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## Article

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# Radical Resource Productivity as an Inspiration for Business Model Innovation: The Case of Foodchain

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## Abstract

Radical resource productivity (RRP) is a design and engineering approach to manufacturing that can potentially yield dramatic improvements in energy and material efficiency, and thus contribute to sustainability. This study explores whether the RRP can also be a source of business model innovation in the service sector. An application of RRP in a restaurant in Montreal is presented, and analyzed by means of an activity map. The case suggests that activity maps can be employed to design business models that promote sustainability through pursuit of radical resource productivity.

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## Introduction

Of the many business model templates devised to promote sustainability, one group focuses on principles of eco-design, in particular efforts to “maximize material productivity and energy efficiency” (Lüdeke-Freund et al., 2018: 153). This objective is appealing and uncontroversial because less waste contributes to sustainability while at the same time reducing costs and thereby improving profitability. Efficiency efforts

are part and parcel of the quotidian work of designers and engineers, and can easily generate incremental improvements throughout value chains. But, in some instances, concerted, systemic efforts to maximize efficiency can yield ten-fold improvements in material and energy productivity (Robèrt, et al., 2002), aligned with the levels of decarbonisation and dematerialization required to attain the sustainable development goals.

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**Keywords:** radical resource productivity, business model innovation, service sector, restaurant, activity map, sustainability

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The promise of radical resource productivity (RRP) as a trigger for breakthroughs in design and production was a cornerstone of the book *Natural Capitalism* (Hawken et al., 2000), an influential tract on sustainability, design, engineering and the economy. Perhaps the most elegant example provided in the book detailing how such a breakthrough can be attained is the “hypercar”, a dramatic departure from the dominant design of automobiles. The key insight behind the hypercar was the decision to make it extremely lightweight. The hypercar was built of carbon fiber, rather than steel. This initial weight reduction made possible further weight reduction, because the suspension and other support mechanisms required for a heavy car were either eliminated or minimized. As the car became lighter, entire systems could be jettisoned entirely, such as electric steering and power brakes, further reducing the weight. With a lighter car, the original engine size became unnecessary, and the traditional internal combustion engine made way for small electric engines placed near the wheels. Together, these choices, which cascaded from the initial decision to build a car from carbon fiber, led to a profoundly different, much more sustainable car design.

To date, examples of RRP demonstrate its potential in material and energy-intensive production processes in manufacturing, and in buildings. Whether RRP can yield high-impact improvements at smaller organizations, or in the service sector, is unknown. This paper examines *whether the precepts of radical resource productivity can inspire business model innovation in non-manufacturing contexts*.

## Approach

The food system is widely recognised as critical to planetary sustainability (Foley, et al., 2011). It is characterized by widespread inefficiencies and waste, throughout the value chain (Gustavsson, Cederberg, & Sonesson, 2011). In developed countries, food waste is of particular concern in the later stages of the value chain, and in particular at consumer households, the retail sector, and the hospitality industry. In some markets, public awareness of food unsustainability is increasing, and restaurateurs both respond to and stoke demand for responsibly sourced, healthy, fresh fare, conveniently provided, with little to no associated waste. As they

engage with these trends, restaurateurs pursue different competitive positions and business models to signal that they engage seriously with environmental responsibility (Salmivaara, & Lankoski, 2019).

Foodchain (<https://eatfoodchain.com/en>) is one such restaurant. It is a fast-casual restaurant, founded in 2018 by an experienced, award-winning executive team consisting of two chefs, a boulanger, a designer and a management consultant. Foodchain’s primary business is to serve uncooked, vegetable-based meals – salads – to people in the dense downtown core of Montreal. The restaurant is vegetarian, but does not explicitly declare itself “sustainable”, nor does it attempt to pursue a differentiation strategy based on organic fare.

Foodchain was initially studied with the purpose of preparing a teaching case (Etzion, in press). The protagonist of the case is the co-founder and managing partner of Foodchain, who oversees strategy and is responsible for day-to-day operations. The managing partner was interviewed three times, and he presented the company’s strategy and business model twice in classroom settings. Field observations at the restaurant were conducted at an average rate of once a week for three months, at different times of day. During these visits, employees were observed and interviewed as they performed their tasks, and the managing partner provided additional clarification about specific operational points. Foodchain provided access to internal company documents outlining marketing, strategy and financials, as well as a confidential pitch deck for investors. A draft of the teaching case was submitted to Foodchain for verification, and was reviewed by the managing partner, his direct reports, and a shareholder. After corrections, the draft was reviewed once again by the managing partner, and authorized.

For this paper, the teaching case data were used as reference material, and re-analysed with an intent to understand Foodchain’s business model through an RRP lens. This analysis mainly makes use of data about Foodchain’s efforts to tackle waste in its supply chain, in its operations, and in the choices and actions of its customers. The objective is to understand the effects that these waste-minimization efforts had on the business model that emerged. As will be elaborated below, Foodchain did not devise a new business

model *template* (Lüdeke-Freund et al., 2018). Yet, implementing RRP has generated substantial operational efficiencies, and has also shaped the manner in which Foodchain engages with its suppliers, customers, and employees, thereby yielding business model innovation within an existing template.

## Key Insights

The initial RRP design choice which drove subsequent components of Foodchain's business model is a piece of machinery called a Robot-Coupe. Robot-Coupes are industrial-grade food processing machines often found in large kitchens and major food preparation centres to quickly slice large amounts of raw materials. It is rare to see more than one in a kitchen. Foodchain has eight: one for each salad on the menu. This means that Foodchain can produce food very quickly. The machines are simply loaded with all the vegetables required for each serving of a specific salad and processed in one batch. The ingredients for each batch are washed, peeled, weighed and portioned previously, ready for processing in one bowl kept in refrigeration. Because each machine is dedicated to only one salad, there is no need to wash the machines between servings, and the bowl that holds the uncut vegetables is used to collect the sliced ingredients as they exit the Robot-Coupe. Slicing occurs only after an order is placed, so that a salad is prepared and served extremely fresh, under 90 seconds from when it was ordered.

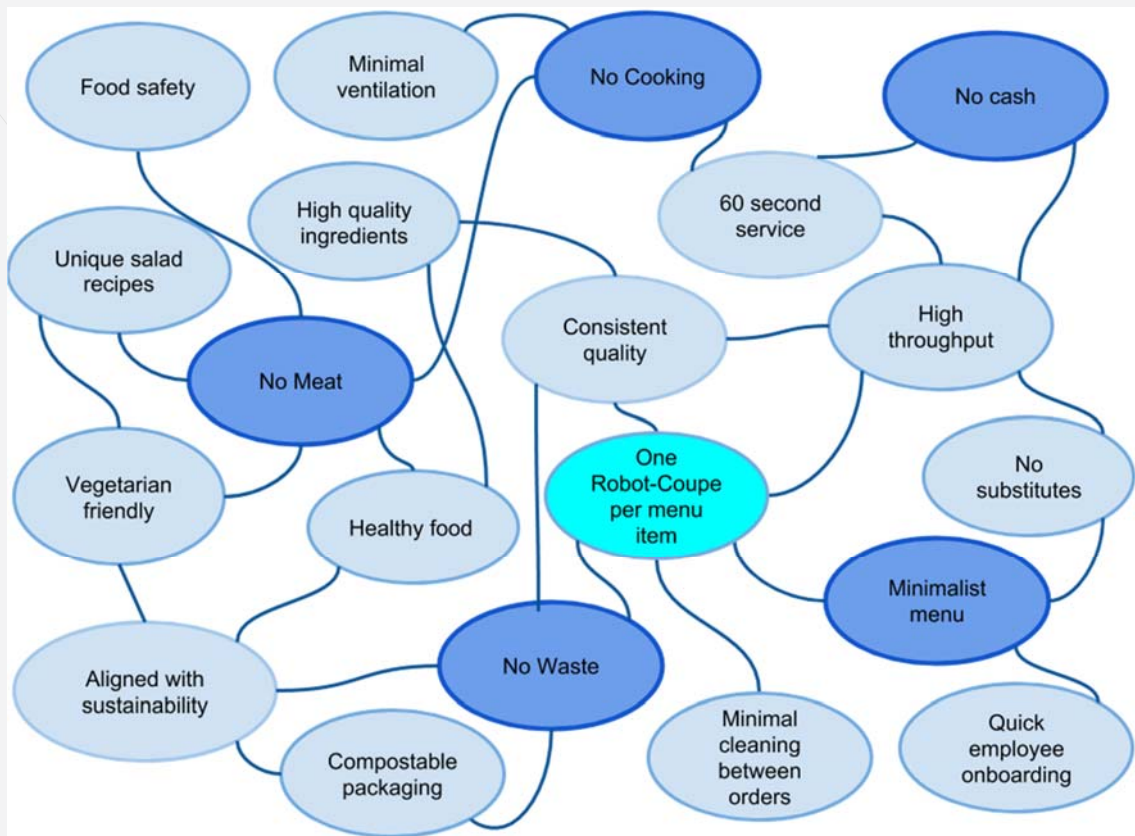
The decision cascade triggered by the initial choice of the Robot-Coupe is described in Table 1. However, other important aspects of the business model do not cascade from this choice. For example, cash is not accepted. All purchases are transacted with either credit or debit cards. This makes the transaction process faster and the restaurant more secure, because there is no cash on the premises, but does require robust fallback procedures in case payment systems go down.

Other waste-elimination efforts occur in the post-consumer phase. Foodchain recognizes that individuals often err in sorting waste into separate streams for waste, recycling and trash. Therefore, except for glass beverage bottles, all containers and utensils are made of fully compostable materials. Thus, there are only two streams of waste: bottles and everything else.

Choice	Rationale and implications
No Meat	Meat cannot be chopped in the same machine as vegetables because of food safety concerns, and also because its texture is unsuitable; it cannot be sliced effectively. Foodchain's positioning as vegetarian derived automatically.
No Cooking	If there is no meat in the restaurant and it is vegetarian, there is a possibility to not cook at all. And in fact, raw food and especially firm fruits and vegetables such as cauliflower, mushrooms, apples and cucumbers are the most suitable ingredients for the machine. If there is no cooking, there is no need for exhaust piping and ventilation systems to be installed and maintained. In terms of future expansion, any commercial space can potentially be a Foodchain site, whereas other restaurants must consider building specifications and ventilation feasibility.
Minimalist menu	To minimize food preparation times, washing of the machines between servings is unfeasible. Each salad therefore requires a dedicated machine, meaning that the menu has to be small. This simplifies kitchen operations vastly. To ensure streamlining, the restaurant enforces a no modifications policy; customers cannot ask for any changes to how a menu item is prepared. Overall, equipment and staff in the restaurant are always ready to prepare each menu item with no lead time, leading to very few delays in the busy lunch hour.

**Table 1: Activities directly deriving from the choice to employ Robot-Coupe machines.**

Figure 1 presents Foodchain's discreet design choices in an activity map (Porter, 1996). The Robot-Coupe choice is highlighted. Major choices are presented in dark blue. The activity map depicts the extent to which the choices are interconnected and comprise a compelling business model pattern (cf. Joyce & Paquin, 2016). At the same time, the diagram makes apparent the cascade of choices made possible through RRP. Notably, the "No Cash" choice is only weakly linked to the other main nodes. The "No Waste" choice is linked to



**Figure 1: Foodchain activity map.**

the choice of using a Robot-Coupe because it reduces cleaning, but this is a relatively minor linkage.

The managing partner at Foodchain, a former management consultant, emphasizes that running a restaurant is challenging because it is essentially “just-in-time manufacturing with a retail front using perishable items with very fluctuating demand”. Figure 1 reveals that the nodes that represent manufacturing (i.e. food preparation) – no meat, no cooking, minimalist menu – are more interconnected and cascade directly from the Robot-Coupe initial design choice. By contrast, the nodes that represent the post-manufacturing phase of the value chain – no waste, no cash – are less linked to the Robot-Coupe, and less densely interlinked overall.

## Discussion and Conclusions

The Foodchain business model suggests that applying the principles of RRP to small businesses can promote sustainability through business model innovation. Not unexpectedly, the benefits of this approach are more

apparent in the earlier, manufacturing-like stages of the value chain in a restaurant, and less so in the post-production phase. Intuitively, it indeed seems more difficult for RRP to yield the same gains in aspects of the business that are farther removed from the operational core. Retail has many more “degrees of freedom” than manufacturing.

Both RRP and strategy are built on the notion that it is the connection between choices that determines success: not just the choices independently, but more importantly the tightness of the linkages between them and their density. As demonstrated in this paper, activity maps, an important component of the strategy toolkit, can help distill the essence of a business models, and uncover potential inconsistencies. Future research can further investigate the use of activity maps as a visualization tool (Täuscher, & Abdelkafi, 2017) for designing impactful business models for sustainability. Currently, they seem to stand apart from the tools typically employed for business model generation (e.g. Osterwalder & Pigneur, 2010).

Another desirable next step would be the development of a practical tool for sustainability-oriented managers (Vladimirova, 2019) that can help them work through the choices they need to make to create tight linkages between activity map nodes in a way that optimizes RRP. An even more ambitious goal is to develop a tool to rigorously assess the compatibility between nodes and quantify the strengths of linkages between them. It may be possible to employ simple scores, even a Likert scale, to assess the meaningfulness of each link in an activity map, and then employ measures from network theory to quantify the productivity gains that can ensue for the business model in its entirety.

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