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Circular economy in supply chain management

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Due to the ever-escalating demands of the global economy, the limited resources of the planet are being utilized at an increasing rate and waste and pollution are being generated fast (Vegter et al., 2020)it is necessary to be able to measure the actual performance of all processes of a supply chain in a circular business model. To measure the actual performance it is required to define what performance objectives are being pursued for all processes of a supply chain in a circular business model. There is a common understanding in literature that a supply chain in a circular business model differs from a supply chain in a linear business model. However, studies on what processes and what performance objectives conceptualize a supply chain in a circular business model are currently not available. A systematic literature review is conducted to conceptualize the processes and performance objectives of a supply chain in a circular business model. The study indicates that a supply chain in a circular business model consists of eight processes: (1. The idea of 'Circular Economy' is gaining popularity among researchers and practitioners. The world economic forum defines a circular economy as "*an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse and return to the biosphere, and aims for the elimination of waste through the superior design of materials, products, systems, and business models*" (Moktadir et al., 2018). The circular economy is a framework of three principles, namely, i) eliminate waste and pollution, ii) keep products and materials in use, and iii) regenerate natural systems (Casado-Vara et al., 2018).

A circular supply chain keeps resources in use as much as possible (Hultberg and Pal, 2021). It reduces waste at every stage, from design to distribution and beyond. Normal supply chains use materials for producing products, after using them, discard them into landfills, other countries, or rivers and seas (Lerdlattaporn et al., 2021)respectively. This research therefore aimed to analyze the key drivers and challenges in implementing the circular economy concept in the cassava starch industry in order to generate higher demand for biogas systems, increase the energy security and resource efficiency, and combat the environmental problems associated with cassava wastes. The following three scenarios were analyzed in this study: (1. This process of the ordinary supply chain is wasteful and damaging to the environment. In a circular supply chain, raw materials used are recycled back into the manufacturing operation.

They are strategically repurposed for the production of another product. The main purpose of a circular supply chain economy is to simply reduce waste and eliminate carbon from the environment (Glöser-Chahoud et al., 2021)the production of electric vehicles is accompanied by high environmental impacts, mainly due to the resource intensive high-voltage battery systems. Hence, a prerequisite for sustainable electro-mobility – beside the provision of renewable energy for vehicle charging – is a well-functioning and efficient circular use system of electric vehicle battery systems (EVBs. A conceptual diagram of the circular economy is presented in Fig. 1. A circular economy in supply chain is very important because it generates increased income, reduces resource dependency, minimizes waste, and reduces environmental footprint (Aurisano et al., 2021). In fact, a circular economy is based on the idea that there is no such thing as waste. The objectives of a circular supply chain economy are (Vegter et al., 2020)it is necessary to be able to measure the actual performance of all processes of a supply chain in a circular business model. To measure the actual performance it is required to define what performance objectives are being pursued for all processes of a supply chain in a circular business model. There is a common understanding in literature that a supply chain in a circular business model differs from a supply chain in a linear business model. However, studies on what processes and what performance objectives conceptualize a supply chain in a circular business model are currently not available. A systematic literature review is conducted to conceptualize the processes and performance objectives of a supply chain in a circular business model. The study indicates that a supply chain in a circular business model consists of eight processes: (1:

1. Maximize the usage of raw material, water, and energy.
2. Maximize strategic inventory level.
3. Improve the effective and efficient usage of supply chain assets such as trucks, warehouses, machines, and other equipment.
4. Reduce waste.
5. Extend the availability of the products in the system.
6. Maximize and stimulate the number of recovery flows.
7. Reduce impact on the environment by eliminating carbon emission.

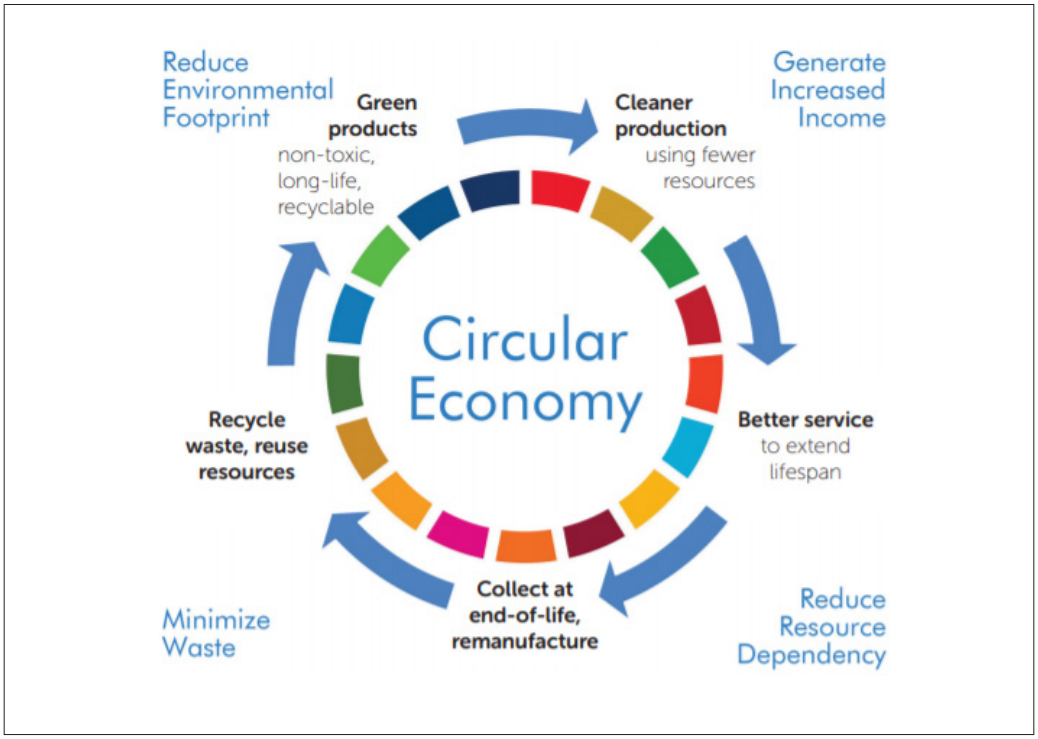

Fig. 1. Diagram of the concept of circular economy (source: UN, 2017)

Most industries need to switch to the circular economy business model for greater benefits. Through a circular economy, industries can rethink to break the old patterns of consumption and continue to economic growth by making the environmental transformation, ensuring social equality, and eliminating business risks (Mostert et al., 2021). Basically, the circular economy gives priority to the services that a product provides, supply chains that foster that service, and large-scale societal, environmental, and economic impacts of the whole structure (Leong et al., 2021). That's why, supply chains partners of a company should work together to enhance the paradigm shift towards circular economy. Switching to a circular economy business model might enable companies to transition away from take-make-dispose linear production, toward circular business models that allow products to be designed produced for long-term use, disassembly, reuse, and recycling from the outset (Lerdlattaporn et al., 2021; Mostert et al., 2021)respectively. This research therefore aimed to analyze the key drivers and challenges in implementing the circular economy concept in the cassava starch industry in order to generate higher demand for biogas systems, increase the energy security and resource efficiency, and combat the environmental problems associated with cassava wastes. The following three scenarios were analyzed in this study: (1.

New technologies will be the driving force for this paradigm shift towards a circular economy. Artificial intelligence, blockchain, the internet of things, cybersecurity, and Big Data all are the technological tools that will help to make this shift possible (Upadhyay et al., 2021). Industries will be able to shift to a circular economy business model by optimizing different processes, increasing their effectiveness and efficiency, enhancing competitiveness, and above all, improving in both reuse and repair, and remanufacturing, and waste management (Vegter

et al., 2020)it is necessary to be able to measure the actual performance of all processes of a supply chain in a circular business model. To measure the actual performance it is required to define what performance objectives are being pursued for all processes of a supply chain in a circular business model. There is a common understanding in literature that a supply chain in a circular business model differs from a supply chain in a linear business model. However, studies on what processes and what performance objectives conceptualize a supply chain in a circular business model are currently not available. A systematic literature review is conducted to conceptualize the processes and performance objectives of a supply chain in a circular business model. The study indicates that a supply chain in a circular business model consists of eight processes: (1.

References

Aurisano, N., Weber, R., Fantke, P., 2021. Enabling a circular economy for chemicals in plastics. Curr. Opin. Green Sustain. Chem. 31, 100513. https://doi.org/10.1016/j.cogsc.2021.100513

Casado-Vara, R., Prieto, J., La Prieta, F. De, Corchado, J.M., 2018. How blockchain improves the supply chain: Case study alimentary supply chain, in: Procedia Computer Science. https://doi.org/10.1016/j.procs.2018.07.193

Glöser-Chahoud, S., Huster, S., Rosenberg, S., Baazouzi, S., Kiemel, S., Singh, S., Schneider, C., Weeber, M., Miehe, R., Schultmann, F., 2021. Industrial disassembling as a key enabler of circular economy solutions for obsolete electric vehicle battery systems. Resour. Conserv. Recycl. 174, 105735. https://doi.org/10.1016/j.resconrec.2021.105735

Hultberg, E., Pal, R., 2021. Lessons on business model scalability for circular economy in the fashion retail value chain: Towards a conceptual model. Sustain. Prod. Consum. 28, 686–698. https://doi.org/10.1016/j.spc.2021.06.033

Leong, H.Y., Chang, C.K., Khoo, K.S., Chew, K.W., Chia, S.R., Lim, J.W., Chang, J.S., Show, P.L., 2021. Waste biorefinery towards a sustainable circular bioeconomy: a solution to global issues. Biotechnol. Biofuels 14, 1–15. https://doi.org/10.1186/s13068-021-01939-5

Lerdlattaporn, R., Phalakornkule, C., Trakulvichean, S., Songkasiri, W., 2021. Implementing circular economy concept by converting cassava pulp and wastewater to biogas for sustainable production in starch industry. Sustain. Environ. Res. 31. https://doi.org/10.1186/s42834-021-00093-9

Moktadir, M.A., Rahman, T., Rahman, M.H., Ali, S.M., Paul, S.K., 2018. Drivers to sustainable manufacturing practices and circular economy: A perspective of leather industries in Bangladesh. J. Clean. Prod. https://doi.org/10.1016/j.jclepro.2017.11.063

Mostert, C., Sameer, H., Glanz, D., Bringezu, S., 2021. Climate and resource footprint assessment and visualization of recycled concrete for circular economy. Resour. Conserv.

Recycl. 174, 105767. https://doi.org/10.1016/j.resconrec.2021.105767

UN, 2017. No Title. https://www.unido.org/sites/default/files/2017-07/Circular_Economy_UNIDO_0.pdf.

Upadhyay, A., Mukhuty, S., Kumar, V., Kazancoglu, Y., 2021. Blockchain technology and the circular economy: Implications for sustainability and social responsibility. J. Clean. Prod. 293, 126130. https://doi.org/10.1016/j.jclepro.2021.126130

Vegter, D., van Hillegersberg, J., Olthaar, M., 2020. Supply chains in circular business models: processes and performance objectives. Resour. Conserv. Recycl. 162, 105046. https://doi.org/10.1016/j.resconrec.2020.105046