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Research Article

Monetizing Social Life Cycle Assessment (SLCA): A Case Study in SMEs Tapioca Industry in Lampung, Indonesia

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Abstract

To verify the responsible and sustainable functioning of circular economy (CE), assessing the sustainability of CE methods is essential. The consistent absence of a social aspect within the CE has been a recurring topic in research. This paper aims to pinpoint social-benefit aspects that are quantifiable in monetary values and investigate how attributing monetary significance to these elements can enhance the evaluation of social sustainability, leading to more informed decision-making processes. The methodology involves both quantitative and qualitative research methods. A quantitative research study was initiated in February 2023. Two approaches were used for sample selection. First, a case study approach was applied to select a specific SME within the tapioca industry. Survey interviews with workers follow the second step. This study also incorporates qualitative methods like literature review and interviews with key informants (cassava and social experts, government officials, and business owners) in April 2023. This research utilized descriptive analysis as a diagnostic tool, offering valuable insights. Challenges in monetizing social factors are discussed, highlighting the need for standardized frameworks, transparency, and stakeholder engagement. The paper also provides a practical example of monetizing social aspects within a small and medium-sized enterprise (SME) tapioca industry to address issues such as gender wage gaps, worker safety, and community engagement. The findings suggest that the costs of monetizing social aspects may outweigh the benefits in certain cases, calling for a reassessment of practices to ensure a more equitable and sustainable approach to social responsibility. Integrating social factors into assessments improves decision-making processes and stakeholder engagement, ultimately leading to more socially responsible decisions.

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Introduction

The circular economy offers a promising break-through to achieving sustainability; unlike its linear model predecessor characterized by the 'take-make-waste' slogan which triggers some economic problems [1]. The circular economy (CE) has the potential to address the challenges of linear systems, such as resource scarcity [2–4], resource efficiency [5–7], and environmental impact [8–10]. The essence of the CE generally lies in fostering regenerative industrial transformation [11], altering the patterns of production and consumption relation [12–13], and promoting stakeholder engagement in supply chains [14] to achieve sustainable resource utilization. The small and medium enterprises' (SMEs) tapioca flour

industry in Lampung Province, is used to research the application of circular economy principles. Cassava holds significant importance in this region as a leading cassava commodity contributing 33.3% of Indonesia's total cassava production of 16.35 million tons in 2019 [15]. Therefore, Lampung has the second-largest tapioca large-industry in Indonesia with around 59 major enterprises. However, this thriving industry has a significant presence of 3,294 small and medium-sized tapioca industries [16].

Studying these SMEs is crucial as they often implement localized, resource-inefficient practices. Furthermore, wastewater management practices still need to be improved on a small and medium scale. The SMEs tapioca industry is often discharged directly into the surrounding river or canal system, resulting in significant pollution levels [17]. The study in Lampung revealed significant environmental impacts associated with tapioca processing including fossil energy and freshwater consumption which contributes to greenhouse gas emissions, and high organic pollutants [18]. For Instance, to produce one ton of tapioca flour, approximately 16 m^3 of water are needed, and a significant quantity of wastewater generated amounts to 17 m^3 [18–19].

Integrating the circular economy principle into cassava waste management could offer a solution to address this tapioca industrial environmental challenge [20–21]. The utilization of biogas derived from wastewater provides various benefits, such as heat and electricity generation, along with valuable by-products like nutrients and organic matter to support the circular economy [22–23]. Additionally, the combustion of biogas will save CH_4 emissions to the atmosphere at an amount of 1.26 million tons of CO_2 equivalent per year, representing environmental benefit [24].

However, while this circular economy practice shows a potential for sustainability, considering their long-term viability and potential unintended consequences is of paramount importance. A study highlights that examining the sustainability in circular economy practice is essential to ensure their responsible implementation [25]. Yet, despite growing interest in mitigating any undesired externalities resulting from circular practice, developing CE indicators to evaluate sustainability implementation is still a debatable issue [26–27].

Moreover, the various interpretations of the CE concept result in a variety of circularity measures [28] and develop a metric or framework for evaluating the outcomes of circular initiatives. Typically, researchers focus on the environmental benefits of sustainability [29–30, 26] or jointly consider both environmental and economic benefits [31]. Whereas, environmental considerations alone cannot be used as a decision-making tool for sustainability [32].

Life cycle assessment (LCA) presents promising approaches and choices in enhancing the environmental impact of individuals' consumption and production behaviours. Its use as a decision-making has grown in popularity [33]. On the contrary, the challenge lies in measuring impact across different categories, which may vary in their units. This diversity complicates the assessment of trade-offs between environmental factors.

There is increasing focus on assessing the company's social impact across the circular economy throughout the life cycle of their products. The author advocates for the incorporation of more social science elements in environmental LCA development and the utilization of a broader range of scenarios that reflect real-world behaviours. Eventually, this discussion should focus on people, not just products [34].

In other words, the analysis points out that the social dimension, whether in combination with other factors or exclusively, receives minimal attention. Murray et al. [35] emphasizes the CE's primary focus on redesigning manufacturing and service systems for environmental gains, often neglecting the social dimension. The authors emphasize the CE's relative neglect of social aspects compared to the broader concept of sustainability, encompassing environmental, social, and economic facets. These insights collectively underscore the deficiency in addressing social dimensions within the CE [11]. Similarly, supported by other researchers with less attention paid to social considerations [36, 28, 37].

Hence, it is crucial for studies to incorporate the social dimension within the domains of circular economy and policy-making [38]; social life cycle assessment (SLCA) enables consumers to make better-informed and conscientious purchasing decisions [39]. Ultimately, the overarching aim of conducting an SLCA is to facilitate communication among stakeholders, and decision-makers, as emphasized by Garcнa-Sбnchez and Gьereca [40] to enhance the social well-being of the stakeholders impacted by the product's life cycle [41].

SLCA approaches are effective for aiding decision-making to mitigate negative social impacts and enhance positive ones [42] to yield any immediate or advantageous outcomes [41]. The success of an SLCA hinges on stakeholder involvement in defining assessment goals and scope, while considering available resources [43].

While research on qualitative assessment of social impacts in SLCA, as depicted in Figure 1, has made significant, there is a significant challenge in the lack of well-defined standard method to quantify social issue, and by the subjective nature of certain social indicators [46–47]. Furthermore, as most social impacts addressed in SLCA are influenced by an organization’s behaviour and national conditions (e.g., fair salary) rather than a

product, an organizational approach may be more straightforward than a product approach to address social aspects [48].

The current literature mainly focuses on qualitative indicators and there is limited research that explores the potential benefits and challenges of monetizing social factors in SLCA [49]. This research gap highlights the need for further investigation of quantitative assessments in SLCA, specifically in monetizing social aspects. The objective of this paper is to identify the social-benefit elements that can be measured in monetary terms and explore how assigning monetary value to these factors can improve decision-making in assessing social sustainability. To address the research gap and achieve the objective of this paper, the following research questions will be explored:

Which social elements can be quantified in monetary terms? How can the monetization of social factors enhance decision-making in social sustainability assessment?

Measuring progress towards circularity requires considering the entire lifecycle of a product, from raw material extraction to end-of-life disposal or reuse. This requires collecting data from multiple stakeholders across different stages of the product lifecycle, which can be time-consuming and costly. To address this challenge, establishing a clear boundary system becomes essential. This delineation helps define the scope and limits of analysis, facilitating a more focused approach.

Commonly used system boundaries a. gate to graves; transportation of cassava to the processing of sack waste used for tapioca flour b. cradle to gate from planting cassava to managing cassava waste c. gate to gate: transport cassava to tapioca industry to process cassava into tapioca flour. However, to limit the coverage, this research uses gate-to-gate LCA, employing the boundary system previously used by another researcher [50]. The tapioca industry's significant reliance on fossil fuels and freshwater consumption is identified as a core environmental concern within this specified boundary system, contributing to resource depletion, increased greenhouse gas emissions, and elevated levels of organic pollutants [50].

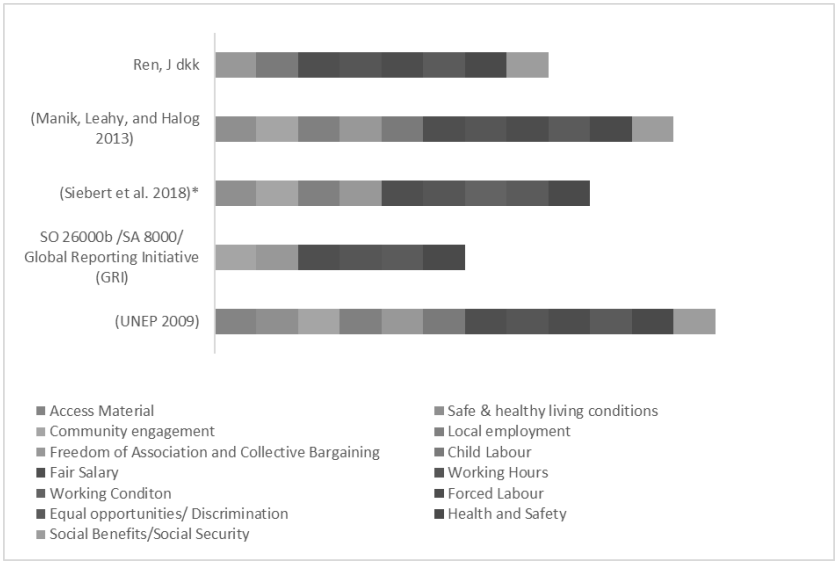

Figure 1 Results of the study of social aspects in a life cycle perspective taken from previous studies [42, 44–45].

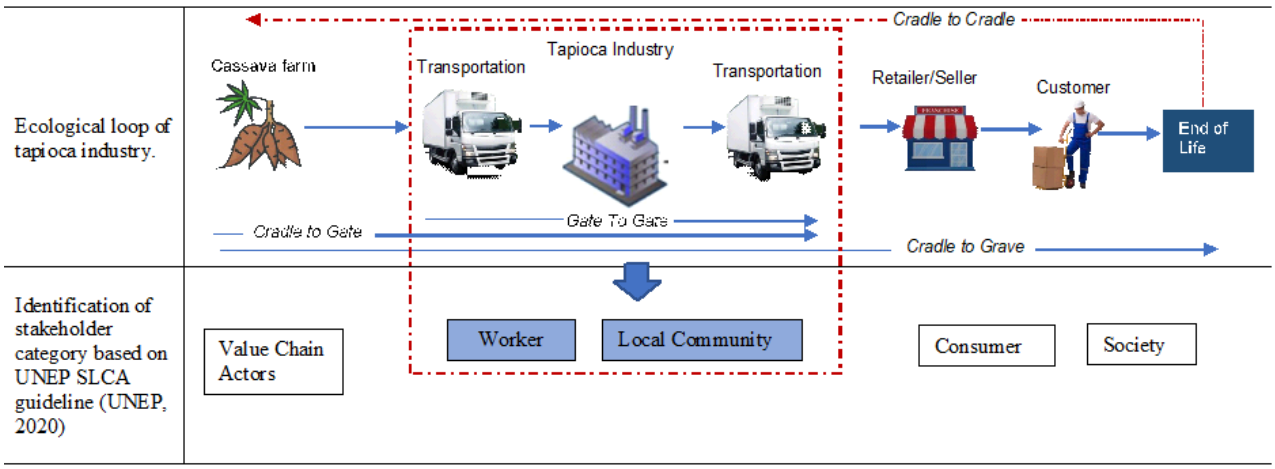

Figure 2 System boundaries of gate-to-gate social life cycle assessment dan stakeholders' engagement SMEs tapioca industry; adapted from Colley et al. [50].

Materials and methods

The study employs a mixed-methods approach that involves both quantitative and qualitative methods. Quantitative research involves interviews to gather data from business owner and workers in February 2023. Two approaches were used for sample selection. First, a case study approach was applied to select a specific SME within the tapioca industry that implements circular economy principles and offers easy access to critical information. The second step was conducting interviews to gather data from workers, using the issue from SLCA guideline sub-categories such as fair salary discrimination, working conditions, equal opportunities/discrimination, etc. The study aimed to conduct a complete census of all workers in the industry; however, only 47 out of 50 workers were available and interviewed due to their availability during enumeration.

Furthermore, the qualitative research involves a comprehensive literature review of the existing literature and a discussion with five key informants: an expert in cassava, another expert in social and culture, a government official from the environmental office, a business owner involved in a case study, and for comparison, another business owner from a different tapioca industry. Incorporating evidence from multiple sources is suggested by Yin [51] to improve validity. All these key informants underwent in-depth interviews in April 2023. The sample question used for this interview, taken from section 3.5 of the questionnaire, is as follows. How applicable do you think the concept of social monetizing for SMEs in the tapioca industry?

A case study method is used extensively in qualitative social studies [52–53]. Their usage is gaining popularity which is adopted by practitioners in many fields, including, law, business, medicine, environmental science, and policy sectors [54]. However, case study doesn't aim for generalizations but rather than their potential to provide conceptual insights [55] a profound understanding of phenomenon [54, 53]. Hayden [56] enables the identification of crucial elements, processes, and relationships [52] in social LCA. Additionally, Hayden [57] emphasizes that we're unable to create universal laws that apply across all situations, times, and places, and no social science method can assert the creation of unchanging laws. Subsequently, the collected interview data were analysed descriptively as its primary purpose is to provide a description of the current state or conditions of a specific case,

The phase SLCA adapted from LCA ISO 14040 (2006) the following steps:

SLCA to assess the potential or actual social impact of a product where impact is primarily understood as the impact on human resources, human well-being, cultural heritage, and social behavior [59, 40] based on guidelines [43, 60].

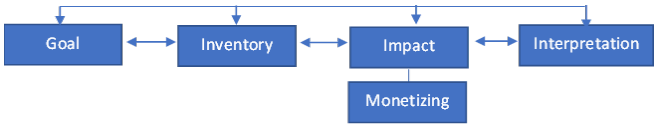

Figure 3 SLCA [44] framework adapted from LCA ISO 14040.

Approaches for assigning monetary values to social impacts: several approaches can be employed to assign monetary values to social impacts in SLCA. One common method is the market-based approach, which relies on existing market prices or wage rates to estimate the monetary value of social factors. This approach considers the economic value of social impacts, such as the cost of providing fair wages or the value of improving working conditions.

However, the result of a decision doesn't solely equate to the existing or future circumstances. When evaluating the effects of a process or product on workers or users, it's crucial to consider both the direct impacts and the effects prevented by the changes introduced by the process or product [41]. The baseline of our industry is characterized by unequal pay between women and men, the utilization of both locally sourced and imported cassava equally, minimum wage compensation for workers, overtime wages at double the standard rate, a minimal commitment to corporate social responsibility (2 percent of total profit), and the industry covering the health insurance costs for employees at a rate of USD 1.7.

Challenges and considerations in the monetization Process: The monetization of social factors in SLCA is a complex task that involves various challenges and considerations. One challenge is the subjectivity involved in assigning monetary values to intangible social impacts, such as human rights violations or cultural heritage preservation. Addressing this challenge requires careful deliberation and the inclusion of multiple perspectives to ensure fairness and accuracy. Another consideration is the potential trade-offs between different social impacts when assigning monetary values. Decision-makers need to be aware of the potential biases and unintended consequences of monetization and consider the social context in which the values are applied.

Other considerations include the need for transparent and consistent methodologies to ensure comparability across different studies and sectors. The development of standardized guidelines and frameworks specific to monetizing social factors in SLCA can help address these challenges and promote consistency and reliability in the process. By considering these methodologies, approaches, and challenges, the monetization of social

factors in SLCA can provide a systematic and quantifiable assessment of social impacts.

1) Monetizing social benefit in SLCA

The concept of monetizing social benefit in SLCA involves assigning monetary values to social impacts, allowing for their quantification and comparison. This approach enables the translation of social impacts into a common unit of measure, such as currency, facilitating the integration of social aspects with economic considerations. such as the value of improvements in social welfare or the value of environmental resources Furthermore, a benefit can be described in terms of reduced costs [61]. By monetizing social benefits, SLCA can provide a more tangible and comprehensive assessment of social sustainability. It allows decision-makers to consider the economic implications of social impacts and enables the comparison of social performance across different products, systems, or alternatives.

Table 1 describe the various method used which encompasses several subcategories, including access material minimum acceptable wage (as a specific component of fair wage), excessive working hours, and occupational safety and health serve as a metric to quantify the environmental impact of a product by considering the prevention of that impact since there are no child labor and force labor cases and the social impact only limited within tapioca industry coverage area.

2) Benefits of monetizing social factors in SLCA

The baseline tapioca industry presents a concerning picture as it heavily relies on materials imported from other regions, potentially undermining local economic development. Furthermore, the industry is predominantly male-dominated, a situation that not only limits opportunities for women but also perpetuates gender pay disparities. This gender pay gap is a clear indication of unequal treatment and highlights the need for equitable employment practices. Moreover, it is disheartening to observe that the majority of the industry's workforce is compensated well below the regional minimum wage. To compound these challenges, the absence of comprehensive health insurance and job security further exposes employees to vulnerabilities. Addressing these issues within the baseline tapioca industry is essential to ensure fair and inclusive economic growth, promoting equal opportunities and social protections for all workers. Measured for the standard output, usually established using a linear relation as followed suggested by UNEP [44].

Access to local materials is approached by cost-saving transportation methods, which are determined by imported and locally sourced materials transportation cost.

$$(\mathrm{TCS}) = \mathrm{TC\,im} - \mathrm{TC\,local} \qquad \text{(Eq. 1)}$$

Where, TCS is the transportation cost savings (USD), TC_{imp} is the transportation cost of imported material (USD) and TC_{loc} is the transportation cost of local material (USD).

Equal opportunity in this study, is represented by the proxy of the gender earnings gap, which is determined by calculating the aggregate earnings difference between women and men in the following manner:

$$\mathrm{LEG} = \mathrm{Total}\ \Delta(\mathrm{FW}, \mathrm{MW}) \qquad \text{(Eq. 2)}$$

Where, LEG is the loss earning (USD), FW is the female wage (USD) and MW is the male wage (USD).

Regarding working hours, additional compensation for extra hours worked is determined according to Indonesia's overtime regulations, which stipulate a payment rate of twice the normal hourly pay for overtime. This applies to hours worked beyond the standard 40-hour workweek in a year, as outlined below.

$$\mathrm{LSOE} = Total((WH - 40) * OvCost * \frac{30}{7} * 12 \qquad \text{(Eq. 3)}$$

Where, LO is the loss of overtime earning (USD), WH is the working hours (hours) and OvCost is the overtime cost (USD).

Fair Salary are proxied to the concept of loss wages, which is defined as the total earnings unjustly withheld from employees due to wage underpayment. This is calculated using the equation provided below.

$$\mathrm{LW} = \Delta(\mathrm{inc}, \mathrm{RWmin}) * \mathrm{NumEmP} \qquad \text{(Eq. 4)}$$

Where, LW is the loss wage (USD), INC is the income (USD), RW_{min} is the regional wage minimum (USD) and NumEmp is the number of employment.

Table 1 Approach method for monetizing social benefit for SMEs tapioca industry

No.	Impact categories	Sub categories	Inventory indicator approach method	Baseline	Study literature
(1)		(2)	(3)	(4)	(5)
1	Local community	Access to material resources refers to the ability and opportunity for individuals or entities to obtain and utilize the necessary raw materials, components, or supplies required for their operations, production, or activities. Access to material resources involves obtaining and utilizing necessary raw materials, components, or supplies, ensuring their sustainable and ethical use to support various operations or activities [62].	Transportation cost savings approach. The societal advantage of industries having access to local resources, from the viewpoint of local farmers, is that when these industries have a significant presence in the area, farmers don't need to invest in transporting their cassava to distant industries. This, in turn, enables farmers to reduce their expenses associated with transportation.	minimum value of Access to material when using all imported material.	Encouraging the use of locally sourced materials can boost local manufacturing by cutting transportation costs and boosting domestic production capacity [63]. Achieving sustainable growth in the future depends on sourcing raw materials from local extraction activities, as this is the only way to minimize the carbon emissions associated with transportation [64].
2		Equal opportunities/ discrimination; This classification focus on the implementation of fair practices for equal opportunities or the existence of bias among employees based on gender [65].	The gender earnings gap approach.	The maximum value of gender gap, when male and female salary is equal; indicating.	The gender earnings gap is calculated as the deflated aggregate earnings differential between women and men, related to those of men [67-68].
3	Worker	Excessive working hours per week [44]; Working hours is the time spent on paid labour. It is the only social topic considered in the first SLCA case study [69].	Overtime pay approach	Minimum overtime pay is 2 x normal working hours wage.	The payment of extra working hours is based on overtime regulations in Indonesia [70-71].
4.	Worker	Fair Salary; Fair wages have frequently been cited as a measurable indicator of societal welfare, a defined impact category [72].	Loss of wage	Social cost with a negative net benefit when the wage falls below the minimum wage requirement.	Wages stolen are defined as the aggregate earnings unlawfully taken from employees as a result of underpayment of wages [73-74].
5.	Worker	Social benefits/social security.	Social benefits provided to employees Proxied by health insurance.	Minimum health insurance is USD 1.7 per employee.	The research utilizes social benefits to workers (for example, unemployment benefits, healthcare Insurance, and retirement plans) [75, 40]. This calculation is typically based on Presiden Republik Indonesia [58].
6.	Local community	Community engagement; Community engagement involves collaborating with and operating alongside clusters of individuals connected by geographical proximity, shared interests, or comparable circumstances to tackle matters influencing their welfare.	Approached by total of corporate social responsibility	The underlying assumption that a company's CSR contribution should not be less than 2 percent.	The requirement CSR – CSR payment. Article 9 verse (1)-(3) Per-05/Mbu/2007, that partnership program and community funding sourced from shelve of its profits after tax for a maximum of 2% (two percent)[76].

Social benefits/social security social represented by the overall expenditure on employee health security as follow.

$$\text{Social Security} = \text{PB} * \text{NumEmp} \quad \text{(Eq. 5)}$$

Where, Social is the social benefits/social security (USD), PB is the cost of social security insurance (USD) and NumEmp is the number of employment (person).

Community engagement approached by total of corporate social responsibility.

$$\Delta\text{CSR} = \Delta(\text{CSR}, \text{MCSR}) \quad \text{(Eq. 6)}$$

Where, CSR is the yearly spending corporate social responsibility (USD) and MCSR is the minimum CSR (USD).

Based on each of the afore-mentioned formulas, henceforth, the computation of the net social benefit attained by the project in a given year is expressed as follows by Eq. 7.

Result and discussion

The net social benefit in SMEs tends to be negatively influenced by various factors. Cost constraints and the prioritization of immediate financial needs can further limit resources available for social programs. Additionally, SMEs may also lack awareness and expertise in assessing and implementing social initiatives, making it challenging to demonstrate positive net social benefits.

Figure 4 elaborates on monetizing social aspects in SMEs' tapioca industry, specifically highlighting six social aspects, focusing on six specific social aspects: access to material, fair salary, working hours, equal opportunities/discrimination, and social benefits/social security and community engagement. The values are expressed in USD.

The analysis of access to local resources, particularly SMEs tapioca industries, highlights the societal advantage of proximity. When industries are located near local resources, farmers benefit by not having to invest in transporting their produce over long distances. This strategy leads to a decrease in the financial burden of transportation for both the tapioca industry and nearby farmers while also contributing positively to their economic prosperity. Utilizing local materials to the extent of 30 percent translates into financial relief for farmers through reduced transportation costs. However, it's important to note that the calculated social benefit for farmers remains at USD -9,733.33, indicating that there is room for further optimization in reducing transportation expenses.

SMEs' limited use of local materials, often due to perceived quality and availability issues, represents a significant societal opportunity. Encouraging SMEs to embrace local materials, such as cassava, not only benefits their products but also fosters sustainability by reducing the carbon emissions tied to transportation. Our key informant, identified as DT, highlighted that fostering collaborative efforts between SMEs, local producers, and government bodies can help improve supply chain management, thereby supporting local communities, increasing income for farmers, and ultimately promoting a more sustainable and socially responsible business ecosystem. To ensure sustainable growth in the future, it is imperative to obtain raw materials from local extraction processes. This approach is essential for reducing the carbon emissions linked to transportation, as noted by Domaracka et al. [64].

$$\text{Net social benefit} = \text{TCS} + \text{LEG} + \text{LO} + \text{LW} + \text{Social Security} + \Delta\text{CSR} \quad \text{(Eq. 7)}$$

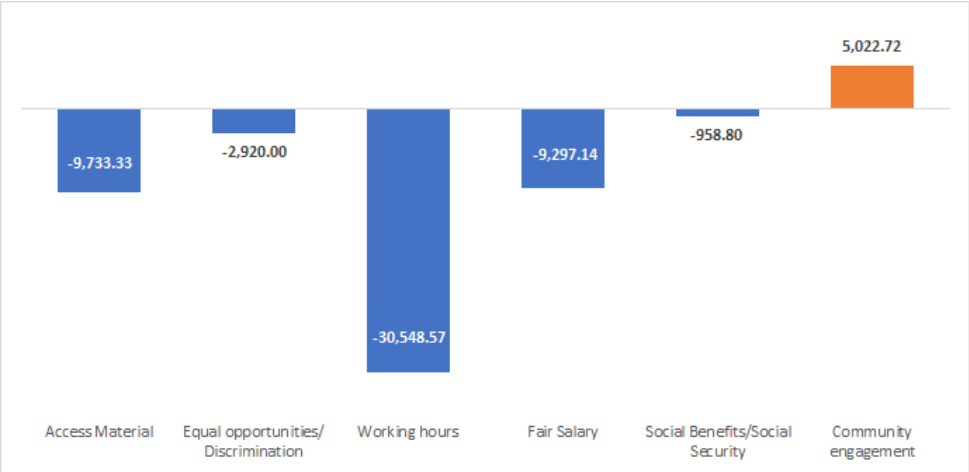

Figure 4 Filed data of the monetizing of social aspect in SMEs' tapioca industry (USD).

Regarding the category of equal opportunities/ discrimination in this study displays a negative value of USD 2,920.00, signifying unequal treatment of female workers, evident in a daily wage difference of approximately USD 0.66 compared to their male counterparts. Nevertheless, addressing issues related to equal opportunities and discrimination is pivotal in advancing social sustainability within SMEs. The expenses incurred in rectifying these disparities are justifiable in the endeavour to establish inclusive workplaces.

Noteworthy finding pertains to the gender wage gap, frequently attributed to job role segregation between men and women, particularly in SMEs. Similarly, the authors find gender disparities in job sectors and fields, along with variations in societal gender roles and the allocation of labour by gender, continue to hold significance [67]. This job segregation arises from societal stereotypes and perceptions, limiting women's access to certain industries and roles. For instance, in the tapioca industry within the circular economy, women are often excluded from operating drying machines, typically considered a male-dominated task. Such gender-based job assignments contribute significantly to the gender wage gap, especially in lower-paid positions. Addressing this gap necessitates promoting gender equality in job opportunities, challenging stereotypes, and fostering a more inclusive and equitable workforce.

Furthermore, the analysis of working hours reveals a largest negative benefit of USD 30,549.57 million, suggesting that the cost incurred for overtime falls short of the government's regulated standards for overtime pay. This represents a significant negative impact on the company's finances and should be a focal point for attention. The company needs to align with government regulations and compensate employees properly for their overtime work, as they sacrifice their leisure time and should receive fair compensation for it. This aspect demands immediate attention and rectification to ensure compliance with labour standards and to maintain a fair and ethical work environment.

Moreover, the company operates continuously throughout the year without any days off except on Lebaran's day. However, due to budget constraints, the industry can only afford to compensate its employees with regular hourly wages for overtime work. It should be recognized that allowing workers to take holidays is vital for their well-being and is a fundamental aspect of social inclusion. Denying workers their rightful time off can lead to physical and mental fatigue, burnout, and reduced productivity. Various studies have highlighted a consistent pattern where the connection between working hours and health often forms a curved, inverted U-shaped relationship [69]. The tapioca flour industry should ensure workers have adequate time off, respecting their rights and promoting work-life balance.

Additionally, the concept of Fair Salary in tapioca industry still reveals a negative net outcome of USD 9,297.14. This signifies that employee is experiencing a wage deficit that falls considerably short of the minimum wage stipulated by government regulations. Therefore, it is imperative for the company to take heed of these regulations to ensure that its workforce can attain a decent standard of living.

Another social concern is the inadequate compensation of workers in the tapioca flour industry. Our research indicates that the industry has pledged not to terminate any of its employees. In certain situations, the company is open to hiring married couples in need of employment from various sources. Consequently, the industry is capable of remunerating all its employees for wages that fall below the minimum wage requirement set by regulations [70]. However, falling below the minimum wage can jeopardize workers' well-being, affecting their physical and mental health and under-mining social inclusion principles.

Furthermore, there is an expense of USD -959 associated with social benefits and social security, which suggests that the company does not offer social security insurance, despite having previously covered workplace accidents. Nevertheless, it is crucial for the company to provide social security to ensure the security of employment.

Ensuring the safety and welfare of employees is a fundamental responsibility for any company. One crucial aspect of this commitment lies in providing social benefits and social security measures, including health insurance, as mandated by the law [58]. Such provisions not only safeguard the physical and financial health of the workforce but also contribute to a harmonious and productive work environment. By upholding these legal obligations, companies not only demonstrate their commitment to their employees' well-being but also foster a sense of security and loyalty among their staff. In doing so, they not only comply with legal requirements but also lay the foundation for a positive and sustainable working relationship that benefits both the company and its employees.

In terms of community engagement which is proxied by corporate social responsibility (CSR). This approach necessitates that corporate social responsibility be tied to the organization's annual CSR budget of USD 5,022.72. This implies that their payment exceeds the minimum requirement of 2% of after-tax profits, reflecting a commitment to contributing more to the local community than what is mandated.

To sum up, when considering the substantial cost, it becomes evident that the "net benefit" figure of USD -

48,435 reveals a situation where the costs outweigh the benefits in the context of monetizing social aspects within SMEs. This scenario underscores the need for a comprehensive reassessment of these practices, aiming to establish a more equitable and sustainable approach to social responsibility. By assigning monetary values to social factors, organizations and decision-makers gain a powerful tool to integrate social sustainability seamlessly into their broader business strategy. Despite this initial setback, SMEs can consider aligning efforts to improve this net benefit in comparison to their company's profit margins. Enhancing the net benefit related to social aspects could potentially bring it closer to the profit margins, making the monetization of social factors a more appealing and feasible approach for decision-makers seeking sustainable business practices.

Moreover, it encourages a deeper engagement of stakeholders, including those with financial interests, as the economic language becomes a common ground for discussion. As a result, organizations can build more resilient and socially responsible business models that not only benefit society but also contribute to long-term financial sustainability, aligning economic goals with social and environmental values.

In summary, the research findings highlight the lack of attention to the social dimension in the CE, focusing primarily on environmental concerns. This deficiency becomes more evident as social justice issues gain prominence. Combining the CE with strategies prioritizing social aspects, such as the EU Green Deal, maybe a potential solution. However, it is crucial to acknowledge the interdependence of environmental and social issues to ensure the CE remains a comprehensive and effective proposition.

Conclusion

In conclusion, the monetization of social factors within the SLCA represents a valuable strategy for assessing and managing social impacts in a systematic and quantifiable manner. This approach enhances the tangibility and comparability of social impacts, allowing for better integration with economic aspects and more informed decision-making. Moreover, it fosters improved stakeholder engagement and a more comprehensive sustainability assessment considering social, economic, and environmental dimensions. However, monetization should be conducted with sensitivity to ethical considerations and potential criticisms, and future research should focus on refining methodologies and developing standardized frameworks to advance sustainable development goals.

This paper's exploration of monetizing social factors through the SLCA approach contributes to ongoing discussions aimed at improving social sustainability assessment and informed decision-making processes. The findings and recommendations presented here are expected to inspire further research in social assessment, reinforcing the importance of integrating social considerations into sustainability practices.

For future research and improvement, there is a need to refine and expand methodologies for assigning monetary values to social impacts, addressing challenges like quantifying intangible aspects and considering cultural and context-specific factors. Standardized frameworks and guidelines specific to monetizing social factors in SLCA should be developed to ensure consistency and comparability across studies and sectors. Exploring the integration of emerging concepts can provide fresh insights into assessing and monetizing sustainability impacts.

Implication for policy action

The monetization of social dimensions has emerged as a crucial strategy in contemporary policy implementation, and aiding decision-making for governments, organizations, and investors. By attaching monetary values to social assessment data, this approach enhances public engagement, fosters accountability, and drives the pursuit of social goals, including equity and justice. However, ethical concerns and criticisms exist, as some argue that monetizing social impacts may undervalue human well-being. Careful handling, transparency, and stakeholder involvement are vital to address these issues.

Furthermore, integrating social factors into SLCA facilitates comprehensive decision-making by allowing for a holistic evaluation of social impacts alongside economic and environmental considerations. It enhances stakeholder engagement, provides quantifiable data on social impacts, and aids in making more socially responsible decisions.

For future research and improvement, there is a need to refine and expand methodologies for assigning monetary values to social impacts, addressing challenges like quantifying intangible aspects and considering cultural and context-specific factors. Standardized frameworks and guidelines specific to monetizing social factors in SLCA should be developed to ensure consistency and comparability across studies and sectors. Exploring the integration of emerging concepts can provide fresh insights into assessing and monetizing sustainability impacts.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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