


Journal of Hunger &amp; Environmental Nutrition &gt;

Volume 4, 2009 - Issue 3-4: Food Systems and Public Health: Linkages to Achieve Healthier Diets and Healthier Communities

 Open access

6,608

Views

57

CrossRef citations to date

9

Altmetric

Listen

Original Articles

# Identifying Innovative Interventions to Promote Healthy Eating Using Consumption-Oriented Food Supply Chain Analysis

Corinna Hawkes 

Pages 336-356 | Published online: 11 Dec 2009

 Cite this article  <https://doi.org/10.1080/19320240903321243> Full Article Figures & data References Citations Metrics Licensing Reprints & Permissions View PDF

## Abstract

The mapping and analysis of supply chains is a technique increasingly used to address problems in the food system. Yet such supply chain management has not yet been applied as a means of encouraging healthier diets. Moreover, most policies recommended to promote healthy eating focus on the consumer end of the chain. This article proposes a consumption-oriented food supply chain analysis to identify the changes

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

vegetable supply chains, local food chains, supply chains for health-promoting versions of food products, and identifying financial incentives in supply chains for healthier eating.

Q KEYWORDS:

food system

food supply chain

diet

obesity

Coca-Cola

globalization

food industry

food policy

food history

financial incentives

interventions

# INTRODUCTION

Today, more than two thirds of adults and more than one third of children in the United States are considered overweight or obese and rates are continuing to rise.<sup>1,2</sup> Obesity has become a global problem, rising throughout Western countries and the developing world.<sup>3</sup> Some real efforts are being made to address obesity, but examples of programs or policies that have successfully led to reductions of obesity remain few. In part this can be attributed to a food and beverage environment conducive to unhealthy eating. The food environment is not easy to change given that it is the net outcome of numerous processes, including the dynamics of the food supply chain. Yet efforts made to improve this food environment have thus far typically focused only on the consumer end of the chain.

This article develops a method that can be used to (1) identify innovative interventions throughout the food supply chain to create a healthier food environment and (2) improve existing interventions rendered less effective by their lack of consideration of the dynamics of the food supply chain. (Food is taken to mean all foods and nonalcoholic beverages for human consumption.) The analysis, provisionally termed consumption-oriented food supply chain analysis, follows from established supply chain approaches. We establish the food supply chain as an organizational system that is saved and profits are made. It was, for example, for efficiency reasons, for example, to manage the supply chain.<sup>6</sup> In this article

## About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings



the actors in these chains. Their aim is to shed light on the socioeconomic and environmental consequences, such as working conditions, and identify leverage points for improved business practices.[7–9](#) Researchers concerned with agriculture and international development have also used this value chain approach to identify how export-oriented food chains in developing countries affect employment and other development issues.[10](#) And the development of local value chains is at the heart of movements in the United States and elsewhere to develop more sustainable, locally oriented food supply chains.[11](#)

Food supply chains are increasingly analyzed for their environmental impact and sustainability. Life cycle assessment is a technique for examining the environmental impact of foods (and other products) throughout their life cycles.[12](#) A related form of analysis is carbon footprinting, used by food companies and others to examine where greenhouse gas emissions are located along the food supply chain.[13](#) Product roadmapping is another form of supply chain analysis that aims to increase the sustainability of supply chains.[14](#) The practice of sustainable public procurement also takes a supply chain approach to increase the efficiency and sustainability of sourcing sustainable, healthy meals for public institutions.[15](#) Another application of supply chain analysis is identifying and preventing food safety risks. The technique of hazard analysis at critical control points (HACCP), for example, maps out the supply chain in order to identify potential points of entry of pathogens and other hazards and then identify measures to mitigate these risks.[16](#)

Though all these applications are different, they share the common objective of identifying points in the chain that can be levered for change. The underlying concept is that it is only by mapping the whole chain, and understanding the interactions within that chain as a system, that the most effective leverage points can be identified. The basis of this concept can be traced to systems analysis, which posits that any system—

connected  
by direct  
are “a small  
verage  
ay be  
aking on  
the chain—  
needed to

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

tipping point for change. The method also adopts the economic concept of incentives and disincentives as the best way to articulate a leverage point for change.

Another critical aspect of the methodology is that unlike other applications, it focuses on identifying how food supply chains could be leveraged to alter food consumption. Despite the increasing application of supply chain analysis to food systems issues, there has thus far been no serious effort to examine how such analyses could be used to leverage healthier diets (also see Gereffi et al., 2009<sup>9</sup>). There have been analyses in the other direction—examining how food consumption patterns affect the food supply—but not in the direction from supply to demand.<sup>18-20</sup> This gap reflects one of the core problems of modern food supply chain management: that human health remains marginalized as a supply chain issue, falling into the gaps between the different processes and actors in the chain (in contrast to the environmental and labor issues now perceived as supply chain issues).<sup>21</sup> How to alter supply chain dynamics to encourage healthier eating thus represents a gap that needs to be filled.

The article starts by describing the concept of food supply chains and then examines how they have changed over time in the United States in the context of rising obesity. Using insights gained from the historical overview, the article then explores why the food supply chain has the potential to be leveraged to improve the food environment. It then explains how this can be done and develops a 5-step method for conducting what is provisionally termed consumption-oriented food supply chain analysis. It then discusses potential applications of the analysis, including a preliminary examination of the supply of Coca-Cola beverages into school vending machines.

## WHAT IS A FOOD SUPPLY CHAIN?

A food s

farm to f

- Inputs
- lar
- fertili
- Agricu

In this article

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

food from

such as

s seeds,

ns,

- Inputs of nonfood aspects of the product and its distribution: A good example would be food packaging (aspect of the product) or vending machines (its distribution).
- Primary food storage and processing: This includes refrigeration and freezing (perishable foods), canning (e.g., vegetables), slaughtering (meat), milling (flour), and crushing (oilseeds).
- Secondary food processing: Notably the manufacturing of highly processed foods such as cookies, snacks, and prepared foods.
- Distribution, transport, and trade: Such as by truck from farm to a local market or from packing house to warehouse or by plane to another country.
- Food retailing: This includes local markets, small stores, supermarkets, as well as catering operations such as restaurants, hospitals, schools. It may also include wholesaling.
- Food promotion and labeling: Such as advertising, sales promotions, nutrition labeling, and health claims.

A simplified arrangement of these basic steps is shown in [Figure 1a](#). Food supply chains can also be characterized by the actors responsible for the different steps; as shown by [Figure 1b](#), there are many—and this is not an exhaustive list. The entire chain is also affected by cross-cutting inputs, notably capital and natural and human resources. What is critical is that the food supply chain is not viewed as a linear, deterministic arrangement (despite its depiction in [Figure 1](#)) but as a system in which the different components are profoundly interconnected, with a change in one part of the chain affecting other parts, whether intentionally or not.

FIGURE 1 A basic food supply chain. (a) Process-based food supply chain. (b) Actor-based food supply chain.



#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings



FIGURE 2 Broad historical shifts in the American food supply chain, from local to national to global.



In this article



place to stamp a brand, food branding and advertising became the way to compete for the consumer dollar. Billboards, newspaper and radio advertisements, premium giveaways, and enticing packaging could now be used to create demand for the wealth of new packaged products. By the 1930s, inexpensive diners, cafes, and hamburger joints had sprung up, and the 1950s saw the introduction of frozen TV dinners and McDonald's.[24,25](#)

This was also the era that saw the beginning of the big farm commodity programs that still characterize agricultural policy in the United States. The Agricultural Adjustment Act (AAA) of 1933 provided subsidies to incentivize farmers to expand production. Technological developments of agricultural inputs over next decades (e.g., fertilizers) further encouraged greater production. Farming became increasingly intensive and industrial, in turn affecting the availability and farmgate prices of the subsidized crops, such as wheat and soybeans.

The second half of the 20th century saw important changes in the way that the entire food chain was organized in the United States.[26–28](#) Most importantly, the power in the chain shifted away from the farm to the food-consuming industries—the primary processors, manufacturers, and retailers who “consume” the products produced by the earlier steps in the chain. Horizontal and vertical integration and consolidation led to increased levels of industry concentration. By 1997, four companies controlled 60% of all hog slaughtering in the United States,[26](#) and in 2000, the top 5 food retailers controlled 40% of food sales.[27](#) Primary food processors also diversified into different steps of the chain, enabling them to control the supply of their foods from farm to retail.[28](#) These higher levels of consolidation and concentration, combined with the effect of the big commodity programs, put pressure on farm size—very large family farms accounted for 45% of production in 2003, up from 32% in 1989—while the size of the farming population fell.[29,30](#)

This reor... moved a... packaging... with... 80% of... declining... competi... in the chain labor, farm costs, By 1999, So despite from

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings



From here, it was a short step to the globalization of America's food supply chain. US food companies began to buy up companies in other countries, thus increasing their global reach and power.[28,34](#) Exports increased as well, as agricultural policy, combined with high levels of technological and organizational efficiency, continued to promote the production of surplus relative to domestic need.[27,35](#) Successive governments pursued the policy of opening foreign markets for American products through the World Trade Organization and bilateral trade agreements (e.g., the North American Free Trade Agreement), which also opened up the country to imports. The development of cold chain technologies now allowed highly perishable products like seafood and fruits and vegetables to be flown in from all over the world. As a result, Americans began to consume more of the fruits—like grapes—now available beyond the US seasons and/or at lower prices than US products.[36](#) The process also allowed US food processors to rely more on ingredients sourced from overseas, cutting their costs of production.[35](#)

This shift to the global model involved more than just more imports and exports. It represented a political, economic, and ideological shift—essentially a paradigm shift—that favored the development of a market-oriented, economically efficient, and competitive food supply chain, a chain that lowers the costs of production and produces a consistent supply of a plethora of foods (many of them highly processed and based on common ingredients), proactively marketed to consumers.[37](#) Even though the majority of food is not imported in the United States, and local chains are reemerging, it is this global model that now dominates the way food is produced and provided in the United States and many parts of the world.

## Characteristics and Incentives in the Food Supply Chain

Between them, these changes over time affected the foods available in the United States, the way they were produced, and the way they were distributed. This shows that the crucial changes in the food supply chain were not just technological (the development of cold chain technologies) but also organizational (the legal and financial incentives that encouraged the development of the food supply chain).

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings



farmers. These four sets of characteristics are thus used as an organizing principle for the methodology.

This in turn leads to the concept of incentives and disincentives in the chain. The important question here is not how food supply chains behave but why. It is this why that is the focus of the analysis part of consumption-oriented food supply chain analysis. To understand the why, it is necessary to go beyond description and enter an analytical framework of identifying the incentives and disincentives to the behavior of the different actors in the chain. The incentives and disincentives stem from the characteristics of the chain:

- **Organizational incentives:** The incentives that actors have to organize themselves in specific ways, such as consolidating to increase their competitive advantage.
- **Financial incentives:** Such as seeking profit, adding value, and cutting costs.
- **Technological incentives:** The incentives presented by new technological innovations.
- **Regulatory/policy incentives:** The incentives created by new regulations, policies, or legal decisions, as well as the disincentives they may present.

A fifth group of incentives are the incentives that come from consumers. These are different in that they are not incentives within the food supply chain but incentives that affect it. Indeed, it is often posited that it is consumer demand that drives the food supply chain rather than the other way around.<sup>38</sup> Though this concept is problematic in that it implies that consumers make entirely independent decisions about what they want and buy, it is unquestionably the case that, in their lifestyles and through their buying power, consumers affect the food supply chain. The rise of suburban living in the 1950s, for example, was an important demographic change that changed the

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings



Another important factor identified through the historical overview is that important shifts in outcomes of the food supply chain occur in response to mutually complementary changes throughout the chain. Take, for example, the rising production and consumption of packaged, processed foods and the decline of loose, unbranded primary processed foods. This pivotal shift was not just the result of the introduction of packaging technologies but of the rise of advertising, the introduction of supermarket retailing, the availability of low-cost ingredients—all operating in a consistent direction. These mutually reinforcing changes led to coherent incentives throughout the chain that provided a tipping point for change. The lesson here is that degree of coherence between the incentives in different steps in the chain is an important factor determining whether and what changes will take place and why chains behave and differ as they do. This in turn suggests that incentives in parts of the chain can be undermined by disincentives elsewhere, preventing change, and thus that the chain must be levered in a coherent manner to create long-term, sustainable changes to the food environment, consumer preferences, purchasing behaviors, and food consumption habits at the population level. There are two general approaches to do so. One is to intervene at several points along the chain to line up the incentives; the second is to implement just one or a small number of actions that introduce incentives or remove disincentives so significant that it has a ripple effect throughout the chain.

## CONDUCTING A CONSUMPTION-ORIENTED FOOD SUPPLY CHAIN ANALYSIS

### Basic Method

A consumption-oriented food supply chain analysis comprises 5 key steps:

1. describe the characteristics of the population
2. describe the production and processing characteristics of the food system
3. identify the distribution and consumption patterns of the food system
4. identify the policy and program interventions that can be implemented
5. identify the policy and program interventions that can be implemented

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

4. analyzing how these characteristics and incentives and disincentives affect the food environment: food availability, prices, and marketing;
5. identifying how these incentives could be leveraged to better align the food supply chain with healthy diets (what and who is needed to lever change).

The development of this analysis, and the concepts on which it is based, has been necessarily very general. To help identify specific levers to encourage healthy eating, the method needs to be applied to solve specific problems in the food environment. The supply of Coca-Cola beverages into school vending machines is used here to show how the method works. The availability of sweetened soft drinks in school vending machines has long been cause for concern among health advocates in the United States and elsewhere. Although there has been considerable activity in the United States and around the world to reduce this availability, efforts have focused on the consumer end of the chain rather than on reducing the incentives in supply chains.<sup>39</sup> A consumption-oriented supply chain analysis could contribute to understanding what these incentives are.

The presented analysis is not complete, because it is intended to simply illustrate the method. A fully comprehensive systems approach would require greater consideration of other soft drinks companies and other actors in the chain (such as soft drink distributors and vending machine operators), the influences on soft drink consumption outside the school environment in the broader food system, and, for all of these aspects, more in-depth information from stakeholder interviews.

## Testing the Method

### Step one

The first step is to describe the steps in the supply chain, as done in Figure 3. As shown, the Coca-Cola supply chain is divided into three main sections: upstream, middle, and downstream. The upstream section includes Coca-Cola bottling companies, which are responsible for the production and distribution of Coca-Cola beverages. The middle section includes vending machine operators, who are responsible for the placement and operation of vending machines. The downstream section includes schools, which are the primary consumers of Coca-Cola beverages in this context. The analysis focuses on the incentives and disincentives that influence the behavior of these actors and how they affect the food environment. The analysis identifies the incentives and disincentives that influence the behavior of these actors and how they affect the food environment. The analysis identifies the incentives and disincentives that influence the behavior of these actors and how they affect the food environment.

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our [Privacy Policy](#).

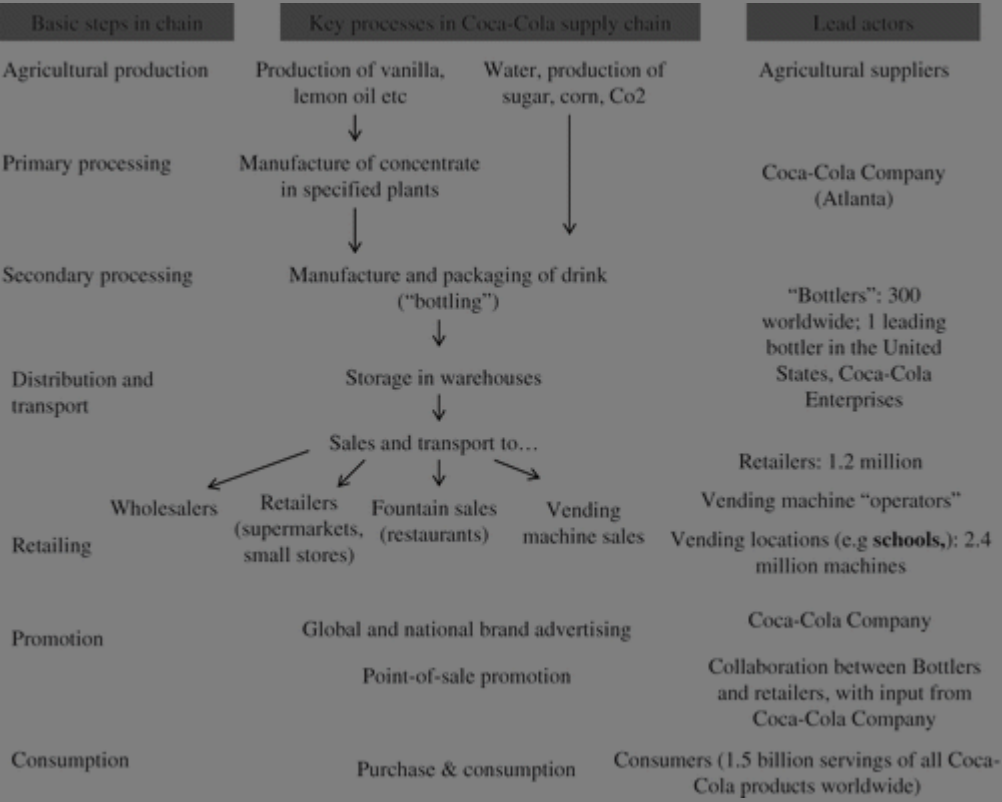
Accept All

Essential Only

Settings

their distributors, that distribute soft drinks into school vending machines, not the Company.

FIGURE 3 The Coca-Cola supply chain.



Display full size

## Step two

The second step is to describe the organization, financial, technological, and policy characteristics of the processes and actors in each step, while also taking account of the role of consumer characteristics. The Coca-Cola Company is (just) the leader in a highly concentrated soda market (35.7% of the market relative to Pepsi's 34.7%).<sup>46</sup> Considered one of the worlds leading brands,<sup>47</sup> the Coca-Cola Company sells over 3000 beverage products in over 200 countries, with leading brands in the United States being Co

Within the

relative

the co

weaker

the bott

example

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click "Settings". For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

Company

the brand and

powerful. This

company and

ite. For

ndling cola

with the right to establish concentrate prices, and require the bottlers to place a specified number of vending machines.

Both the Company and the bottlers are more powerful than the actors in the earlier part of the chain—the agricultural and product suppliers—and the later part of the chain—the retailers etc. At a basic level this is because there are many more suppliers and retailers than bottlers and so they have less bargaining power. It is notable, though, that the Company has expressed concern that the increasing consolidation among retailers and their increasing bargaining power—especially in the case of Wal-Mart—could affect their profitability.<sup>40</sup> Vending machines present an interesting case: they are different to standard retail customers in that they are vehicles through which beverages are sold directly to consumers housed in a third-party setting. As a third-party setting, schools are relatively small, unconsolidated operations with little expertise of contracting arrangements and often desperate for new funds. As such they are in a relatively weak position to bargain about the conditions of housing the machines. In most cases, the contracts between the bottler and the schools formalize this weaker power relation.

The financial costs in the chain reflect these organizational characteristics. The costs of ingredients and packaging are relatively low (albeit rising). Production and distribution costs are relatively high but are borne by bottlers. This means that the Company benefits from high sales volumes while incurring relatively low capital costs (even though this includes the cost of developing new products). This, in turn, frees up significant funds for marketing and explains why the Company is able to spend so much on advertising: the Company spent \$776.8 million on advertising and just in measured media in 2007, not including the money it provided to bottlers for promotional activities.<sup>49</sup> This cost distribution in the chain leads to huge net operating revenues for the Company (\$31.9 billion in 2008) and profit margins (64.4% in 2008)<sup>50</sup> with the

bottlers (\$28.1 b lower co change There ar here is v become

the revenues relatively h margin relevance have since methods, the


ability to vend a wide range of package sizes and a wide selection of beverages, and innovative payment methods.

Policy characteristics of the chain also play a role. An important but often overlooked regulation is the Soft Drink Interbrand Competition Act (1980), which gives bottlers the legal right to exclusive territories within which to distribute their product as long as there is sufficient interbrand competition. This means that it is not permitted to have more than one bottler selling Coca-Cola Company products in one territory (e.g., a state).

Also important here have been the changes in policies affecting the availability of sweetened soft drinks in schools. These changes reflect a history of tortuous debate and decision-making that began with the enactment of the National School Lunch Program (NSLP) in 1946. The NSLP contained no specific provisions relating to the sale of foods in school shops and vending machines etc, but in 1970, congress granted the US Department of Agriculture (USDA) the authority to regulate these so-called competitive foods, a move that led to the designation of “soda water” as a “food of minimum nutritional value” and a legal challenge to the USDA by the soft drinks industry. The result was the limited federal control over soft drinks in schools but with states retaining their ability to regulate beyond federal rules.[39,52](#)

In the 2000s, states started to act, with hundreds of bills proposed to restrict soft drink availability in schools beyond federal regulations. To date, over 30 states have taken legislative action to somehow control the availability of sweetened soft drinks in schools.[53](#) In 2006, the American Beverage Association developed some self-regulatory school beverage guidelines brokered by the Alliance for a Healthier Generation. The guidelines eliminate the availability of full-calorie drinks in schools, limit the portion sizes of caloric beverages, and require low- and no-calorie drinks to be available.[54](#)

Changes among young people spend on Step 1. The third disincen



### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

lower among money to tives and pt for the



into schools, driven by the ultimate incentive of wanting to reach young people. Organizationally, for example, Company-bottler contracts create an incentive for bottlers to place vending machines in schools, while the highly concentrated nature of the industry, combined with the lack of intrabrand competition and the weak power of schools, creates the incentive for exclusive contracts with schools. Financially the high margins from vending machines create an incentive for bottlers, and the cash benefits are an incentive for schools. Developments in the regulatory environment on school food removed disincentives to their availability, as did developments in vending technologies.

## Step four

The fourth step is to examine the implications for availability, retail prices, and marketing. The increase of availability of sweetened soft drinks in schools has been well documented: in 2004–2005, 88% of high school students had soft drinks available to them through vending machines.<sup>56</sup> The effect of prices in vending machines is less clear, but for marketing, there is no question that vending machines provide a critical opportunity for branding young people at an impressionable age, in the hope that they remain loyal for life.

## Step five

Step 5 is to identify what incentives could be levered for change. The approaches implemented thus far are the state laws and school beverage guidelines. Since these measures have come into place, the American Beverage Association report that calories from all beverages shipped to schools nationwide declined by 58% between 2004 and 2007–2008 and shipments of full-calorie soft drinks fell by 65% in all schools.<sup>57</sup>

This analysis aims to identify approaches that have been used in schools to negotiate vending machine contracts. In this article

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

already<sup>58</sup>—at the nature of competition policy to see how it could be leveraged to create disincentives in the chain.

## POTENTIAL APPLICATIONS OF CONSUMPTION-ORIENTED FOOD SUPPLY CHAIN ANALYSIS

This article has exemplified a potential application of consumer-oriented food supply chain analysis to a supply chain into a discrete setting—in the context of the availability of foods in those settings. There are many more potential applications of the analysis ( [Box 1](#)). Supply chain analysis could be used to examine the supply of fatty, sugary, salty foods into other discrete settings like worksites and restaurants. It could be used to examine how consumer-oriented policies, such as regulations on food marketing to children, nutrition labeling, or food taxes, affect the earlier components of the food supply chain. This could help identify bottlenecks to successful implementation of the regulations (aspects that undermine their implementation), and the broader advantages and disadvantages throughout the chain of implementing such regulations. One example would be to examine the effect of voluntary initiatives—such as the school beverage guidelines—on the supply chain relative to legal approaches. In the other direction, the analysis could be used to examine how regulations in the food supply chain affect consumption. For example, how do food quality (e.g., cosmetic) standards affect what foods are available in the marketplace? How would changing environmental or sustainability criteria for food products affect consumption? Supply chain analysis could also be built into studies that involve identifying the barriers to promoting healthy eating, such as problem and solution trees. A recent example shows how these approaches can be useful in identifying supply chain barriers to healthy eating.<sup>59</sup>

Box 1

orien

Down

Another

“healthy

About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings


Ultimately

s available,

supply-side bottlenecks to achieving these goals and by providing insights into how to increase supply into underserved areas (or into discrete settings like schools). Experience of developing local food supply chains to encourage fruit and vegetable consumption while delivering value to producers shows that logistical supply chain management is often the key disincentive to such efforts. Supply chain analysis could be used at a local level to identify bottlenecks in the chain from, say, farm to school, or farm to low-income neighborhood. The analysis could also be used more broadly to examine whether different scales of chain (e.g., local versus national or global provision of fresh fruits and vegetables) are more conducive to healthy eating.

Another potential application is the influence of agriculture in healthy eating. The role of agricultural producers is explicit in local food supply chains, but there has been debate as to the role of agricultural policies in influencing the healthiness of the food supply in general.<sup>60</sup> Supply chain analysis could be used to examine more systematically the role of agricultural policies and programs in influencing the food environment in particular settings. For example, the consumption of pulses (legumes) is declining in many developing countries. Is this simply because of changes in consumer preferences, or are there explanations in the agricultural sector?

Comparison of chains for similar but different products could also be instructive in providing insights into how the supply of more health-promoting product could be encouraged. Examples might be a comparison of the chain of milk into schools compared with the chain for sweetened milk, or between “healthier” versions of products from the same food company, such as unsweetened breakfast cereal and a high-sugar product, or a high-fat snack with a lower-fat version. This could help identify what changes are needed to help the healthier chain outcompete the less healthy product, as well as the supply-side incentives food companies need to produce healthier versions of their products. Likewise, a comparison could be done between



### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

products processing, such as a bread of ingredients and add

Another supply chain, such as a bread of ingredients and add

disincentive to such efforts. Supply chain analysis could be used at a local level to identify bottlenecks in the chain from, say, farm to school, or farm to low-income neighborhood. The analysis could also be used more broadly to examine whether different scales of chain (e.g., local versus national or global provision of fresh fruits and vegetables) are more conducive to healthy eating.

the chain.<sup>61</sup>

little studied problems in the food environment; to illustrate, it is possible that taking a supply chain approach to the problem of soft drinks in schools at an earlier stage would have led to solutions being identified earlier.

## CONCLUDING REMARKS

It was noted in the introduction to this article that the supply chain approaches taken to food issues thus far have typically focused on business management, the environment, labor, and safety. As a counter balance, the method developed in this article has deliberately focused on consumption. This stress that leveraging the food supply chain is an underused policy response to the growing problem of unhealthy eating. Ideally, however, all aspects of the food supply chain that affect human health and well-being—whether it be economic concerns, working conditions, climate change, unsafe food, or healthy diets—should be considered as part of one system and thus in one analytical framework. Further discussion and debate are needed to merge the different approaches to create a new paradigm for the modern food system.

This article is based on a paper commissioned by the Healthy Eating Research Program of the RWJF. The authors would like to thank the RWJF, particularly Mary Story, for their support. The ideas presented were originally stimulated by the work of Tim Lang and colleagues at City University. The author thanks Francesco Branca and Laurette Dubé for inviting me to present versions of these ideas at conferences in 2006 and 2007. The author also thanks Deborah Pinkas for her insights into soft-drink contracts with schools.

Notes



REFE

In this article

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings



1. Ogden , CL , Carroll , MD , Curtin , LR , McDowell , MA , Tabak , CJ and Flegal , KM . 2006 . Prevalence of overweight and obesity in the United States, 1999–2004 . JAMA . , 295 : 1549 – 1555 .

 | [PubMed](#) | [Web of Science ®](#) | [Google Scholar](#)

2. Levi J, Vinter S, Richardson K, St Laurent R, Segal LM. F as in fat: how obesity policies are failing in America 2009 <http://healthyamericans.org/reports/obesity2009/> (Accessed: 2 July 2009 ).

[Google Scholar](#)

3. James , PT , Leach , R , Kalamara , E and Shaveghi , M. 2001 . The worldwide obesity epidemic . Obes Rev. , 9 ( suppl 4 ) : 228S – 233S .

[Google Scholar](#)

4. Martin , C. 2005 . Logistics and Supply Chain Management: Strategies for Reducing Cost and Improving Service , 3rd , Harlow, Essex : Pearson Education Ltd .

[Google Scholar](#)


5. Hawkes , C. 2008 . Dietary implications of supermarket development: a global perspective . Dev Policy Rev. , 26 ( 6 ) : 657 – 692 .

 | [Web of Science ®](#) | [Google Scholar](#)

6. Porter , M. 1985 . Competitive Advantage: Creating and Sustaining Superior Performance , New York, NY : The Free Press .

[Google Scholar](#)

7. Gereffi , G and Korzeniewicz , M. 1984 . Commodity Chains and Global Capitalism , Westport, CT : Ablex .

8. Glo  [http://www.commoditychains.org/](#) (Accessed: 2 July 2009 ).

[Google Scholar](#)

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

 Accept All

Essential Only

Settings

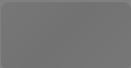


6. United States Dept of Agriculture Food Safety Research Information Office. A focus on hazard analysis and critical control points  
[http://fsrio.nal.usda.gov/document\\_fsheetsheet.php?product\\_id=155](http://fsrio.nal.usda.gov/document_fsheetsheet.php?product_id=155) (Accessed: 29 June 2009 ).  
[Google Scholar](#)


7. Meadows , D. 1999 . Leverage Points: Places to Intervene in a System , Hartland, Vt : The Sustainability Institute .  
[Google Scholar](#)

8. Young , CE and Kantor , LS . 1999 . A Comparison of the US Food Supply With the Food Guide Pyramid Recommendations , Washington, DC : United States Department of Agriculture .  
[Google Scholar](#)

9. Srinivasan , CS , Irz , X and Shankar , B. 2006 . An assessment of the potential consumption impacts of WHO dietary norms in OECD countries . Food Policy. , 31 : 53 – 77 .  
[Google Scholar](#)

10. Gerbens-Leenes , PW and Nonhebel , S. 2002 . Consumption patterns and their effects on land required for food . Ecol Econ. , 42 ( 1-2 ) : 185 – 199 .  
 | [Web of Science ®](#) | [Google Scholar](#)

11. Lang , T and Heasman , M. 2004 . Food Wars. The Global Battle for Mouths, Minds and Markets , London : Earthscan .  
[Google Scholar](#)

12. Barling  
upstre  
306  


23. Lyson

Food system

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings



by: Hirschl , TA and Heaton , TB . 157 – 168 . Santa Barbara, CA : Praeger .

[Google Scholar](#)

24. Smith , AF . 2007 . The Oxford Companion to American Food and Drink , New York, NY : Oxford University Press .

[Google Scholar](#)

25. Levenstein , H. 1988 . Revolution at the Table , New York, NY : Oxford University Press .

[Google Scholar](#)

26. Heffernan , WD . 1998 . Agriculture and monopoly capital . Mon Rev. , 50 : 46 – 59 .

[Google Scholar](#)

27. Hendrickson , MK , Heffernan , WD , Howard , PH and Heffernan , JB . 2001 . Consolidation in Food Retailing and Dairy: Implications for Farmers and Consumers in a Global Food System , Washington, D.C : National Farmers Union .

[Google Scholar](#)

28. Hendrickson , MK and Heffernan , WD . 2002 . Opening spaces for relocalization: locating potential resistance in the weaknesses in the global food system . Sociol Ruralis. , 42 : 347 – 369 .

 | [Web of Science ®](#) | [Google Scholar](#)

29. United States Dept of Agriculture Economic Research Service. Farm structure: questions and answers <http://www.ers.usda.gov/Briefing/FarmStructure/Questions/farmstruct.htm> (Accessed: 3 July 2009 ).

[Goog](#)

30. MacDo  
pay  
http  
Goog



### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings

1. Elitzak H. Food marketing costs: a 1990s retrospective. FoodReview [serial online] 23: 27–30. September–December, 2000  
<http://www.ers.usda.gov/publications/foodreview/septdec00/FRsept00e.pdf>  
(Accessed: 2 September 2009 ).  
[Google Scholar](#)

2. United States Dept of Agriculture Economic Research Service. Food marketing system in the US price spreads from farmer to consumer  
<http://www.ers.usda.gov/Briefing/FoodMarketingSystem/pricespreads.htm> (Accessed: 2 September 2009 ).  
[Google Scholar](#)

3. Leibtag E. Market dynamics keep food prices steady. Amber Waves. February 2003  
<http://www.ers.usda.gov/AmberWaves/feb03/Findings/ marketdynamics.htm>  
(Accessed: 6 July 2009 ).  
[Google Scholar](#)

4. Price , CC . May 1996 . “ The US foodservice industry looks abroad ” . In Food Rev May , 13 – 17 .  
[Google Scholar](#)

5. US Dept of Agriculture . 2001 . Food and Agricultural Policy: Taking Stock for a New Century , Washington, DC : US Dept of Agriculture .  
[Google Scholar](#)

6. Jerado , A. 2008 . What Share of US Consumed Food Is Imported? . Amber Waves , : 36 – 38 .  
[Goog](#)

7. Hawke  
glob  
Glo  
(Acces  
[Goog](#)

es of  
c diseases.  
/2/1/4

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

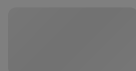
Essential Only

Settings

38. Mentzer Morrison R, ed. FoodReview: consumer-driven agriculture. FoodReview [serial online]. 2002;25 <http://www.ers.usda.gov/publications/FoodReview/May2002/> (Accessed: 2 September 2009 ).

[Google Scholar](#)

39. Mello , MM , Pomeranz , J and Moran , P. 2008 . The interplay of public health law and industry self-regulation: the case of sugar-sweetened beverage sales in schools . Am J Public Health. , 98 ( 4 ) : 595 – 604 .



[PubMed](#) | [Web of Science ®](#) | [Google Scholar](#)

40. The Coca-Cola Company . 2007 . Annual Report 2007 , Atlanta, Ga : Coca-Cola Company .

[Google Scholar](#)

41. Coca-Cola Enterprises Inc “About Us” Web site

[http://www.cokecce.com/pages/allContent.asp?page\\_id=88](http://www.cokecce.com/pages/allContent.asp?page_id=88) (Accessed: 2 September 2009 ).

[Google Scholar](#)

42. Coca-Cola Enterprises, Inc., “The Coca-Cola System” “Value Chain” and “Sustainable Agriculture.” <http://www.thecoca-colacompany.com>

[Google Scholar](#)

43. Coca-Cola Enterprises Inc . 2006 . Corporate Social Responsibility Report , Atlanta, Ga : Coca-Cola Enterprises Inc . Accessed September 2, 2009

[Google Scholar](#)

44. Coca-Cola Enterprises Inc . 2006 . Corporate Social Responsibility Report , Atlanta, Ga : Coca-Cola Enterprises Inc . Accessed September 2, 2009

[Google Scholar](#)



45. Coca-Cola Enterprises Inc . 2006 . Corporate Social Responsibility Report , Atlanta, Ga : Coca-Cola Enterprises Inc . Accessed September 2, 2009

[Google Scholar](#)

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

[Accept All](#)

[Essential Only](#)

[Settings](#)

6. Fuhrman , E. March 2006 . “ The 2006 soft drink report ” . In Beverage Industry March , 16 – 22 .

[Google Scholar](#)

47. Business Week. Best global brands 2008 [http://bwnt.businessweek.com/interactive\\_reports/global\\_brand\\_2008/](http://bwnt.businessweek.com/interactive_reports/global_brand_2008/) (Accessed: 3 September 2009 ).

[Google Scholar](#)

48. The Coca-Cola Company. Product descriptions <http://www.virtualvender.coca-cola.com/ft/index.jsp> (Accessed: 3 September 2009 ).

[Google Scholar](#)

49. Advertising Age. Marketer trees 2008 [http://adage.com/marketertrees\\_08update/](http://adage.com/marketertrees_08update/) (Accessed: 3 September 2009 ).

[Google Scholar](#)

50. The Coca-Cola Company. FORM 10-K For the fiscal year ended December 31, 2008 [http://www.thecoca-colacompany.com/investors/pdfs/form\\_10K\\_2008.pdf](http://www.thecoca-colacompany.com/investors/pdfs/form_10K_2008.pdf) (Accessed: 2 September 2009 ).

[Google Scholar](#)

51. CCE Form 10K and Annual Report 2008 [http://files.shareholder.com/downloads/CCE/716951617x0x279036/BA72537B-37DE-4177-BDD6-11F6ECC123EA/CCE-137\\_2008\\_AR\\_Final\\_Printed.pdf](http://files.shareholder.com/downloads/CCE/716951617x0x279036/BA72537B-37DE-4177-BDD6-11F6ECC123EA/CCE-137_2008_AR_Final_Printed.pdf) (Accessed: 2 September 2009 ).

[Google Scholar](#)

52. Fried , E and Simon , M. 2007 . The competitive food conundrum: can government regula

[Goog](#)

53. Hay , J and Simon , M. 2007 . The competitive food conundrum: can government regula  
in t  
<http://>  
) .  
G  
In this article

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

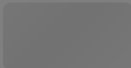
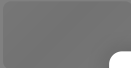
Essential Only

Settings

Availability

neva

ember 2009

4. American Beverage Association. School beverage guidelines  
<http://www.ameribev.org/nutrition--science/school-beverage-guidelines/> (Accessed: 7 July 2009 ).  
[Google Scholar](#)
5. McGinnis , JM , Gootman , JA and Kraak , VI . 2006 . Food Marketing to Children and Youth: Threat or Opportunity? , Washington, DC : National Academies Press .  
[Google Scholar](#)
6. Johnston , LD , Delva , J and O'Malley , PM . 2007 . Soft drink availability, contracts, and revenues in American secondary schools . Am J Prev Med. , 33 : S209 – S225 .  
 | [Web of Science ®](#) | [Google Scholar](#)
7. American Beverage Association. School Beverage Guidelines Progress Report 2007–2008 <http://www.schoolbeverages.com/download.aspx?id=111> (Accessed: 8 September 2009 ).  
[Google Scholar](#)
8. Saltzman , H , Levy , R and Hilke , JC . 1999 . Transformation and Continuity: The US Carbonated Soft Drink Bottling Industry and Antitrust Policy Since 1980 , Washington, DC : Federal Trade Commission . Bureau of Economics Staff Report  
[Google Scholar](#)
9. Snowden , W , Schultz , J and Swinburn , B. 2008 . Problem and solution trees: a practical approach for identifying potential interventions to improve population nutrition . Health Promot Int. , 23 : 345 – 353 .  
 | [PubMed](#) | [Web of Science ®](#) | [Google Scholar](#)

#### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All

Essential Only

Settings



Download PDF

## Related research

People also read

Recommended articles

Cited by  
57

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

Accept All 

Essential Only

Settings



## Information for

Authors

R&D professionals

Editors

Librarians

Societies

## Opportunities

Reprints and e-prints

Advertising solutions

Accelerated publication

Corporate access solutions

## Open access

Overview

Open journals

Open Select

Dove Medical Press

F1000Research

## Help and information

Help and contact


Newsroom

All journals

Books

## Keep up to date

Register to receive personalised research and resources by email

 Sign me up



Copyright © 2024 Informa UK Limited [Privacy policy](#) [Cookies](#) [Terms & conditions](#)

[Accessibility](#)

 Taylor & Francis Group  
an informa business

Registered in England & Wales No. 3099067  
5 Howick Place | London | SW1P 1WG

### About Cookies On This Site

We and our partners use cookies to enhance your website experience, learn how our site is used, offer personalised features, measure the effectiveness of our services, and tailor content and ads to your interests while you navigate on the web or interact with us across devices. You can choose to accept all of these cookies or only essential cookies. To learn more or manage your preferences, click “Settings”. For further information about the data we collect from you, please see our [Privacy Policy](#).

 Accept All

Essential Only

Settings