Farm-to-Institution Supply Chains: Practices, Challenges and Performance Measures

By

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Problem statement

Farm-to-institution programs (mainly farm-to-school and farm-to-college programs) are one of the fastest growing local and regional food sourcing approaches for colleges and schools in the United States of America. The national Farm-to-School Network (FSN) website lists more than 130 farm-to-school programs and estimates the existence of more than 2,000 programs in the U.S. Therefore, these programs have started to garner attention at the national, state and local level. For example, while schools could purchase food items from local producers in the past, they were not allowed to specify "local" or a geographic preference in their bid. The 2008 farm bill allows schools to purchase unprocessed food products including items requiring some further handling and preparation (e.g., washed and bagged vegetables, pasteurized milk, and eggs) from local producers specifying their geographic preference in the bid.

Farm-to-institution programs are closely tied with the development of local and regional food systems. Key driving forces for the development of these food systems include environmental concerns, farmland preservation, health and nutritional issues, community and economic development, and the creation of green and leisure spaces (Abate). Although the primary goal of these programs is to link the institutions directly with local and regional producers, supply chains for these programs can take a number of different forms. Therefore, important components in designing and analyzing farm-to-institution supply chains include (a) understanding of local and regional food purchasing goals, practices, approaches and perceptions, and (b) the development of appropriate performance measures and decision variables that reflect program goals and practices. Researchers and practitioners in the conventional supply chain, which includes producers, wholesalers, processors, and retailers, applied a number of performance measures in the evaluation of the effectiveness and efficiency of the chain (Beamon; Aramyan). These include (1) qualitative performance measures such as customer satisfaction, supply chain flexibility, material and information flow, risk management, and supplier performance, (2) quantitative performance measures such as cost minimization, and sales or profit maximization, and (3) measures based on customer responsiveness. These supply chain performance measures are expressed as a function of one or more decision variables including production or distribution scheduling, inventory level, number of stages, product types, and distribution and plant locations. It can be assumed that a farm-to-institution supply chain analysis requires a conceptual framework with performance measures and decision variables that could be different from those applied and used in the conventional supply chain.

Objectives

The paper presents results from a farm-to-institution study at Michigan State University (MSU) and reviews other empirical studies to identify performance measures and decision variables that are applicable to analyze and evaluate the performances of farm-to-institution supply chains. Specifically, the paper has the following three objectives: (1) It presents key findings from a farm-to-college study (hereafter referred to as Farm-to-MSU) conducted at the Michigan State University (MSU). Specific objectives of the

Farm-to-MSU study were to (i) examine current food purchase experiences; (ii) explore opportunities and barriers for buying local and regional foods; and (iii) propose applicable approaches and models for a sustainable Farm-to-MSU program. (2) The paper will provide a review of recent farm-to-institution empirical studies (focusing on farm-to-school and farm-to-college programs) to assess and analyze similarities and differences in program goals, practices and perceptions. (3) Based on the Farm-to-MSU and other empirical studies, and a review of appropriate supply chain modeling practices, the paper will examine the need for a conceptual framework for analyzing and modeling farm-to-institution supply chains. It will specifically focus on the identification and discussion of relevant performance measures and decision variables that could be applied to design, develop and analyze farm-to-institution supply chains with a focus on local and regional sourcing of food products. It will also investigate the adequacy and appropriateness of existing supply chain performance measures and decision variables in evaluating and analyzing farm-to-institution supply chains. (4) Finally, the paper will suggest a research agenda for future farm-to-institution supply chain analysis and design.

Procedures

A qualitative approach was applied to conduct the Farm-to-MSU study. Fifteen interviews were conducted with individuals currently (and potentially) involved in the supply chain of local and regional food products to MSU, including representatives of various MSU entities: Food Stores, University Housing and Dining Services, Concessions, Cafes, and Convenience Stores. Also interviewed were two large produce distributors, three brokers, three shippers, a processor and a farming family. Snowball sampling was applied to identify and contact interviewees within the supply chain. Interviews were semi-structured and key questions included supply chain actors' behaviors and experiences, products sold, the structure of the supply chain in which the business operates and the firm's function within that chain, relationship with MSU (or the MSU vendor to which it sells), attitudes and experiences in sourcing local products, and perceived obstacles to local sourcing. This approach allowed a closer look at the chain actors' operations and enabled to describe and explore their roles, experiences and perceptions about local foods. Focusing on farm-to-college and farm-to-school programs, a detailed and focused review of other recent farm-to-institution empirical studies will be conducted to better understand and capture key driving forces, features, goals, practices and perceptions in developing farm-to-institution programs. This will be used to develop an appropriate framework for analyzing and evaluating the performances of farm-to-institution supply chains.

Results

University Food Service at MSU is a self-managed operation. Its customer base includes on-campus customers such as the University Housing and Dining Services, MSU Bakers, Sparty's Cafés, the Kellogg Hotel and Conference Center, and MSU Concessions and Catering. The Food Service currently has a relatively rigid and hierarchical organizational and supply chain structure that dictates the types of vendors to be contacted and allows purchasing of food items solely from a set list of preapproved and contracted prime

vendors. It prefers one-stop shopping that allows its staff to purchase many items from very few vendors. This procurement procedure saves time and resource use that could arise from dealing with multiple vendors or farmers.

MSU's current purchase amounts of local and regional food products are very small. Some of the procurement and supply chain related challenges to purchase these products include the following: (1) Lack of appropriate supply chain for the products. Most local food products are not carried by the preapproved prime distributors that currently supply food products to MSU. Bidding protocols and contractual agreements with these vendors do not incorporate clauses or provide specific guidance on sourcing of local and regional food products. (2) Chefs and managers of residence hall dining services and other on-campus food services have little autonomy to establish and maintain relationships with local food producers and suppliers. They can purchase food products only from approved vendors that have contractual agreements with the MSU Food Service. (3) Menu development plans for residence hall dining services are centralized, and dining hall chefs use a fixed set of menus. This process does not provide much room for chefs to pursue different goals and menu planning programs or to incorporate local and regional food products into their menus. (4) In case of produce, there appears to be asynchrony between the demand for and supply of local and regional products. MSU serves most of its meals outside of the region's prime growing season. In addition, MSU purchases processed produce while most fruits and vegetables from local and regional producers come as fresh market products. In-house processing appears to pose a number of obstacles, including increased waste, yield uncertainty, labor costs and safety issues. It is also unlikely that the current processors that supply MSU would wish to run specific batches of local and regional-only produce or to commit to procure local and regional produce for MSU. (5) There are different requirements from local and regional producers who want to sell products through the market channel that supplies MSU. In particular, costs of insurance, handling, order and delivery lead time and other requirements of MSU or its vendors limit the number of local and regional producers who can meet them.

Overall, the study identified that the current MSU supply chain is not suitable for sourcing local and regional food products. MSU Food Service has recently developed a Farm-to-MSU guide in order to incorporate the purchase of locally and regionally grown food products into its program. The guide has set major supply chain goals that could be met in a five-year period. These include incorporation of sustainably raised products in dining services; strengthening educational and promotional programs within the MSU food system on sustainable, local and organic food products; and implementation of "dining boutiques" offering sustainable products year round. This transition to a Farm-to-MSU program would require changes in the supply chain, procurement procedures, logistics arrangements (product order, delivery, and transportation), and methods of production.

Other empirical studies have also dealt with the goals, practices, and motivations of farm-to-institution programs, and identified needed production and supply chain changes to develop farm-to-institution programs. Allen and Guthman note the desire to get healthier foods and more reliable markets for small-scale, often organic/ecological farmers, as some of the driving forces in establishing farm-to-institution programs. They emphasize

that major differences between the conventional supply chain and a farm-to-school supply chain lie in the forms and qualities of food items, geographic focus, intended benefits for producers, intended benefits for children, required supply chain actors, funding sources and expected financial outcomes. Born and Purcell emphasize that local food systems have goals related to ecological sustainability (e.g., minimization of food miles and use of organic or other sustainable methods); social and economic justice (e.g., development of local economies, community stability, democracy, local empowerment and food security), and food quality and human health (e.g., fresh being the best or local foods are healthier). Banks and Bristow list, among others, location, availability, production methods and environmental qualities as main features that differentiate the conventional and local food supply chains that include farm-to-institutions. Product flow plays an important role in modeling the conventional supply chain. However, closer linkages, relationships and collaborations with local and regional producers and suppliers, and flow of information appear to be much more important in developing a farm-to-institution supply chain. In this regard, one recent area that has been the focus of some scholars and practitioners is the Short Food Supply Chain (SFSC) that specifically focuses on sourcing of locally and regionally grown food products (Ilbery and Maye). One key assumption is that this supply chain carries products embedded with information about the methods of production, origin of the product, regional imagery and specific quality.

These empirical studies and conceptual approaches reflect differences in features, goals and practices between the conventional supply chain and the farm-to-institution supply chain. One key performance measure for a farm-to-institution supply chain could be minimization of environmental costs at the production level and within the supply chain. This notion is embedded in the programs' support to sustainable food production and use of short supply chains. Cost minimization models in the conventional supply chain do not primarily reflect environmental costs. Farm-to-institution features such as fair pricing and support to local and regional economy could use benefit to small and medium size farms as a performance indicator. Maximization of health impacts or nutritional values of food served at schools and colleges could be another performance indicator for those farm-to-institutional programs that focus on sourcing of healthier food products.

Conclusions

The paper uses an empirical study to assess opportunities and challenges in developing a farm-to-institution program. The results from the study at MSU show that transition to a farm-to-institution program needs changes in procurement and supply chain practices and structures. Results from review of empirical studies indicate that analyzing and assessing performances of farm-to-institution supply chains will require the use of performance measures and decision variables that are different from those applied in the conventional supply chain.

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