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An Architectural Innovation Approach to Re-designing Businesses and Products for Sustainability

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Abstract

Business practices that exploit earth's resources without limits for production and consumption are unsustainable and result in the global crisis of climate changes. A pressing need is to re-design businesses and products for sustainability. Social responsibility and environmental sustainability have thus emerged as a core element in business strategy and an important source of managerial and product innovation. To contribute to the quest for sustainable business economy, the study analyzed a Taiwan-based tea-manufacturing firm that successfully transformed its mission toward environmental sustainability through innovatively re-designing its product architecture and effectively aligning the internal processes, marketing, and mission governance with product development. It is argued that, at the organizational level, such a transformation can be achieved through a radical change in mission and core values but not necessarily rely on technological breakthrough. The study illustrated how a business used an architectural innovation approach to achieve such product innovation and business re-direction for sustainability.

Keywords: architectural innovation, re-directing business, sustainability, product development.

1. The pressing need of designing products for sustainability

Schumpeter (1961, original in 1934) highlighted the essential role of innovation and entrepreneurship in economic development. According to Schumpeter, innovation is to carry out new combinations that create new product, new production process, new market, new material for production, or new organization of industry (Schumpeter, 1961). While Schumpeter (1961) suggested that "technological possibilities are an uncharted sea," his theory is not limited in the domain of technological innovation. As un-sustainability is an urgently important issue, there is a need for innovation for sustainability. Fry (2009) pointed out that "economic rationalism" has been driving the dominant design and production processes across all industries since last century, treating "the planet simply as an infinite resource at our disposal." As a result, the human world has reached a critical moment in its very existence. The outcry for business corporations to be more environmentally and socially responsible is massive, as well as the social entrepreneurship movement emerges to address those concerns and to create social and environmental benefits (Woolley, Bruno, & Carlson, 2013).

Porter & Kramer (2011) urged corporations to develop their strategies based on the new paradigm of "creating shared value." Sustainability is becoming a key driver of innovation (Basu, Banerjee, & Sweeny, 2013; Nidumolu, Prahalad, & Rangaswami, 2009; Seebode, Jeanrenaud, & Bessant, 2012; Voumik & Shah, 2014). The pressing need is a fundamental transformation from the economic-rationalist, profit-maximization ideology to "sustainable enterprise economy" (Waddock & Mclntosh, 2011). To cope with the complexity of the issue, collaborative leadership for sustainability and innovative solutions to enhance system resilience are needed and may provide a basis for changing current unsustainable practices to more sustainable ones (Waddock, 2013). With this concern, the study explores how a business re-defines its mission for sustainability and re-designs its product and managerial practices to achieve the mission.

2. Architectural Innovation in Designing Product for Sustainability

The study adopted the architectural innovation model originated in the business management research by Henderson and Clarks (1990) and has been widely applied in business innovation management (Seebode, Jeanrenaud, & Bessant, 2012). Henderson and Clarks (1990) highlighted the product as a system that is consisted of two elements: components and architecture. Products are made distinct components that each component is "a physically distinct portion of the product that embodies a core concept and perform a well-defined function (Henderson & Clarks, 1990)." The architecture of the product outlines how the components work together. It is obvious that the component-based knowledge and architectural knowledge are different, and product innovation can be understood as in what ways do the "architecture" or the "components" of a product are changed from the existing product.

Henderson & Clarks (1990) suggested that technological innovations may be incremental, architectural, or radical, as matters of degree rather than types with clear boundaries. Incremental innovation tends to enhance the competitiveness of existing products and does not require major improvements in technology, but radical innovation is usually associated with technological breakthrough which results in new products so superior as to drive existing products obsolete. Architectural innovation lies in between of the two extremes, representing a reconfiguration of existing components (perhaps with slight changes) in a novel way (Henderson & Clarks, 1990). The uniqueness of architectural innovation is not in technological advancement but in the re-designing of the product architecture using existing product components to develop new markets or to address changing market demands.

Henderson and Clarks (1990) argued that because radical innovation is rare and usually relies on a breakthrough in technology, more attention should be given to architectural innovation. Seebode, Jeanrenaud, and Bessant (2012) pointed out that the architectural innovation approach is considered as a strategy for businesses to manage innovation for sustainability. The study extends this insight to the field of social enterprise management, arguing that social enterprises may incorporate social and environmental values into the development of product architecture, to purposefully re-design products for sustainability not relying on technological breakthrough but on reviewing what are the components available and can be integrated into the new product architecture that embodies social and environmental values. The case in the study will illustrate how it works.

3. Managerial Alignment for Product Innovation

Activities of product innovation needs to be integrated with organizational infrastructure and marketing efforts (Hagel & Singer, 1999). Organizations need to be innovative in their management practice, process, structure, or technique to further organizational goals (Birkinshaw, Hamel, & Mol, 2008). Westall (2007) pointed out the importance of innovations in value-based enterprises that address how economic and social outcomes may innovatively come together. Westall (2007) highlighted that innovations in value-driven enterprises happen through external goals such as creating market niches or cultivating public interests; or through internal processes that include: (1) creating new governance structure to engage multiple stakeholders, (2) cultivating social capital and community development, (3) empowering employees, (4) engaging users as co-producers, (5) developing managerial practices and employee incentives aligning with the social, environmental, and economic goals, (6) bricolaging underused resources, (7) developing new value chains, (8) engaging excluded groups in mainstream markets, and (9) creating sustainable organizations with a range of diverse resources. In short, innovative efforts by social enterprises in product development need to be integrated with managerial practices in mission governance, internal process, and marketing.

The emphasis of social or environmental value differentiates value-driven enterprises from conventional businesses and guides its governance practices and strategic management (Guclu, Dees, & Anderson, 2002; Mair & Marti, 2006; Perrini & Vurro, 2006; Mair & Schoen, 2007). Boschee and McClurg (2003) pointed out the importance for socially or environmentally value-driven enterprises to balance the financial needs and the social goals. In the entrepreneurial stage, value-driven enterprises may extensively acquire social and business resources, and it is critical for those enterprises to develop a governance model that adequately embodies their social or environmental missions and effectively engages multiple stakeholders.

Internal process is another critical field generating and underpinning innovations in value-driven enterprises. Process needs to fit with the enterprise's background, management style, internal coordination, and cross-organizational interaction (Garvin, 1995). The focus of internal process is not on the product itself but on the production process and the value chain that justifies the value of the business and integrates the upstream and downstream operations (Morash & Clinton, 1998; Tapscott, 1999). An architectural innovation for a social enterprise may result in major changes in its operational process. Re-designing products for sustainability would imply adopt environmentally friendly production technologies, change input materials, learn new technical skills, and develop new coordinating mechanisms.

Social marketing, defined as "the application of commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of their society (Andreasan, 2002), " is another field of managerial practices for social enterprises to innovate. Social marketing is applied to promote social or environmental ideas as well as to change behavior of target groups (Kotler and Lee, 2008). Value-driven enterprises may formulate their marketing strategies based on their missions, visions, and core values to develop social trust and support. Enterprises driven by environmental value may attract customers with consciousness in ethical consumption, and distribute their products through channels committed to social responsibilities.

4. Methodology

This research aims to explore how environmentally value-driven enterprises carry out their environmental missions and innovatively de-design their products in achieving the missions. The research used a case study method (Yin, 2003) and chose one enterprise that contained the proposed theoretical implications as its research object. This enterprise possesses well-articulated environmental objectives and is a successful business entity.

4.1 Case Selection

The Antique Assam Tea Farm (AATF) is located at YuChi Town of Nantou County in Taiwan. It was originally the branch of Taiwan Tea Corporation at YuChi, which planted and produced black tea. The farm was established during the period of Japanese occupation and was under the government-owned Taiwan Tea Corporation after the World War II. At that time, the tea firm was the largest tea plantation and tea production factory at Nantou, able to hire as many as two to three hundred workers. The farm owned a total area of 794 hectare of land, among which the farm used only about 10 hectare for its won plantation. The rest of the land was rented out to the farmers, from whom the farm would purchase the raw tea leaves to produce black tea. In its golden age from the 1940s to early 1980s, the black tea from the Antique Assam Farm of the Taiwan Tea Corporation represented as high as 90 percent of Taiwan's black tea exports of 2,000 to 6,000 tons a year. However, facing competition from the South-East Asian countries, Taiwan's black tea exports decreased rapidly in early 1980s. The business of the Antique Assum Farm factory declined and the plantation gradually became idle.

Part of the factory was badly destroyed during the devastating 1999 September 11 earthquake. The factory became almost a ruin and faced the problem of closing down. However, Madam Zhuang, wife of the former president of the Taiwan Tea Corporation, who with the organic and ecological ideal from Buddhist teaching, was able to persuade the owner for a change. In order to introduce the ecologically friendly and leisure concepts into the factory and the farm, Madam Zhuang, who later became a consultant to the company, and some others rented the factory and the farm from the owner, to establish the ecological promotion and leisure tea culture business. The vision is a farm for "agro-ecological farming and life education." With the organic and ecological oriented ideal, the farm changed its operations and repositioned itself in line with the organic, leisure, ecological and educational concepts.

In 2004 the farm changed its method of farming. It started by removing all the old tea plants and replaced them with new ones. This was due to the use of chemical or synthetic fertilizer and pesticide, the ecosystem of these farms was seriously damaged and had very little agricultural value left. Some senior staffs of the factory and some young people who possessed agricultural knowledge decided to implement the agro-ecological farming method to restore the farm and turned the factory in to an educational and cultural product. They started to use the agro-environmental farming method to produce organic red tea. In the same year, they reestablished the factory, by keeping the old accessories and building. They revived the environment around the factory and turned it into a non-polluted environment. They then renamed the factory as Antique Assam Tea Farm and officially started their new operation in October 2004.

Since the beginning, the farm has integrated the concept of ecological leisure with YuChi's unique Assam tea, by operating Argo-ecological touring programs, a shopping store, a cafeteria, a tea farm, and a tea production factory. The farm has provided the organic black tea experience, life and ecological education, and ecological tour, for the visitors to understand the farming and processing procedures of organic black tea. The Antique Assam Tea Farm is able to strategically reposition itself. They are transforming themselves from a traditional tea production factory into a company that combines tea production and agro-ecological tourism. Now the factory has a personnel of twelve full-timers. This case is able to overcome their financial deficit and achieves a break even within three years since their re-launching. As they are increasing their production capacity, they have established good image and reputation. The farm is committed to environmental values and redesign its products based on its traditionality and new mission.

4.2 Data Collection

This research collects qualitative data from three different sources, secondary data, site visits, and in-depth interviews. First, to bet a basic understanding of the background of the case, the research collects secondary data regarding the farm and YuChi's black tea industry from the company's websites, reports, and related articles. Further, this research carries out site visits and participates in the farm tour, where video and audio data are collected for analysis. Lastly, this research adopts in-depth interviews, to understand the reasons and process of the transformation, as well as the difficulties, coping strategies, and the results. Four persons are interviewed, including Madam Zhuang (consultant to the Antique Assam Tea Farm), manager, and two senior staffs. The interview lasted one to three hours. The consultant and the manager were interviewed twice, and each of the

senior staffs was interviewed once. All interviews were recorded and transcribed for analysis.

4.3 Data Analysis

The research has used the triangulation method in data analysis. This research uses data from the secondary sources, tour guide materials and in-depth interviews for triangulating the validity of the data (Eisenhardt, 1989). Further, in the interviews, this research has asked some questions that are the same for all interviewees for cross references and confirmation of the data (Cardinal, Sitkin, & Long, 2004).

5. Findings

The case, the Antique Assam Tea Farm, has gone through a transformation from a conventional black tea production to agro-ecological tourism. The transformation involves redesigning of products, articulation of business mission in deep ecology, developing ecologically conscious operational processes, and integrating the marketing practices into the new mission. These product redesign and managerial practices contribute to the environmental value creation by the enterprise.

5.1 Product Innovation

The Antique Assam Tea Farm (AATF) changed its core products from conventional black tea to organic black tea and agro-ecological tourism. The product architecture changed significantly. The new product is much more beyond black tea per say. New values are introduced into the product: the historical, cultural heritage of the black tea production, the value of ecological diversity and the environmental protection, and the value of organic agricultural products for health. New services in agro-ecological tourism, on-site shopping for the organic black tea, and organic food dining are provided.

Experiencing the agricultural ecosystem is a major business item for AATF. AATF deigned three different packages (i.e., 1.5-hour, half-day, and whole-day tours for people coming in individually or in groups. Take the-half day tour as an example, the program would include five parts: (1) an orientation about the history of black tea industry and the Antique Assam Tea Farm, (2) tasting the organic Assam black tea, (3) touring the historical factory and learning how black tea being , (4) touring the tea farm with an introduction of organic farming, the concept of bio-diversity, and the different kinds of tea trees, and (5) dining at the cafeteria where tasty organic foods are served. Throughout the entire ecological experience and tour guide, the tea factory and farm become a concrete case for ecology promotion. The organic tea farm and the environment of the Antique Tea factory embody are the ecological concepts. Further, the foods served to their visitors are mainly made of seasoning vegetables grown locally. This practice is to reduce food transformation mileage and to remind visitors the interconnections between human beings, the plants, and the soils so that people my start to ponder on the importance of protecting the ecosystem. The packaging is also environmentally friendly, using simple packaging methods using recycled papers and re-usable containers.

5.2 Internal Process

Changes of the internal processes in AATF include a new agro-environmental farming method, a production process emphasizing “hand-made” technologies, and a new process for services and agro-ecological tourism with the reviving “antique” facilities of tea production.

AATF adopted a new agro-environmental farming method to replace the conventional method. In 2003, AATF painfully retired all of the old tea trees in a 0.4-hectare farming area and re-planted new seedlings for organic farming. Since then, AATF requested consultative assistance from the Tea Research and Extension Station **f**or the farming techniques. AATF manager and staffs actively participated in organic farming courses and enhanced their knowledge through first-hand experiences. AATF gradually expanded the area for organic farming and was granted organic farming certification in 2007.

Formerly the factory used mainly tea-plucking machines and machinery in processing and packaging tea, to produce tea at a large scale with low cost. To increase the quality of tea, AATF introduced handmade production and service processes. The case introduced the “one-tip-two-leaf,” hand-picking method in the collection of tea leafs to enhance the quality. In the packaging process AATF arranged workers to remove impurities that may exist. The emphasis of handmade production process allows AATF to hire local residents as part-timers. Seven to ten part-time female workers would be hired during the tea harvest seasons, and some part-timers are hired for farming activities.

The old building and heavy machines vividly conveyed a living history of the black tea industry. A new product architecture would leverage such historical heritage for new services. Hence, AATF kept intact most the building and the machines. However, to add functions for services and tourism, spaces for orientation, cafeteria, shopping

store, were designed. The renovated factory is still keeping the nostalgic and historical views. Also, some of the factory's old machines, such as the tea leaf withering machines and roasters, are still put in use for production. This renovation allows visitors not only to experience black tea leisure culture but to immerge themselves into an atmosphere mixed of traditionality and modernity.

5.3 Mission-based Marketing

AATF re-designed its marketing strategies to fit into the new mission, processes, and product. The following summarizes AATF's marketing practices which might not be genuinely innovative in strategic marketing but are intentionally developed and adapted to support the reviving business.

AATF communicates its social and environmental concerns by providing experiential tourism and by appealing to both reason and emotion of the visitors or consumers. First, AATF uses the overall design and the atmosphere to create an environment that would be felt as a very unique mixture of traditionality and modern, leisure life. Second, AATF is serious about ecological concepts such as bio-diversity, habitat, and ecology. The ecological damages by excessive use of pesticide in farming were explained. Shocking pictures of earth pollution and starving children appealed to the emotion of visitors and customers. Third, story-telling is used. For example, when the tea is served at the orientation, the tour guide will share with visitors the beauty of the tea and ways to observe the color, smell and distinguish the fragrant, and taste the flavor of the tea. The tour guide often makes connections between the black tea in Taiwan and the YuChi county. The tour guide tells stories about how much time and efforts the farmers have to spend in the process of planting organic tea; in the hope that those who listen to the stories may be touched and may appreciate the resources they owned. AATF intentionally slowed down the pace of the tour so that the visitors may learn a "slow way of living" and discover the experiences of the various senses of watching, listening, smelling, tasting and touching. Last, through experiencing the Antique Assam tea Farm itself, visitors may realize that it is through the nature that plantation grows; food and water are closely connected, and thus develop a positive living attitude.

The brand was changed from "Taiwan Tea Corporation Black Tea" to "Antique Assam Tea" and the factory's name from Farm "YuChi Tea Factory" to "Antique Assam Tea Farm," for the purpose of highlighting the traditional, classical connotations. The packaging of the products applies the environmental values by using simple packaging style, environmentally friendly materials, and reusable containers. Together with practices in agro-ecological tourism and organic farming, the renaming and product packaging efforts contribute to the branding on environmental awareness. AATF attempts to orient the visitor and customers to become environmentally and socially conscious. AATF shared its experiences with other individuals or groups involving in organic farming or environmental protection. AATF welcomes and offers special programs for marginalized groups, such as children from the orphanage, kids with developmental difficulties, and diabetic patients, etc.

If marketing implies efforts to stimulate people's desire to buy more products, what AATF is doing would be a retreat from marketing. AATF avoids over marketing. AATF keeps low profile, using little advertising. AATF does not print DMs to minimum the use of papers. AATF is cautious about media, refusing purely commercial coverage. Dining at AATF is exclusively for visitors who have participated in the ecological tourism. AATF does not take in "shopping-only" groups from travel agencies or hotels. In addition, AATF set limits of the maximum number of visitors a day. AATF adopts a reservation policy to keep the quality of touring services.

AATF sells products mainly through its own store and its website. AATF developed partnerships with distributors or groups sharing environmental values, such as s Homemakers' Union Consumer Cooperatives (the largest consumer cooperatives for organic foods), Leezen (a Buddhist organic food chain store), and Hola (a private chain store emphasizing health), etc. AATF also partnered with some young marginalized people who are creating new businesses. AATF set high environmental standards in choosing packaging materials and suppliers. For example, AATF insists to use soy ink, a kind of ink made from soybeans and is more environmentally friendly, in printing. The foods for dining are mainly from local organic farmers.

5.4 Mission Governance

To achieve sustainability and balance the triple bottom line, AATF developed policies quite different from conventional practices. First, AATF is committed in ecological concepts and practices, encouraging the public to appreciate and respect lives and the environment. This commitment drives AATF's employee development and internal learning. From the governance aspect, the emphasis on internal learning is to encourage workers to internalize the environmental values and to work for intrinsic motives rather than external rewards. AATF developed an apprenticeship program for junior staffs to learn from senior staffs not only for the farming skills but, more importantly, for AATF's core values. Most staffs have the opportunity to do the farming and to be story-tellers facilitating the agro-ecological tours. Staffs are encouraged to share and discuss about the life and

work. In a sense, the work and the way of life are integrated under the environmental values and supported in the work community. A staff shared her testimonial in the interview, "I think it is a very good policy, at least I myself am the biggest beneficiary from it. This is because I always have to be in close touch with the plantation and eat what we grow." The positive feedback and affirmation from customers, media, and partners also gave AATF's staffs a sense that they are doing the right thing. Another staff shared her affective commitment, "I feel that this environment, the space, and the cultural values attached to the place, are worth continuing for another century. We do not know how good we can do it, but we are trying all our best."

Second, AATF puts environmental values first, commercial values second. The Antique Assam Tea is positioned as a means to convey the ecological values. The 1.5-hour touring package charges as low as NT$50 (US$1.7) per person. The maximum number of visitors per day is set, and dining services are limited to participants of ecological tours. The scale of farming and production is also confined to ensure the health of the ecology and the quality of tea. AATF even set aside as high as half of its annual profits for the well being of the community and the environment, mainly to support farmers to switch from conventional farming to more environmentally friendly, alternative farming.

Third, AATF highlights a cooperative culture. Workers have their own areas of responsibility but at the same time require to support one another, basing on the needs of the circumstances. The manager said, "here colleagues are very good, all of us are open minded and willing to support each other in our work. If we were like other companies, where jobs are fixed and each one doing his own business, it will be very difficult for our tea farm to really get moving." Externally, AATF shared its experiences with other tea farms, and some farms did switch to more environmentally friendly, alternative farming methods.

6. Conclusion

Business practices that exploit earth's resources without limits for production and consumption are unsustainable and result in the global crisis of climate changes. A pressing need is to re-design our businesses and products for sustainability. Through a case analysis of AATF, the study explores how an ailing business enterprise transforms its mission toward environmental sustainability through innovative re-designing its product architecture and effectively aligning the internal processes, marketing, and mission governance with the product. The paper argues that, at the organizational level, such a transformation can be achieved through a radical change in mission and core values but not necessarily rely on technological breakthrough. A business can transform itself using an architectural innovation approach that, based on its new mission and core values, evaluates existing technologies, adapts the suitable ones to the new product, and designs new product architectures to effectively integrate the components into the new purpose. In the case of AATF, all of the "components" for its new services, such as organic farming, environmentally friendly production and packaging, and argo-ecological tourism are basically already existed, ready to be learned and applied. The land, building, production facilities, experienced farmers and workers are existing resources for AATF. What really changed radically is AATF's mission and core values toward sustainability. This resulted in an architectural de-resigning of the whole business concept and the product. The functions and connections of the components were thus changed to adapt to the new business purpose. Further researches may apply the architectural innovation framework to examine more cases in different industrial or country settings.

In addition, the internal processes, mission-based marketing, and mission governance are identified as three critical areas for managerial practices underpinning product innovation. The farming method changed from conventional ways to organic or alternative farming methods, and the production facilities were renovated to serve the new production and agro-ecological touring purposes. The marketing practices were re-directed toward telling stories about respecting lives and the environment, and engaging customers in experiencing the ecology. The governance policies became to emphasize internal learning and the development of a cooperative culture. AATF committed half of its profits for the enhancement of farmers' well-being and community development. All these managerial efforts would not be considered as innovative if the mission and core values were not changed. Further researches may take a deeper step to identify critical factors associated with the success of adopting the architectural innovation approach to sustainable business. Last but not the least, the AATF case showed how a value-driven enterprise successfully revived its old building and facilities to become a historic site to experience the black tea plantation and production, mixed with the old memories of roaring machines and clear reflections on modernity and sustainability.

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