Clean Technologies and Environmental Policy
https://doi.org/10.1007/s10098-018-1522-6

BRIEF REPORT

The need to adapt sustainability audits to atypical business models

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Received: 20 November 2017 / Accepted: 22 March 2018

Abstract
While a growing number of businesses aspire toward sustainability, doing so requires new business models that aim to achieve triple bottom line benefits (economic, environmental, and social), while utilizing appropriate technologies and new knowledge platforms for doing business. "Third Places," defined as places of public gathering outside of work or home, have emerged as powerful platforms for business model innovation, in the form of incubators, co-working spaces, and innovation hubs. Third Places enable a diverse group of actors, including entrepreneurs, employees, and investors to informally interact and develop innovative ways of doing business. Third Places tend to be structurally more complex than traditional production facilities as they have multiple firms interacting in formal and informal ways. In this commentary, we discuss the challenges of measuring the sustainability performance of Third Places using conventional sustainability audit tools.

Introduction

Traditional versus sustainability-oriented Third Places

New business models are now springing up around the world that are much more versatile than traditional businesses in terms of values orientation and organizational structures, and in how they delineate between customers, employees, and stakeholders (Amit and Zott 2010; Baden-Fuller and Haefliger 2013). Within these new business models, there exists a class focused on transitioning the contemporary production and consumption system toward a more sustainable management of resources and a more equitable distribution of social and economic benefits (Jackson 2011). Focusing specifically on emerging sustainable business models, Bocken et al. (2014) described eight archetypes that fall under three dominant themes: (1) technological or more environmentally oriented models include the adoption of core business strategies and practices around maximization of resource efficiency, value creation from waste, and utilization of renewable inputs and processes; (2) social-oriented business models include "servicizing"—delivery of a function or service rather than products (Rothenberg 2007), social responsibility or stewardship such as fair trade, and encouraging sufficiency in consumer behavior; (3) organizational-focused sustainable models emphasize business models that redefine the purpose of business as achieving social and/or environmental benefits above or on equal footing with profitability, such as through social enterprises and benefit corporations, and scale-up solutions meant to promote widespread adoption of novel businesses, such as through incubators and collaborative approaches. Emerging sustainable business models may incorporate one or more of these archetypes.

A related, and sometimes overlapping concept, is that of "Third Places" that initially described informal public gathering spaces, distinct from home and work, where individuals socialize and build community (Oldenburg 1997). Wexler et al. (2017) distinguished three modern variants of Third Places: "communitarian" Third Places address specific social problems and may be organized by government, not-for-profit, or social enterprises; "commercial" Third Places are profit-driven and create space for participating community members to benefit from the collective activities in this

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Published online: 02 April 2018

space; and "digital" Third Places build virtual communities. Some Third Places, including incubators, co-working spaces, and innovation hubs, exhibit characteristics of all three variants and tend to break away from the standard hierarchy of competence and responsibility adopted by most traditional businesses. Moreover, they tend to be innovative and they are often based on shared values.

Two examples of organizational-oriented sustainability business models that also incorporate elements of Third Places are *The Warehouse Darwin* in Bordeaux, France, and *The Plant* in Chicago, USA. Created as a start-up incubator, *The Warehouse Darwin* hosts a number of diverse activities from food service to shopping, including a cafe, an urban farm, and repair shops (Wave-Innovation 2018). The structure also hosts art exhibitions, sports events, and even aquatic activities. *The Plant* is a former meatpacking factory that has been repurposed as a hub for sustainable urban agriculture and food production with emphasis on the circular economy, business incubation, and community education and engagement (Bubbly Dynamics 2018). Such initiatives are inspiring because they provide a means of realizing sustainability aspirations through business collaboration and collective action. However, trying to concretely assess and measure their performance is far from trivial.

On measuring performance

The traditional way to evaluate business performance, regardless of the category being measured, is based on auditing the business' activities and its ability to achieve particular goals. These goals typically include producing or trading goods or services to satisfy customers, generating sufficient profits to satisfy owners/investors, and/or maintaining conditions to satisfy concerned stakeholders (Kaplan and Norton 1992). Audits provide a snapshot of an organization's current performance and relevant information that can be used to maintain and improve relevant activities. In general, audits can be performed to investigate performance along any selected category, including financial, food safety, quality, partnership-related, environmental, or even social. Audits can be pursued toward regulatory compliance, performance assessment, external certification, or simply continuous improvement. For example, environmental audits typically begin with a quantification of the material and energy resources consumed by an organization, and the products and wastes generated, commonly referred to as a material flow analysis (MFA).

Although there are numerous frameworks for measuring sustainability performance, none are universally accepted or applied. There is a need for a more global and universal sustainability assessment similar to what ISO 22000 represents as an international standard for food safety (ISO 2005). Coyne (2006) partially addressed the issue for the business world, discussing elements of social responsibility. Moreover, Soyka (2014) summarized multiple discussions and events addressing the need for corporations to measure and improve their sustainability. Commonly used sustainability-oriented auditing and reporting frameworks include: Global Reporting Initiative (GRI, focused on triple bottom line accounting), CDP (formerly Carbon Disclosure Project, focused on greenhouse gas emissions), Leadership in Energy and Environmental Design (LEED, focused on building performance), and SA8000 (social accounting standard). The ISO 14000 family of standards, for example, emphasizes environmental management systems, with sub-standards focused on specific tools such as audits, communications, labeling and life cycle assessment, and specific issues such as climate change (ISO 2015).

While sustainability audits are the norm to measure the performance of an establishment, they are often created by and geared toward larger entities with linear production systems (Baumann-Pauly et al. 2013; McEwen 2013). We hypothesize that such methods are too rigid and impractical for smaller and rapidly changing entities with emerging business models and operating in Third Places. These different challenges were raised while working on an MFA analysis of *The Plant*, in Chicago.

Case study

MFA approach of The Plant, Chicago

In summer 2016, we set out to perform a sustainability audit of *The Plant* in order to measure the performance of adopting this sustainability-oriented, Third Place business model. The MFA method was chosen as the research was part of "GloFoodS," a French INRA–CIRAD project to study food waste management in various urban contexts. *The Plant* is an old meat packing facility in the Back of the Yards neighborhood in Chicago that has been renovated to host multiple food and environmentally conscious businesses. The project advocates for a "circular economy" by encouraging the sharing of material and knowledge resources across businesses (Plant Chicago 2018). Activities include production of crops from outdoor and indoor farming and food preparation such as brewing, baking, and light processing. An onsite biodigester is designed to create energy using waste biomass from the site and from organic waste producers across the city. Moreover, Plant Chicago, a not-for-profit organization operating within *The Plant,* is socially driven and aims to promote the concept of circular economy through education and community outreach (Plant Chicago 2018). *The Plant* has become quite popular, getting media and public interest from around the world. It has been hailed as a desirable model that can be replicated to address sustainable food

production, industrial building reuse, and public engagement in an urban environment (Huffington Post 2012; WTTW 2016). It can also be considered as a Third Place as the dynamics between the different parties takes an inclusive approach, considering different interests of the owner of the building, the nonprofit organization, tenant businesses, visitors, interns, and volunteers. The gathering of skills, time, money, and creativity sparks formal and informal collaborations, innovations, new business opportunities and resource cycling practices. *The Plant*'s strength lies in the intense social interactions among the actors, which allow the overall system to progress in an organic way.

We spent 3 months mapping and measuring the flows of energy and material among individual tenants across the facility, using a material flow analysis (MFA) approach (Graedel and Allenby 1995), and analyzing utility bills for energy and water use. For each tenant of the building, we created a Sankey diagram for the flows of materials for a 3-month period and mapped overall flows and resource sharing across companies (Chance et al. 2017). One example of these diagrams is shown in Fig. 1, capturing the total material flows of the Pleasant House Bakery for 3 months. Water represents the largest material flow by mass for both inputs and outputs. Firewood for heating the ovens is the second biggest inflow. Bread and pies are the next largest material outflows following water and are the primary product output of Pleasant House Bakery's business. This business' special feature is the wide variety of materials going in and out, requiring a strict tracking for the employees. The project enabled us to extract various material flows estimations, which can be used as indicators for the overall system performance and sustainability.

Challenges raised by the MFA

The MFA of the businesses in *The Plant* was valuable for the tenants and the owner of the building to reveal quantities of materials consumed and the disposition of various categories of waste by different tenants; however, conducting the analysis was significantly challenging.

- Most businesses located at *The Plant* are small, entrepreneurial, flexible, and they adapt their production to market needs. These are desirable traits for a small business, but they do not align well with traditional MFA and audit methodology that favor consistent flows over time.
- In addition, most small and new businesses did not precisely track their input or output flows or they were unable to easily translate certain items into weight measurements.
- Another MFA protocol challenge was the collection of many flows of small quantities as opposed to few (important) material flows with large quantities, which are pre-

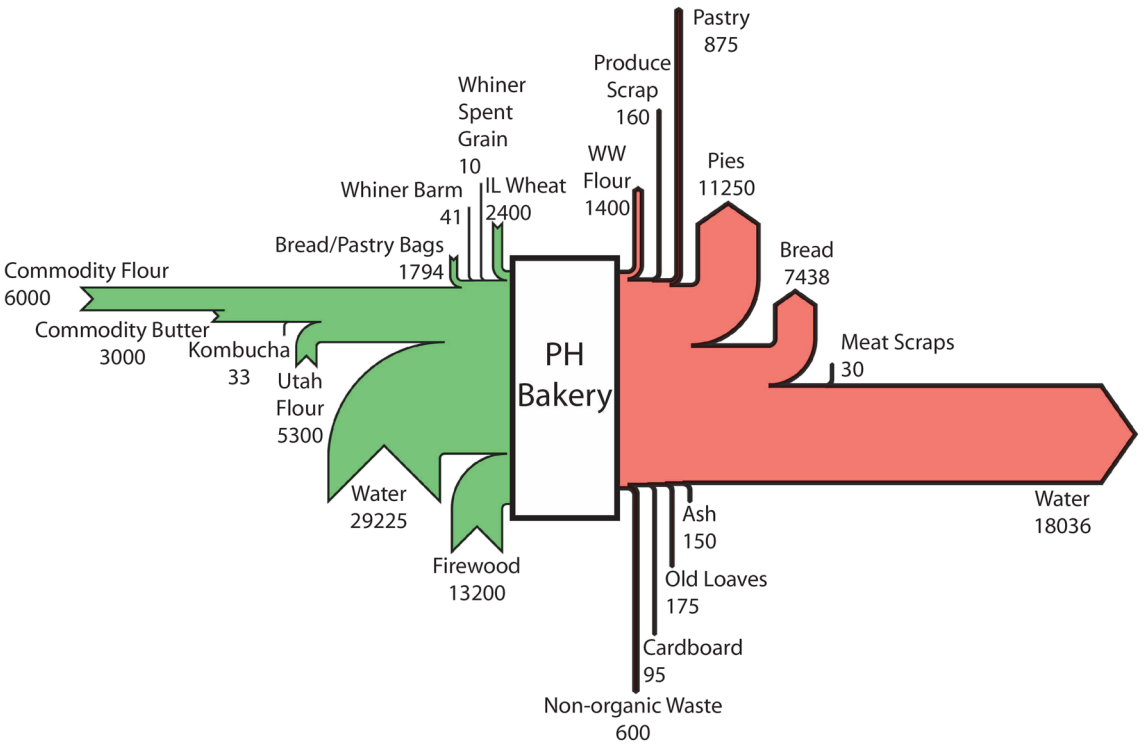

Fig. 1 Material flow diagram of Pleasant House Bakery, unit in pounds (1 lb ~ 0.45 kg) for the months of March–May 2016

ferred to more easily quantify energy and material flows; this is typical in other urban farms (Martin et al. 2016).

- Moreover, because most businesses are seasonal, their energy and material consumption can vary enormously by season, and then even by year since businesses may change the type of produce they grow, and their market might expand or shrink.
- *The Plant* is a dynamic place, and businesses come and go. Getting a standard energy and material "snapshot" in a given year simply seems insufficient to get a good idea of *The Plant* activity and potential. Even if we were able to fully audit *The Plant*, it became evident that any effort to reproduce the audit in a similar way in the future would not give us comparable results as companies, products, and material flows will change over time, and therefore, tracking the evolution of the facility using current auditing standards was simply not feasible.
- In addition to these significant issues, we also had trouble managing the data we were collecting at such a small scale. Traditional relational databases are not flexible, and storing the data in Microsoft Excel or Google Spreadsheet was not convenient because of the large variety of data categories and absent data in each different category.

Another issue is that social benefits were not captured using the MFA framework. This is also confirmed by Heinbach et al. (2014) who created a framework to measure the impact of renewable energies on local value added and employment, which are the main incentives for municipalities to get involved in this type of endeavor. Mulrow et al. (2017) suggested measuring five types of capital flows—manufactured, natural, financial, social, and human—to be able to understand facility-scale industrial symbiosis, which fits the organization and structure of Third Places. This is also in line with the work of Flora et al. (2004) on the importance of examining seven capitals, which includes the previous five, along with political and cultural capital.

A more comprehensive sustainability assessment ought to include *knowledge* flows between individual businesses and the broader society. Plant Chicago is already recording several knowledge flow indicators, including the number of visitors for the tours, the number of people attending events and workshops, and the number of interns. These types of measures are referred to as "indicators for cultural service" by Mononen et al. (2016). As projected in Fig. 2, *The Plant* could also measure these indicators among businesses, and count the number of hours spent on consulting/advising others by individual businesses, and the number of people benefiting from this service. Figure 2 represents a hypothetical

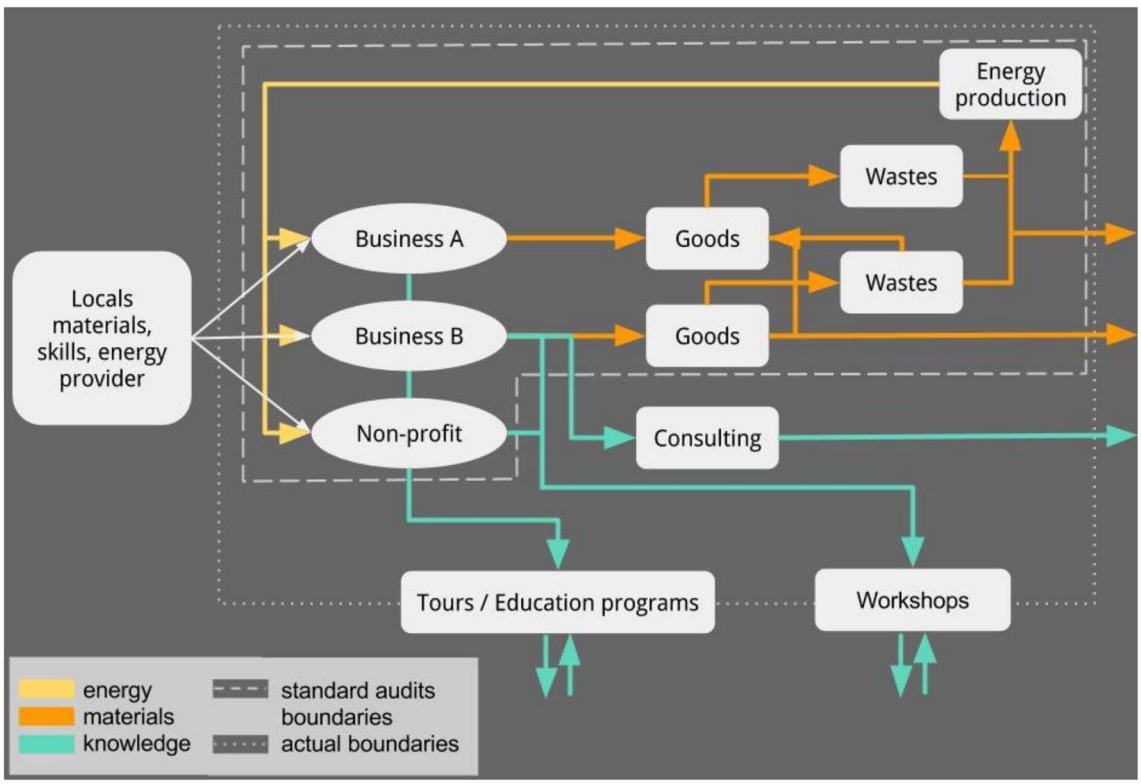

Fig. 2 Differences in system boundaries between what would be considered by traditional audits at The Plant and the complexity of the actual system

Table 1 Summary of the different MFA challenges and the authors' proposed solutions

MFA challenge	Proposed solution
Small businesses continuously adapt production levels to market needs	Use accounting information to track materials consumed
Small businesses do not carefully track material flows Tracking small quantities of many different types of materials	Install an electronic tracking system to register materials entering and leaving the building, such as by using a blockchain system
Seasonality of production (particularly for outdoor farm businesses)	Adapt the measurement time scale to distinct seasonal activities and/or measure flows over years
Businesses continuously move in and out of facility	Track entry and exit of businesses and normalize flows to approximate production levels of businesses present at a given time
Complex data management	Develop new data collection and database management strategies for tracking large numbers of diverse material flows in small quantities
Social impacts not measured	Develop metrics for social impact or knowledge flows, using conception of multiple types of capital

Third Place system based on *The Plant*. It shows that traditional audits will mostly collect energy and material flows as they are convenient to measure with standard units. In contrast, knowledge flows are overlooked because they are difficult to scale and compare across organizations.

When comparing both abstract cultural services such as knowledge with market-valuable gains and exchanges, a challenge is to be able to compare these values on a similar scale. This is further complicated by the fact that an effective protocol should be applicable to any type of facility. The Foundation Center (2016), a leading source of information on philanthropy worldwide, summarizes over 150 tools and resources for assessing social impact. It may be interesting to use this extensive database to create a relevant protocol, to combine it with an MFA approach and to fully quantitatively audit an innovative structure such as *The Plant*. At a more technical level, new standards should also include details on how to dynamically manage and store the data collected (e.g., data management plan), so that audits can be performed more frequently and more easily. New techniques have notably been used to extract meaningful information from datasets (Derrible and Ahmad 2015; Ahmad and Derrible 2015) and applied on urban metabolism data (Ahmad et al. 2016, 2017). Moreover, a potential opportunity worth exploring is the use of blockchain for electronically tracking materials entering and exiting facilities, as this is an emerging trend in supply chain management (SDExec 2018; Techcrunch 2016).

New auditing protocols should be easily applicable, so that even small businesses can conduct audits regularly and thus monitor their progress on relevant parameters. They should also be more flexible to consider the seasonality and changing production schedules of small businesses. A study done on corporate sustainability measurement in service organizations brought forward similar conclusions (Mamede and Gomes 2014). These authors showed that the easiest way to acquire information is to collect it from the organizational accounting information system that includes traditional data such as invoices, employee demographics, and salaries. Moreover, a second type of metric should also be added to acknowledge efforts made to be more environmentally conscious and socially oriented, whether in the form of a score, a color, or a credit, similar to the system used to rank energy efficiency for electric equipment or nutritional quality for food (World Health Organization Europe 2017). It is important because some of these activities currently appear as an environmental cost, for instance requiring electricity during a festival or a seminar; however, the electricity used for the event produces long-term educational and cultural benefits. A summary of proposed solutions to the indicated challenges is presented in Table 1.

Outlook

In short, new auditing protocols should reward flexibility and adaptability and favor new and sustainability-driven practices. We need to incorporate different measures like social, environmental, cultural, or knowledge capital to measure the performance of Third Places like *The Plant* in Chicago and The Warehouse Darwin in Bordeaux, and thus encourage new businesses to follow similar practices. Only after the measurement frameworks have been adapted to these emerging and atypical business models might we be able to accurately measure the costs, benefits, and potential impact of scaling and replicating such initiatives around the world.

Acknowledgements This study was partially funded by the GloFoodS meta-program. The authors would like to thank everyone who has been taking part of the auditing process at The Plant, including Jonathan Pereira and the staff at Plant Chicago. We would also like to thank Julia Norberto who interned in the Complex and Sustainable Urban Networks (CSUN) Lab in summer 2016. We were thrilled to be part of *The Plant*, taking part into that great adventure to more sustainable businesses practices and a better society. This research was also partly supported by the National Science Foundation (NSF) CAREER Award #155173.

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