloud generated for this table):

6.2. Summary of qualitative results (overall)

6.2.1. Qualitative findings: Business thematic framework

This study draws a sobering conclusion from the business community: Guam presently stands unprepared for the full-fledged adoption of a CE paradigm. However, the discernment of opportunity amidst this readiness deficit does not elude Guam. This insufficiency is rooted in a confluence of factors, prominently marked by a dearth of resources, limited logistical capacity for sustainable processing units, and a pervasive lack of community knowledge concerning the CE, among other formidable barriers.

Resoundingly echoed by interviewees is the refrain of skepticism, with numerous reasons proffered as to why Guam may appear ill-suited to embrace the CE, outweighing the rationale for its adoption. These reservations are exemplified in the perceived dearth of concerted effort on the part of the government, business entities, and the wider community. A poignant declaration made by one interviewee encapsulates this sentiment: "It just isn't feasible here."

Indeed, this sentiment bears a striking measure of truth. However, amidst this realism, a beacon of hope emerges in the form of behavior change interventions. Simply by conducting this first phase of discovery may hold the key to instigating transformative progress. At its core, the solution rests upon a bedrock of community education, underpinned by incentives that coalesce around the CE, and substantiated by tangible success narratives that the CE paradigm can herald.

6.2.2. Qualitative findings: General population thematic framework

Respondents who represented the general population of this study indicated that Guam stands poised for the introduction of a

Table 8
Selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ4

Interview direct quotes:
<ul style="list-style-type: none">- Education is really important . . . getting the word to children . . . start with the younger kids, will move the consumer behavior- Take a lot of changes. Adopt a delivery mechanism to retrieve and use again. The manufacturing side of things, to do things on your own as in reusing computer parts- Appreciate a business that encourages circular economy that I could follow it through- First, people should have mindset, people should have a common mindset on what it is to have a circular economy, so that each person know their role. Because if you are just going to teach to certain group of people without the whole population knowing what it is. They might get confused. It should be explained to all the people who are concerned, to all the stakeholders. Get them involved to know their roles- The community needs to be onboard. If options are not available for people to avail themselves, it's hard to get people to participate
Focus group direct quotes:
<ul style="list-style-type: none">- We really need to educate everyone . . . it could work . . . I am conflicted- I think Guam is ready because there are more vendors coming up with this mindset. For me I see a lot of local business owners, especially the youth. They're gearing everything towards sustainability- Guam is ready; need direction and the support financially; but are we prepared?- Educate people, especially younger gen. gets them used to it- Can be productive when we start with educating from the bottom up or the top to help us. Guam is ready.- The challenge is infrastructure is not here on the island, to feed what the people want- Businesses are not ready to invest in this. Businesses lacking in products. Big businesses are not ready to make that investment- Guam can be ready. It's up to us. We have to speak out and voice out in order for things to happen- Push our government to make this happen- Accountability. Holding each other accountable to businesses and the government. Bring greener and sustainable products to the island

CE concept, albeit not without a concomitant sense of trepidation. The readiness of Guam is framed within the contextual challenges of minimal resources and a pervasive lack of communal familiarity with the CE, among other notable barriers.

In the course of interviews, participants repeatedly emphasized that the path to embracing a CE in Guam would be characterized by gradual progress and incremental steps. This deliberate pace underscores a pragmatic realism, echoed in one individual's powerful assertion, "If that lifestyle is going to shift things in a manner that is going to take away things from people, like their jobs, that's never what I wanna do." This statement encapsulates the complex interplay of concerns surrounding change.

Yet, amidst these realistic concerns lies a viable solution in the form of behavior change interventions. This strategic approach hinges upon multifaceted community education, strategically designed incentives aligning with CE principles, the dissemination of compelling success case studies, and the cultivation of unwavering commitment and lifestyles aligned with circularity.

It is essential to underscore that this path forward is characterized by a deliberate, measured cadence, designed to build consensus and assuage concerns over time. In essence, the adoption of behavior change interventions constitutes a prudent and effective approach to navigate Guam's journey toward a more sustainable and circular future.

7. Discussion

The results of this discovery phase of the research provides evidence that the island of Guam should highly consider learning more about CE in general and efforts should be considered to seek more evidence of where CE could assist the local business community, and employ interventions to build awareness of CE. Sciacca [57] highlights the perspective that CE is rapidly entering the tourism research agenda, which should be desirable for a location such as Guam. He outlines that the traditional linear model that tourism has used for decades may not be sustainable for SIDS.

When using the traditional linear model in tourism, it comes with lots of negative "baggage" to the industry and the destinations that tourists visit. Rodríguez-Antón and Alonso-Almeida [58], Sciacca [57], and Rodríguez et al. [59] all mention that the "take-use-dispose" approach (linear model) leads to the over-exploitation of resources (e.g., water), unsustainable levels of waste generation, and poor waste management, especially in destinations that lack appropriate infrastructure and suffer from over-tourism and/or seasonality. Guam is definitely one of these locations.

One of the many examples is the potential excessive use of water resources used in hotels and resorts, which can cause an imbalance in the local population's need for water. Additionally, there is the ever-present issue for SIDS, solid waste [60]. In 2015, Guam reportedly generated somewhere around 50 tons of plastic waste per day [61]. Estimates are now that it generates somewhere around 90 tons per day [62]. One last facet to interject into this discussion is generational. Moving toward a more sustainable way of life is of high importance to the millennial and Gen-Z population, who are quickly becoming the majority in our communities [63].

7.1. Theoretical implications

By leveraging OD, along with one of its foundational elements (change management), and action research, another pebble is and will be placed in the larger ocean of data that support OD as still being relevant and appropriate for large group interventions, as will be needed in Guam [64]. In fact, the United Nations, understanding the necessity that change is inevitable and to promote change as it relates to sustainability, has developed a unit solely dedicated to change: UN Lab for Organizational Change & Knowledge [65].

The data presented in this study are beneficial in developing future engagement plans to help the various communities in Guam and potentially regionally (Northern Marianas Island chain and the Federated of States of Micronesia) to bridge the gap that exists between present state (lack of CE knowledge) and future state (the potential benefits of CE especially as it related to the business community) by focusing on change processes that incorporate whole systems approaches [66].

7.2. Practical implication

The blending of theory and practice is important if operational change is to occur, which is exactly what Guam needs if it wants to become a truly sustainable island, one that could become a model of excellence for the Western Pacific. In order to do so, scholars and practitioners need to collaborate for this change to occur. Unfortunately, academics and practitioners focus on opposite sides of the same coin. While academics, who are scientific practitioners [67], look at empirical data, practitioners look at practical ways to make

their operational lives better. This study, as it progresses through its development, will need this blending of these two worlds or the flipping of this coin to occur. Leveraging the power of OD, with its ability to stimulate change [68], action research's strength of combined research efforts [69], and interventions designed and conducted by practitioners who understand how behavior change occurs, especially as it relates to SIDS, is imperative.

8. Limitations, Recommendations for Further Research, and Conclusion

The purpose of this discovery phase (Phase I) was to set the foundation of a much larger initiative. The research results captured will be used in a longitudinal study of CE in Guam. The purpose of the larger longitudinal study, which is currently being designed by the author, will seek to identify how and where CE may be able to assist a SIDS location, Guam, a state that relies heavily on tourism. Currently there is a lack of scholarly research on the CE as it relates to SIDS. Therefore, the data in this study and data that will be captured in subsequent studies will provide invaluable to scholars and practitioners alike on the challenges and possible necessity of deploying CE for small island destinations, filling in the various gaps in knowledge that currently exist.

Two limitations occurred with this study. One limitation was the sample size of the study. Of the 153,000 inhabitants in Guam, 44 respondents (n=44) were sampled for this study. Additionally, further studies should highly consider casting a wider net by surveying and querying a larger portion of the business community and ensuring that a larger cross-section of local businesses is included in the data gathering.

In terms of future research, it is essential to outline a comprehensive roadmap for future research, which should extend and enhance the findings and insights gained in Phase I. The next set(s) of studies and research should incorporate a multifaceted approach that delves deeper into assessing Guam's readiness to embrace CE principles. It is highly recommended that the implementation of action research and OD interventions occur. These interventions should be designed to build upon the knowledge and understanding acquired during Phase I's discovery review. The primary objective of these interventions should be to assist in evaluating and developing transformation of local businesses and the general population in Guam toward CE practices with the aim of disseminating knowledge about the CE's benefits and encouraging sustainable practices among the island's residents.

The collective wisdom distilled from this study proclaims that while Guam may presently stand at a crossroads in its journey toward CE adoption, the prospect of meaningful change endures, contingent upon a resolute commitment to transformative action. While the road to circularity in Guam is replete with challenges, the collective resolve and concerted efforts of stakeholders hold promise for a sustainable and circular future.

The study delineates a mosaic of impediments and prerequisites inherent to Guam's CE journey. It underscores the pivotal role of collective willingness, affordability, resource availability, and proactive engagement from both the government and business sectors as prerequisites for transformative change. It also highlights the need for action that can be leveraged by the power of organizational development, action research, and the deployment of multi-phased interventions to fill in the gaps of knowledge about the CE that will lead to attitudinal transformations and incremental changes. In doing so, it holds the promise of ushering in a sustainable CE paradigm on the island.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The author declares that he has no conflicts of interest to this work.

Data Availability Statement

Data are available on request from the author.

Author Contribution Statement

Albert Valentine: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition.

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Appendix

NVivo clusters of analyzed words and themes “Word Clouds”

As indicated in the article, a thematic, inductive approach was used to look for themes or patterns that surfaced in the data. What is contained in this appendix are the word clouds that emerged when conducting the thematic analysis using NVivo Pro11.

Tables 1–4 contain salient feedback, selected direct quotes from the semi-structured interviews, and focus groups with the **business population** as related to research questions 1–4 (RQ1–RQ4). Outlined below are the word clouds that emerged for each table:

Figure A1
Thematic word cloud supporting data for Table 1



Note: Table 1, selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ1.

Figure A2
Thematic word cloud supporting data for Table 2



Note: Table 2, selected direct quotes from the semi-structured interviews and focus groups with the business population as related to RQ2.

Figure A3
Thematic word cloud supporting data for Table 3



Figure A5
Thematic word cloud supporting data for Table 5



Note: Table 5, selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ1.

Figure A6
Thematic word cloud supporting data for Table 6



Note: Table 6, selected direct quotes from the semi-structured interviews and focus groups with the general population as related to RQ2.

