



Category: Research Article

The Impact of Circular Economy Success Factors and Circular Economy Knowledge on Resilience and Brand Image of Sri Lankan Business Organizations

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ARTICLE DETAILS

Article History

Published Online: 14th August 2024

Keywords

Circular economy, Firm Resilience, Brand image

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ABSTRACT

Circular Economy (CE) strategy is implemented to accomplish sustainable development through increased resource efficiency. The concept is still at the infancy level in Sri Lanka, but few empirical articles in the Sri Lankan context can be found in recent literature. This research aimed to assess the current level of knowledge on the circular economy among Sri Lankan Businesses and to understand how principles of circular economy can be applied to Sri Lanka to make companies resilient especially during and after pandemic disruptions. The objective of this work was to study circular economy knowledge and critical success factors and analyze them with respect to the resilience and brand image of business organizations in Sri Lanka. This research tested the relationship between CE knowledge and capabilities, CE success factors, and firm resilience and brand image. This research used a quantitative methodology with a questionnaire for data collection. It found that there is a significant positive relationship between CE knowledge and capabilities, CE success factors, and firm resilience and brand image. CE knowledge and capabilities and CE success factors explained 32.3% of the variation of the dependent variable. Based on the findings, the study recommends some significant efforts that can be undertaken by firms and the government to accomplish a circular economy.

1. Introduction

The Sri Lankan ecosystem is constantly deteriorating. Sri Lanka is amongst the top 65 countries at risk from the impacts of climate change [1]. To reverse this trend, Sri Lanka needs to make significant changes in the way industrial operations are carried out and the way raw materials are used. Many concepts have been offered for this purpose, with the circular economy gaining the most prominence in recent years [2].

In recent years, a lack of commitment and dedication on the part of both the public and the state has resulted in major environmental damage to Sri Lanka [3]. Deforestation is one of the major environmental issues in Sri Lanka. Sri Lanka's natural forest cover is currently less than 25% of its land area, or around half of what it was before independence. If we include planted forests in this calculation, the total area is likely to be approximately 30% [3]. Around the year 1800, natural forests covered about 80% of Sri Lanka's area. Garbage and pollution are also contributing a

lot to environmental pollution. In Sri Lanka's metropolitan surroundings, increased waste and pollution are big concerns. In many municipalities, garbage pollution has risen due to a lack of effective disposal or recycling procedures.

The circular economy concept provides a direction to reduce the environmental damage by deforestation and garbage disposal while facilitating economic growth. Unlike the traditional linear economy, where raw materials are eventually transformed into trash after use, the circular economy strives to create a virtuous loop in which commodities that have reached the end of their useful lives are changed into resources for the next generation of goods. As a result, the circular economy aims to close loops in industrial ecosystems [4], allowing businesses to generate and capture value through reuse, repair, remanufacturing, and recycling [5]. Despite its growing popularity among academics, governments, policymakers, and nonprofit groups, the circular

economy is still a niche phenomenon, with just a few enterprises in a few industries adopting it [6]. Barriers to the growth of the circular economy have already been investigated in developed countries [7]. However, a complete knowledge of how to promote the circular economy on a global scale to the point where it becomes a mainstream economic practice is still lacking.

Few studies have been conducted in the Sri Lankan context on circular economy. [8] studied the "Circular economy of composting in Sri Lanka". Their findings revealed that establishing compost capabilities to recycle organic waste will decrease total waste management and fertilizer costs by US\$191 million.

The worldwide outbreak of the COVID-19 virus exposed various flaws in global manufacturing and supply chains [9]. It showed that countries are too dependent on imports and exports even when local production is feasible. Given the fact that the shipping industry and aviation industry are responsible for 1800 million tons of CO₂ per year, which is 4.6% of the world's total CO₂ emissions, international economic strategies must be revisited [10].

As for Sri Lankan entrepreneurs and policymakers, COVID-19 may be considered as a "wake-up call". It demonstrated very clearly how frail the economy of Sri Lanka is and how pollutive the Sri Lankan business and society are which raised doubts about the resilience of Sri Lankan business. The circular economy, according to [11], can help firms become more robust to pandemic disruptions in the future [11]. The circular economy is also being promoted as an ecologically friendly method of post-pandemic economic recovery. COVID-19 demonstrated the interdependency of business, environment, government, and society on each other for mutual survival during a crisis. For example, air pollution in Sri Lanka's metropolitan regions decreased by 75% during the lockdown, while plastic pollution and other marine pollution decreased by 40% along the coastline [12]. On the other hand, the indicators jumped back to the previous or even worse with the remission of Covid-19 in Sri Lanka. New challenges such as the disposal of facemasks, environmental damage in the production and use of sanitizers, etc. created new challenges. The conclusion is that as a country we have failed to understand the opportunities for a circular economy in the post-COVID period. As a country, Sri Lanka is yet to "learn the lesson", whereas many other countries revisit and restructure their economies based on circular concepts.

This research hopes to address the following research questions.

1. What is the current level of knowledge and interest in the circular economy among Sri Lankan Businesses?

2. What are the impact of circular economy-related knowledge and capabilities that companies possess and critical success factors of circular economy with the ability to survive in turbulent times (measured as brand resilience)?

The specific research objectives are as follows

1. Assess the current situation of knowledge and interest in circular economy among Sri Lankan Businesses

2. To find out the influence of circular economy-related knowledge and capabilities and critical success factors of circular economy on brand resilience

2. Literature Review

According to a World Bank analysis titled "What a Garbage 2.0," the world is anticipated to create roughly 3.4 billion tons of waste per year in 2050, up from 2.01 billion tons now. According to this research, at least 33% of total trash created today is not recycled or reused. According to [13], 90% of raw materials used in manufacturing become waste before the finished product leaves the manufacturing plant, and 80% of manufactured items are discarded during the first 6 months of their existence.

The circular economy entails sharing, renting, repairing, and renewing products and their materials as many times as necessary to counteract a linear economy that has wreaked havoc on ecosystems throughout time. The circular economy considers all aspects of a product's development, from manufacturing to packaging material selection, and has three basic goals: to reduce waste and pollution, to keep goods and materials in continuous use without disposal, and to renew natural systems [14].

Switching from the existing linear economic model to a circular one would not only save Sri Lanka hundreds of billions of financial resources, but it would also have a huge positive impact on the environment. The circular economy is an economic system of closed loops where raw materials, components, and products drop their value as little as possible, minimum materials and energy are used in production, and renewable energy sources are used as much as possible. Systems thinking is at the core of the circular economy. [15] mentioned a conceptualization of circular economy which is linked to environmental sustainability. They stated circular economy as "a concept used to describe a zero-waste industrial economy that profits from two types of material inputs: (1) biological materials are those that can be reintroduced back into the

biosphere without harm or waste and, (2) technical materials, which can be continuously re-used without harm or waste”.

Another concept that resembles circular economy in a business context is “Circular Product” [16]. Maintenance, repair, refurbishing, redistribution, upgrading, and resale are all possible with circular goods. They are made to make reusing, recycling, and cascading easier. This necessitates a modular design as well as the selection of materials that allow for cascading, reusing, remanufacturing, recycling, or safe disposal. As a result, these goods are completely ready to circulate in closed material loops. Furthermore, product design should allow for the use of less raw material or energy, as well as the reduction of emissions. Circular products can likewise be dematerialized and sold without any obstacle.

Past research has linked circular economy with business models and canvas [17]. In Value Proposition Design, businesses develop products that are 100% ready to be circulated in the closed material loops. Furthermore, product design allows using less raw materials or energy. User-oriented services such as leasing, pooling, renting, and pay-per-service units are becoming very popular compared to traditional buy-and-own systems. Circular value propositions associated with services may focus on shifting their traditional form to virtual (e.g., virtual teaching, virtual travel). “Collaborative consumption” can create cost savings, services tailored to customer needs, and additional benefits.

In 2020, the world was affected by COVID-19, which caused severe respiratory infections, leading to an increase in environmental problems due to the increased consumption of facemasks, sanitizers, medical waste, and plastics (such as PPE and packaging plastics). Although human lives were protected by the use of these plastics during this pandemic, it is critical to progress toward plastic recycling methods and ecological and sustainable alternatives, such as bio-based degradable plastics, to achieve a circular economy [18].

The unexpected situation with the pandemic has forced countries to adopt a linear economic approach to waste management, which entails the consumption of resources to manufacture new products, with the majority of these products ending up in landfills [19]. To further worsen the situation, during the pandemic, material recovery facilities were hindered in Sri Lanka as local authorities were worried about the risk of coronavirus spread among the waste handlers, and thereafter economic crisis in Sri Lanka reduced the amount of capital and recurrent expenditure allocated for recycling facilities by the government.

Small and medium companies (SMEs) can enter the circular economy in five phases, according to [20] increasing knowledge about concepts of CE and understanding the company's partners, stakeholders, and preparation for CE are the first two stages. The next phase is about assessing redesign opportunities and how the model needs to be rebuilt to support this. The last phase determines if the value supplied is what customers anticipate and are willing to pay for.

Different sustainability models are being implemented in the drive for environmental sustainability, with the circular economy (CE) being one of them. CE's fundamental objective is to create an economic system that allows materials, goods, and components to be recycled in a way that preserves their worth for as long as feasible.

Previous research on CE has found that the resilience and brand image of businesses is reliant on the level of knowledge and capabilities possessed by them [21]. An experimental study was carried out to assess the perception of remanufactured refurbished or repaired products in a panel of consumers [22]. The results showed that consumers who consider remanufactured/refurbished/repaired products green typically found them to be significantly more attractive. [21] stated that brand equity manipulation proved less important to consumers than specific remanufactured product quality perceptions. Therefore, there is evidence that adopting CE practices leads to a better brand image.

Knowledge can be defined as the often implicit or tacit know-how on how to perform actions. [23] examined the influence of CE knowledge on the ability to develop environment-friendly production processes and found that CE knowledge fosters change capabilities toward a successful CE model. The more knowledge and capabilities organizations possess, they are likely to engage in CE-related developments and communicate their achievements to the public. This will enhance their brand image. As discussed in the introduction section, in turbulent times such as the pandemic and economic recession, resilience is also affected by the level of CE adaptation.

Research Hypothesis and Conceptual Framework

Hence the first hypothesis is formed as:

H1: Circular economy knowledge and capabilities have a positive relationship with resilience and the brand image of the organization

Recent research by [24] focused on the identification and evaluation of Critical Success

Factors (CSFs) needed in the business strategy development of CE practices. They found that six CSFs are classified as causal towards CE practices: “leadership and top management commitment,” “strong legislation towards CE practices,” “ecological scarcity of resources,” “knowledge of CE practices,” “funding support for R&D from the government,” and “competitor pressure on CE practices.” Past research on CSF of CE indicates that these or similar CSFs lead to brand name development and sustainability of businesses during and post-COVID era [25]. Hence the second hypothesis can be formed as follows:

H2: Critical Success Factors of the circular economy have a positive relationship with resilience and the brand image of the organization

The following conceptual framework was developed to test the above hypothesis.

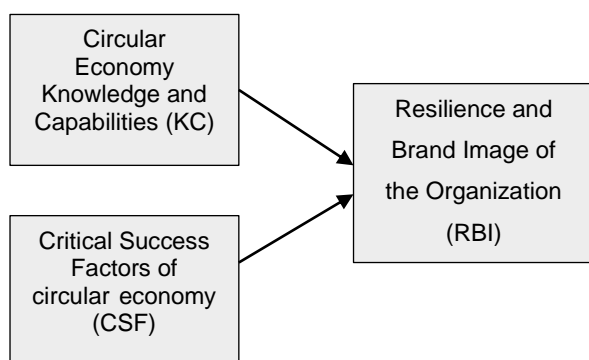


Figure 1. Conceptual Framework of the Research

3. Methodology

This study is explanatory in nature and a quantitative research approach was adopted where primary data were collected using survey questionnaires. The survey questionnaire was developed based on measures used in previous studies.

To assess the feasibility of implementing CE in Sri Lanka, this research investigated the critical success factors of CE. The questionnaire was adopted from the items proposed by [24]. To sustain the Sri Lankan products in the global market and to introduce CE initiatives for the minimization of waste, it is important to identify and examine CSFs for the Sri Lankan manufacturing industry. Therefore, in this research, Circular economy-related knowledge and capabilities (Circular Literacy) required for CE implementation have been identified through the literature review and feedback from experts in the field. The respondents were asked to indicate their perception about the current level of support for each indicator in a 5-point Likert scale.

The population of the study is all business organizations in Western Province, Sri Lanka. The sampling frame used for this study is the yearly registration lists maintained by the Provincial Department of Business Names Registration, Western Province. A simple random sampling method was adopted in selecting the respondent from the sample frame. 100 business organizations were randomly selected from business registrations within the period 2015-2020. The data collection was carried out in 2021.

A structured non-disguised questionnaire was developed to test the conceptual framework. All structured questions were measured on a five (5) point Likert scale similar to the original scale.

Table 1: Scales of Measurement

| Variable | Scale of Measurement | Num of Items |
|---|---|--------------|
| Circular economy-related knowledge and capabilities (Circular Literacy) | Author developed | 8 |
| Critical Success Factors of CE | [24]. | 10 |
| Resilience and brand image of the organization | The author developed based on Naidoo (2010) | 3 |

A total of 100 survey questionnaires were distributed using both online and physical methods. Questionnaires prepared using the Google Forms facility were distributed through email. Some questionnaires were also physically presented to the entrepreneur/owner or a first-level manager. Respondents were promised anonymity for themselves and their organization, together with a guarantee of the confidentiality of data they provided. The final response was a total of 76 observations (A response rate of 76%). The conceptual framework and its hypothesis were tested using SPSS and SMARTPLS.

4. Results

4.1 Demographic Profile

There are 76 usable questionnaires from respondents for this study. The demographic characteristics were analyzed by descriptive statistics by computing the percentage of each

group. Analysis of demographic characteristics indicates that male entrepreneurs/managers outnumber female entrepreneurs/managers easily in Sri Lanka. The majority of entrepreneurs/managers are from 20-40 years range. About 34% of the respondents had a degree or above qualification level indicating entrepreneurs or higher-level managers of organizations are well educated.

Table 2: Demographic characteristics

| Variable | | Percentage (%) |
|-----------------|--------------------------------------|----------------|
| Gender | Male | 82 |
| | Female | 18 |
| Education Level | Had A/L or Certificate/Diploma level | 85 |
| | Had Vocational Qualification | 7 |
| | Had a Degree or Postgraduate | 34 |
| Age | 20-26 years | 13 |
| | 27-33 years | 14 |
| | 34-40 years | 20 |
| | More than 40 years | 53 |

4.2 Reliability Test

Table 3 below summarizes the reliability test of all measures after factor analysis has been done (all items of Compatibility factor were eliminated). As shown, the Cronbach alphas of the measures were all comfortably above the lower limit of acceptability which is $\alpha \geq .7$.

Table 3: Summary of Reliability Coefficients

| Variables | Number of items | Reliability |
|--|-----------------|-------------|
| Dependent Variable (DV) | | |
| Resilience and brand image of the organization (RBI) | 3 | .874 |
| Independent Variables (IV) | | |
| Circular economy-related knowledge and capabilities (KC) | 8 | .727 |

| Variables | Number of items | Reliability |
|--------------------------------------|-----------------|-------------|
| Critical Success Factors of CE (CSF) | 10 | .836 |

4.3 Descriptive analysis

It can be seen that the mean of Circular economy-related knowledge and capabilities (8 items), is 2.8 which is considerably low. Out of the 8 items, items KC6: The company has spent a substantial amount on investments that improve circular economy performance, and KC7: The company vision, mission, and strategic plans reflect organizational commitment to circular economy concepts recorded less than 2 mean values, indicating the poor commitment of business organizations on CE.

The histogram plots revealed that although the data is not normal, there is no serious violation of the assumption of normal distribution.

4.4 Analysis of Data Using PLS-SEM (SMARTPLS)

Minimum factor component loadings of 0.50 or higher are normally considered significant for the outer measurement model [26]. All the indicators of the outer measurement model of this research fulfilled this criterion of a minimum of 0.5. [27] stated that if the Average Variance Extracted (AVE) is greater than 0.5 that is a necessary and sufficient condition for convergent validity of the instrument. As seen from Table 4, all AVEs are above 0.5 for the constructs.

Table 4: AVE for the constructs

| Variable | Num of items | AVE |
|----------|--------------|--------|
| KC | 8 | 0.6637 |
| CSF | 10 | 0.8266 |
| RBI | 3 | 0.8087 |

The number of bootstrap samples was set to 500 to run the SMARTPLS program.

Table 5: Summary of structural model testing

| | Path | Path Coefficient | SE | t | |
|----|---------|------------------|-------|------|-------------|
| H1 | KC>RBI | 0.4450 | 0.056 | 6.67 | Significant |
| H2 | CSF>RBI | 0.4310 | 0.097 | 4.56 | Significant |

R^2 is also called the coefficient of determination because it assesses the proportion (which is converted to percentage by multiplying by 100) of the variance of the endogenous construct that can be explained by its predictor constructs [26]. [28] suggest 0.10 as a threshold to identify a minimum level of prediction that can be practical significance.

Circular economy-related knowledge and capabilities and Critical Success Factors of CE (CSF) account for 32.3% of the variance of Resilience and brand image of the organization (RBI) in the Sri Lankan context. This is a substantial significance in explaining the dependent variable.

5. Discussion

Most of the recent research carried out in the Sri Lankan context contributed to a greater understanding of various elements of the circular economy especially recycling technology, but these studies looked at the waste management sector in isolation from other relevant economic activities [8]. Few studies have been conducted on the broader application of circular economy in Sri Lankan business ventures. This study fills the research gaps discussed above by developing a conceptual framework that links CE knowledge, CE success factors, and organizational performance.

The descriptive analysis of questionnaire items indicates the extremely poor knowledge of higher-level managers on circular economy. This finding is in line with the research by [29] and [30] who commented on the lack of knowledge of Sri Lankan organizations on circular economy, recycling technology, and technology transfer.

Several past research have looked into how CEs are implemented and measured. In the Italian pasta sector, [31] looked at CE techniques to reduce food waste, while [32] looked at CE practices for an eco-industrial design process in the south of the Netherlands. [33], indicated that developing CE knowledge is the first step in developing CE practices. [34] analyzed the success factors that influence implementing CE activities from a systematic literature review. Technical factors (e.g. availability of technology, technical support, training) economic factors (transaction costs), and soft drivers with social, regulatory, and institutional factors were found to be the main success factors. This research reinforces the fact that CE knowledge and success factors play a main role in the development of CE practices which in turn creates a favorable environment for resilience and brand image.

CE concept is widely discussed in the academic literature, especially after Covid-19, but limited progress has been accomplished so far regarding empirical research. The objective of this work was to study circular economy knowledge and success factors and analyze them with respect to the resilience and brand image of business organizations in Sri Lanka.

Governments must realize the necessity for CE policy at the national level in a variety of ways. The Sri Lankan government must reduce over-reliance on other manufacturing countries and imports. This will unwittingly encourage concepts such as reduce, repair, reuse, and recycle when goods are not easily available for consumption. Sri Lanka must develop legal frameworks to promote green logistics and waste management which incentivize responsible manufacturing and cleaner technology. Cities need to be redesigned carefully so that they mimic "smart cities" with optimized energy utilization, mobility (e.g. facilities for cycling), and a supportive atmosphere for shared mobility choices (such as ride-sharing) etc. Business and consumers on the other hand must change their business operations and buying behavior to promote and sustain the circular economy. The consumers must understand the long-term repercussions of the "linear products" economic model which the products end up in dumps in a short time. Government must stop cheap low-quality imports where the quality and life of products are low. Sri Lankan consumers need to support organizations which embrace concepts of circular economy (not done for promotion purposes).

6. Conclusion

This research tested the relationship between CE knowledge and capabilities, CE success factors, and firm resilience and brand image. This research used a quantitative methodology with a questionnaire for data collection. It found that there is a significant positive relationship between CE knowledge and capabilities, CE success factors, and firm resilience and brand image. CE knowledge and capabilities and CE success factors explained substantial variation of the dependent variable. Based on the findings, the study recommends some significant efforts that can be undertaken by firms and the government to accomplish a circular economy.

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2. Majority of employees in this organization have an awareness of the circular economy
3. Frequent training and development programs are carried out to increase the knowledge of employees on aspects related to circular economy
4. The company always promote and reward 3R (Reduce, Reuse, Recycle) ideas
5. The company have been engaged in renewable energy practices to minimize energy utilization
6. The company has spent a substantial amount on investments that improve circular economy performance
7. The company vision, mission and strategic plans reflect organizational commitment to circular economy concepts
8. The company has developed a rapport with the government organizations and NGOs which are engaged in promotion of circular economy

ANNEX

Questionnaire Items to measure "Circular economy knowledge and capabilities" (Author developed based on past literature)

1. I am well aware of the concept of circular economy as a higher-level manager