

CIRCULAR ECONOMY BUSINESS CASE STUDIES IN SOUTHEAST ASIA



Lotus Farm by Samatoa

- Siem Reap, Cambodia
- Textiles/Fashion, Bio-textiles
- lotusfarm.org
- Analysis period: 2008-2024

Lotus Fibre for Sustainable Fashion

Business Spotlight

Lotus Farm by Samatoa (previously Samatoa Lotus Textiles), a social business located in Siem Reap, Cambodia, exemplifies innovation in sustainable fashion with its eco-friendly, plant based textiles, especially in the use of lotus fibre, a natural resource with exceptional qualities. Founded in 2003, the company switched their focus from silk to lotus fibre in 2008, addressing both environmental challenges and social inequities. Samatoa involves local artisans in fibre extraction and textile creation. Lotus fibre treatment is free from polluting energy or toxic chemicals, as it is the result of a handmade artisanal process. Samatoa's commitment to full control over fibre-to-fabric production ensures quality and facilitates the application of circular economy principles. Despite production challenges like low capacity and long lead times, Samatoa's unique

approach and market niche in high-luxury fashion have earned international recognition and attention from both the luxury market and institutions. Samatoa continues to strive for a balance between luxury market appeal, sustainable practices, and local community empowerment.

Keywords

Lotus fibre, Vegan leather, Sustainable fashion, Eco-friendly innovation

Innovation

Product/service design, Manufacturing, End-of-life management, Resource circularity

Analysis of Samatoa Lotus Textiles

Context and baseline

In 2003 Awen Deval established Samatoa in Siem Reap as a social enterprise for the production of silk products. The drought in Cambodia in 2008 severely affected the growth of mulberry leaves, the

essential food for silkworms, causing a significant decrease in silk production. The silk shortage prompted Samatoa to investigate alternative fibres, particularly lotus stem fibre, which was known in the region for its silk-like properties. Samatoa was given the opportunity to benefit from the expertise of the

Institute of Research in South Korea and the French Institute of Textile and Clothing on lotus fibre to improve and validate its processes, as well as lend credibility to this innovative fibre and fabrics. This expertise compensated for the company's lack of in-house textile and fibre expertise. The development of lotus fibre represented a pivotal moment for the company, which was already committed to socially responsible manufacturing, especially by including disadvantaged women as spinners and weavers and thereby contributing to their economic and social empowerment.

Samatoa thus developed and commercialized an eco-friendly fabric made entirely from lotus stems which were previously discarded as agricultural waste. Despite their exceptional qualities, lotus fibre products until Samatoa began producing them only served niche markets. Samatoa also offers custom-made clothing and accessories using both homemade, artisanal yarns (including kapok, banana leaves, and silk) and imported yarns (organic cotton, silk, and cashmere). Moreover, the company continues to explore and develop new materials, including vegan leather-substitutes, to diversify and expand its market reach.

Innovation

Samatoa has succeeded in developing and producing high-end fabrics and textiles from previously discarded lotus and other agricultural wastes, by capitalizing equally on traditional Khmer spinning and weaving skills and advances in textile and other materials. Its signature products are silk-like lotus-stem fibre fabrics along with a vegan leather substitute made entirely from lotus waste.

Even though the artisanal production of a silk-like fibre and fabric from lotus has long been known in the region, particularly in Myanmar, its application thus far had remained small and local due to the lack of optimization and standardization in the techniques and processes, resulting in low quality and consistency, limited applications, and very little awareness of the product. Samatoa took the lead to develop lotus fibre as a modern, high-quality textile fibre – thereby revitalising nearly forgotten traditional Khmer spinning and weaving skills.

The lotus fibre is extracted from previously disregarded lotus stems, and is now confirmed as a light-weight natural microfibre with excellent softness and exceptional breatheability. Lotus-fibre face masks, for example, offer excellent filtration and antibacterial properties. Samatoa has improved the production process from fibre extraction to finished fabric, and also succeeded in breaking into the ultra-high luxury export market, all the while maintaining socially responsible manufacturing practices.

After fibre extraction, the bulk of the lotus stem remains as a waste that can be mulched for recovery of nutrients or used as a source for making paper that is produced and used internally in their shop.

In a further effort to create valuable products, Samatoa set out in 2021 to pioneer 'Lotus Leather', an innovative leather-like material made entirely from lotus waste and other types of vegan leather alternatives that are natural, biodegradable materials, and plant wastes. These vegan leather alternatives could be a potential game-changer in the fashion industry, as these alleviate consumer concerns regarding animal-skin-based leathers.

In addition, Samatoa is exploring other plant materials such as kapok and banana leaves for vegan leather production. Ongoing research is focused on assessing the properties of these materials and optimizing them to meet market expectations.



Circular Economy impact

Samatoa's innovations are relevant and illustrative of key circular economy strategies, most profoundly resource circularity by extracting valuable materials from previously discarded lotus stems. Cambodian farmers cultivate and harvest lotus plants for their flowers and seeds, discarding the bulk of the plants, particularly the stems. Samatoa takes these stems as source for the extraction of lotus fibre. As the stems have just a small amount of fibre, the bulk of the stem material remains after fibre extraction.

Samatoa supports the further use of these discarded stems for mulching and nutrient recovery in agriculture and for paper manufacturing. As a further circularity measure, Samatoa has started to use the discarded stems for the production of Lotus Leather – a leather-like, fully plant-based material.

Samatoa manages the entire process in-house, avoiding intermediaries to ensure consistent quality.

The impact of lotus fabric on the circular economy in numerical terms is still modest, with the company annually producing approximately 1500 meters of lotus fabric using about 300 metric tonnes of lotus waste.

Business and market impact

Operating in an ultra-niche segment, Samatoa has adapted its business model to align with market dynamics. While its lotus fabric has attracted the attention of international ethical fashion designers in the high-luxury market, its export potential remains limited due to high production costs, limited production capacity, and extended lead times. Various options and business plans have been considered for capitalising such a niche product, and in the past, the company focused on international expansion and broad-based promotion. However, these plans encountered challenges, and served to highlight the difficulties of scaling in such a niche market.

However, during the COVID-19 pandemic, Samatoa did successfully capitalize on the demand for face masks. One of their customers made some tests in Korea and the lotus fabric displayed exceptional anti-bacterial properties. Despite this commercial success, Samatoa is now shifting its focus towards the domestic market, including local and international tourists. This shift includes diversifying into tourism-related ventures, such as the Lotus Farm, as part of a strategy for more sustainable growth. Therefore, in 2024, Samatoa took officially the name of "Lotus Farm by Samatoa" to reflect this switch.

Samatoa nonetheless continues to work on a few requests from the luxury fashion sector, such as capsule collection from designers – the latest being Pierre Cardin – but this revenue source remains limited.

In contrast, the development of vegan leather products presents promising prospects, as these items are relatively simpler to produce and scale. Samatoa was contacted in 2024 by a large automotive parts supplier who was interested in exploring leather-like options. While initial tests have been encouraging, Samatoa is nevertheless committed to ensuring consistent quality before promoting these products widely.

In total, Samatoa employs 22 persons working in Siem Reap, and about 30 artisans working on lotus fibre extraction.

Stakeholders

Samatoa's initiatives are deeply rooted in the principle that sustainable economic growth should exist in harmony with environmental conservation while contributing to social equity. It achieves these aims by hiring local women as artisan spinners and weavers, and using waste as their fibre source.

Samatoa's commitment to sustainability extends well beyond fabric production, incorporating a sustainable model that delivers economic and social benefits to local communities. As an example, the company trained 150 artisans in lotus fibre extraction and spinning, and provided them with solar panels to supply energy for a fan and phone charging. In this way, these artisans can earn supplemental income as they are employed based on fluctuating demand. They are paid per metre of fibre. On average, an artisan can potentially extract 500 m of lotus fibre per day and earn USD 15.

Additionally, by educating farmers about environmental conservation, and harnessing the multiple and complementary uses of lotus plant materials, Samatoa effectively combines ecological stewardship with community development.

The company's dedication to both environmental and social well-being has been recognized with several prestigious awards and honours, including the UNESCO Prize for Handicraft Excellence in 2012, a social innovation prize awarded in 2015 by the then French President François Hollande, and the esteemed Prix Energy Globe. More recently, in 2021, Samatoa received a prize from Khmer Enterprise, which has contributed to the development of its vegan leather.

Implementation

The process of creating Samatoa's lotus fibre products is both delicate and time-consuming. Skilled artisans are required for the delicate task of extracting lotus fibre, a process that takes about a month to produce enough for just a small scarf. This timeline includes ten days for fibre extraction and spinning, followed by dyeing, softening, and weaving. For the dyeing process, Samatoa is using high-quality products such as the Dyestar brand, because using natural dyeing processes does not provide the desired quality. At the request of individual customers, natural dyes can be used, but the colour quality will not last as long.

Due to this lengthy production process and limited capacity, the company often fills fewer client requests than they receive, with lead times extending to several months.

Despite these challenges, the cultural attributes of the 'sacred' lotus flower and the intricacy of the manufacturing process, coupled with Cambodia's competitive labour costs and Samatoa's specialized expertise, all provide a distinct competitive advantage and reduce the risk of market replication. However, the demand for such a specialized product is unlikely to surge, nor can the company's production line be instantly scaled-up. In addition, conducting thorough research and testing on lotus fabric and the lotus leather has required extra investments and additional equipment.

At the present time, Samatoa is seeking business partnerships to co-invest and co-create unique products from lotus plant fibres and materials.

Takeaways

Samatoa demonstrates that it is possible for a social enterprise to develop unique materials and create innovative eco-products for the luxury market, while adhering to sustainable production practices, and with the active participation of local people and tangible benefits for communities. By prioritizing environmental responsibility, Samatoa has managed to achieve minimal environmental impact in their fabric production process. However, finding a balance between production capacity, market demand, quality, and sustainability remains a significant challenge for the company. Despite having earned international recognition, a focus on predominantly export markets is not the only viable business strategy, considering the company's enduring commitment to sustainable growth. Adapting to local conditions will also be crucial for Samatoa's continued success.

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