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Systems from a Regional Science Perspective

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Abstract

Various types of local food systems are being touted as a means of engendering local economic growth and reducing environmental impacts of food production in general (by reducing the so-called food mile). These systems include farmers' markets, community supported agriculture (CSAs), u-pick operations, and other forms of direct to consumers marketing. Also included are direct linkages between farmers and local restaurants or grocery stores. However, most discussions of local food systems have not received rigorous analysis based on tools of regional science. Using the Porter Diamond as a starting point, we will provide a preliminary critique of the current literature and how regional science may be used in analyzing local food systems. We also include some discussion concerning local food systems as an economic development tool. Also included is an analysis of the literature concerning the potential environmental benefits of local food systems.

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Introduction

Advocates make many claims concerning the advantages of local food systems. These claims include enhanced social and economic activities for local communities, primarily from strong backward linkages. Local consumers are also seen as receiving substantial benefits from such systems, including enhanced food quality, greater nutritional benefits, and the opportunity to form social linkages with local farmers. Local food system advocates also praise the environmental benefits (less pollution and energy use) primarily by reduced transportation system use (i.e., reducing so-called food miles). Finally, many advocates believe that such systems have sufficient growth potential for transforming the entire food delivery system.

Despite such claims, relatively little neutral analysis has been conducted concerning the claims of local food systems; probably for several reasons. First, at least until recently in the modern economic era, such systems have formed a small part of food expenditures. Second, those involved in such systems view them as inherently beneficial; hence, analysis of cost and benefits is not warranted or even desirable. However, such systems, while still relatively small, are growing in importance. Also, policy makers need to be aware the assumptions that underlie claims concerning the benefits of local food systems. Advanced here is a preliminary attempt to evaluate the economic and environmental benefits of local food systems from a regional science perspective. We also seek to provide initial thinking concerning the reasons why such systems spread (such as, do local food systems tend to cluster).

Initially, we define local food systems based on the definition of the region and

discuss the overlap between local food systems, direct marketing by farmers, and locality foods. We then tie the arguments concerning benefits of local food systems to claims made concerning small farms in general. Next, the Porter cluster model is used as an analytical tool for examining local foods as potential clusters. In this regard, we evaluate the potential for local food systems to transform numerous rural areas. We also discuss the potential for local food systems to actually cluster, both in general and in the Porter sense. Arguments concerning local food systems and resulting environmental benefits are then examined, especially in relationship to decreases in food miles. Finally, we summarize with a number of research questions.

What Constitutes Local Food Systems

At least for the U.S., we have been unable to locate a systematic review of the various types of local food systems, their share of the food market, or their contribution as a group to economic activity at the national, regional, or even local levels. Also, local food systems seem to mean different things to different people.

Part of the confusion concerning local food systems is definitional. Like defining the region, what is considered “local” depends on the nature of the specific local food system or issue under study. For example, if the emphasis is on a local farmers’ market sponsored by county government, then the county is the appropriate unit for considering what is local. For any effort that is sponsored by a given state department of agriculture, the entire state is the appropriate unit of analysis. Ilbery et al. (2006) states that local foods (or in certain European literature short food supply chains (SFSC)) have been defined as foods that are produced, processed, and retailed within 30-50 miles of their

point of origin (i.e., where the food was grown). This definition probably reflects the emphasis on farmers' markets, where farmers' profitable involvement is limited by transportation costs. For example, analysis by Hughes et al. (Forthcoming) of survey results of West Virginia farmers' markets vendors indicated participating farmers as traveling an average one-way distance of 14.5 miles to such markets.

Another part of the confusion is the strong overlap with direct marketing. Much of the information concerning local food systems is presented under the topic of direct farmer marketing, where farmers make sales directly to final consumers or retail outlets. While there is a large amount of overlap between the two concepts, they are not the same. For example, direct marketing includes internet sales, where customers are usually not local, and local food systems include community gardening, which does not involve commercial farmers. Even farmers' markets are not entirely local foods, because some farmers' markets have tourists as a major segment of their market and depending on the definition of the region (for example in-state versus out-of-state), it is possible that selling farmers are not local. Additionally, farmers' markets sellers may be vendors who do not necessarily sell any local products. Also, at least part of the literature (Ilbery et al. 2006) talks about "locality foods", such as Washington State wines, that have product branding associated with a given locality or region, but with largely external markets. While the authors are clear in maintaining the distinction, there still is the potential for confusion in the minds of the general public concerning local foods versus locality foods.

Positive Economic and Social Benefits?

Much of the discussion holds the view that local food systems are inherently beneficial for local communities. Advocates argue that local food systems meet a growing consumer need for higher quality foods, enhance community ties, retain local dollars and reduce environmental degradation. Because local food systems have been synonymous with small farms, claims made for the former are easily traced to those made for the latter.

The argument that community well-being is driven by the existence of small-scale, locally-controlled enterprises is rooted in Goldschmidt's (1946) examination of production agriculture. The underlying premise is that small-scale production is tied to place by social and economic relationships. It suggests that a dense network of local institutions and organizations, including churches, retail enterprises, and voluntary associations, among others, serves as a glue that ties people to place.

This contention stems from the early work of Goldschmidt (1946) which suggests that there may be positive benefits to communities that embrace small-scale, locally-based models of development. In a 1944 study of two farming communities in the Central Valley of California, Goldschmidt found that the quality of economic and social well-being was greater in the community characterized by small, locally owned firms than in the community that was characterized by large, absentee-owned firms. He writes, "the scale of operations...inevitably had one clear and direct effect upon the community: It skewed the occupation structure so that the majority of the population could only subsist by working as wage labor for others. [This occupational structure]...has had a series of

direct effects upon the social conditions in the community. ...It means that a large portion of the population has little vested interest -- economic or social -- in the community itself.” (Goldschmidt, 1946, pp. 415-416). These findings support Goldschmidt’s hypothesis -- large-scale, corporate farming diminishes the quality of life in rural communities -- and led him to identify social inequality as the central causal mechanism. Moreover, he downplays the economic contributions of small business development and argues that it is the social networks among government, schools and other social organizations that benefit most from the diffuse resources of a decentralized local economy based on small business.

Research on the emergence of spatially-clustered, local production districts, comprised of loosely-coupled, small firm networks built around a craft form of production (Piore and Sabel, 1984) has helped spawn new interest in local food systems, which also represent the link between small-scale production and community well-being. Local food systems—sales made by local farmers to local markets--can take a variety of forms including community supported agriculture (CSAs) or subscription agriculture, farmers’ markets, roadside stands, u-pick operations, community gardens, and direct sales by farmers to local restaurants, grocery stores and institutions (such as schools and food banks). Advocates often point to the Goldschmidt Hypothesis, and other more recent analysis, such as the work of John Ikerd (2002), in touting the potential benefits of local food systems. The craft production networks of Pierre and Sabel provide another explanation of local food systems.

For instance, in recent years, proponents have touted local farmers’ markets as a

key component of a counter movement to the dominant trend toward larger scale, industrial-like farm operations (Lyson, 2004; Hilchey et al., 1995; Lyson et al., 1995). Arguably, farmers' markets manifest a grassroots response to the social and economic distancing that characterize today's food system. According to this argument, common features of the present food system include consumer separation from their food source, industrialization of food production, processing and distribution, and decline in local enterprise and economy. Since mass markets often fail to meet the demands for specialized, nonstandardized food and agricultural products, local farmers' markets are becoming the market of choice and the bridge between the formal and informal economy in many communities (Lyson et al., 2004).

Application of the Porter Model

As discussed in Barkley and Wilson (1995), the Porter model (1985) provides a framework for three strategies that can be used to create and maintain a dynamic spatial cluster (also consistent with the analysis of Piore and Sabel and others). First, firms in the cluster can be low-cost producers, by using new technologies that reduce per unit production cost. These innovations can occur in product production, marketing, finance, or management. Second, firms can use a market focus strategy by devoting their efforts in serving a market segment based on location, income category, age, race, or other factors that can lead to differentiate buying habits. Product differentiation is a closely related third strategy, where customers differentiate the firms' products from those of others.

As indicated by Woodward and Guimaraes (Forthcoming), Porter-type economic

clusters have four drivers of activity, which relate more or less to local food systems. First, local consumers are knowledgeable about cluster produces and production processes. Second, linkages between local input suppliers and firms oriented toward final markets are well developed within the cluster. Third, firms in the cluster have sufficient access to resources (or factors of production) that favor growth, such as sufficient physical infrastructure, access to sufficient supply of the right types of capital, and for agricultural products appropriate land and climate. Finally, there is an appropriate competitive environment, where competition between firms drives continuing innovation but where firms cooperate when it is to the advantage of all. Another salient aspect of the Porter model is that firms are usually export oriented, or the cluster forms part of the regional economic base.

Advocates of local foods systems explicitly or implicitly follow a combination of Porter-based strategies of market segment and product differentiation in our view. Market segment holds because consumers of farmers' markets, community supported agriculture, and probably other types of local food systems marketing often have higher than average income and education levels, and are viewed as caring more about environmental degradation than the population at large. For example, local food system consumers often purchase higher than average levels of organically produced foods. Local food system advocates may also often decry the amount of energy "wasted" by transporting food items over long distances.

Place of location (locally versus "elsewhere") also provides a means for product differentiation. Using farmers' markets as an example, consumers' benefits from farmers'

markets include having access to products that might be otherwise unavailable (i.e., to a differentiated product). Products are often of a higher quality, especially in terms of freshness, in comparison to agricultural commodities purchased through standard marketing channels. Many consumers also like the direct interaction with local producers. Such interaction allows consumers to question farmers about pesticide use and production methods and may ensure that the product is “chemical-free” (Gale 1997, p.2), especially when farmers are not organically certified but claim organic status. Many consumers also like the idea that they are supporting local agriculture, especially small local farms, and helping to retain dollars in the local economy (Brown 2003; FPC 2001).¹ For example, in their analysis of survey results concerning a buy state agriculture campaign in South Carolina, Carpio et al. (2007) found that 90% of respondents claimed they would pay higher prices for in-state produce.

Barkley and Wilson, in two different papers (1992; 1995), use the Porter framework to assess alternative agriculture as a potential rural development strategy. They define alternative agriculture as activities that “are in some sense unusual or atypical, at least for that part of the country” (p. 240, 1992). They cite new crops or products in a region, such as wine grapes in South Carolina, industrial uses of agricultural products, such as ethanol, value-added agriculture (i.e., the local processing of locally grown products, such as making wine from local vineyards), and even urban agriculture, such as fee fishing and companion animals (such as horses or pigs).

Barkley and Wilson conclude that alternative agriculture will only serve as a rural development strategy in a few, select places. First, the potential profitability (and hence

long-run sustainability) of many such efforts are limited because customers usually have a variety of low cost alternative products to which they can easily switch. Competitors may also invoke barriers to entry through pricing policies or by manipulating supply chains. Hence, establishing alternative agricultural enterprises can be an especially risky proposition. Second, even if successful, such enterprises have limited potential for meeting rural revitalization goals on a wide scale. For example, assuming all U.S. newspapers used soybean based ink and making other generous assumptions, Barkley and Wilson calculated a resulting maximum of 2,000 new farms. Spread across all soybean producing areas, the resulting growth would have a negligible impact on local economies.

These major points made by Barkley and Wilson are well taken. However, can local food systems be viewed as a different form of alternative agriculture? That is, first, by virtue of being local foods, do such systems have the potential for enhancing farm incomes in a sustainable (long run) manner? Stated differently, do local food systems have a sufficiently differentiated product serving an arguably growing market niche? Evidence suggests that local food systems are indeed a sustainable, differentiated product in many locations. Once again using farmers' markets as an example, the number of farmers' markets has increased significantly over the last decade, from 2,410 in 1996 to 4,385 in 2006 (AMS 2006). A study conducted by Payne (2002) also demonstrates the growth of farmers' market as a marketing tool. In 1994, 20,946 farmers participated in farmers' markets with 6,648 (31.7 percent) using such markets as their only marketing outlet. By 2000, 66,700 farmers participated in farmers' markets with 19,000 using such markets as their only marketing outlet. The estimated number of customers per week

grew during the same period from 915,777 to 2,760,000, an increase of 201.4 percent. An older study (conducted in 1996) estimates the number of community gardens at 150,000. Relevant to our study, advocates of community gardens also point to examples of linking with local food banks to enhance nutritional content for patrons (The American Community Gardening Association, 2006). Likewise, according to the Biodynamic Farming and Gardening Association website (2007), there are currently over 600 CSAs in the U.S. and Canada.²

Second, do local food systems have the potential for becoming major engines of local economic growth and transformation? Many (Goldschmidt, 1946; Haweii, 2002; and Pirog et al., 2001, among others) consider local economies vital in their definition of sustainable agriculture. Local food advocates generally see local economic growth resulting from import substitution, which is the replacement of products purchased outside the local economy with local production (Homm et al., 1991). The rationale for import substitution is based on economic multiplier analysis, where the level of local purchases in turn determines further buying in the local economy (Hughes, 2003). Another view of sustainable agriculture could be in terms of developing economic clusters (Piore and Sabel, 1984; Porter, 1985) driven by loosely held networks.

In regard to this point, the argument by Barkley and Wilson that alternative agriculture is a tool with limited potential is better backed by the evidence. For example, Otto and Varner (2005) examined the state-wide impact of all farmers' markets in Iowa with estimated direct sales of \$20 million and a total economic impact of \$31.5 million, with \$12.2 million of that impact in personal income throughout the regional economy. They

estimated that 471 full-time jobs were generated by the spin-offs arising from Iowa farmers' markets. Hughes et al. (Forthcoming) estimated that farmers' markets in West Virginia had annual direct sales of \$1.725 million with gross multiplier-based impacts of 112 jobs and \$2.434 million in output including \$1.532 million in gross state product (GSP). When the effect of direct revenue losses are included (primarily for grocery stores), the impact is reduced to 71 jobs, \$1.048 million in output, and \$0.760 million in GSP. We would expect an impact study of other forms of local food systems, such as CSAs, would yield estimates of similar smaller magnitudes. Other research has yielded much smaller impacts. For example, an analysis by Robinson et al. (Forthcoming) indicated that linkages between a regional food bank and local farmers in Beauford County South Carolina had very marginal effects on local employment and income levels.

While many of these predicted impacts are nothing to sneeze at, these studies imply that farmers' markets, and probably other forms of local food systems, are not likely to serve as catalysis of agricultural transformation anytime soon, unless major shifts occur in the U.S. economy, such as a large and sustained increase in energy prices. However, small impacts can "add-up". For example, a study by DEFRA (2004) estimates that local food systems were directly responsible for 1-5 % of grocery sales in the United Kingdom. However, to our knowledge, no one has simultaneously evaluated the impact of all types of local food systems on a given regional economy in the U.S. or elsewhere. Additionally, a much less easily measured, but potentially important effect could be the impact that such systems may have on local attitudes about entrepreneurship.

Do Local Food Systems Tend to Cluster?

In one sense, one can argue that local food systems are inherently economic clusters in respect to the emphasis on local purchases and enhanced producer and consumer interaction leading to the “knowledgeable consumer”, a key aspect of the Porter-type cluster. A different question is whether the existence of local food firms or organizations (such as farmers’ markets) enhances the probability of more local food systems developing in the future? For example, does the existence of local farmers’ markets lead to more local farmers’ markets because of knowledge spillovers or other factors? Similarly, do local food systems “cross-pollinate”, or, for example, does the existence of local farmers’ markets tend to lead to the development of local CSAs. Alternatively, are such systems more often substitutes in meeting similar taste and preferences of consumers for local food products or is there typically no relationship between their development? Further, if clustering does occur, is it generally driven by local farmers, other businesses, consumers and government explicitly working together (i.e., is it a Porter Cluster), or do local food producers merely co-locate without any real cooperation among themselves or with other entities?³

The tendency of local food systems to cluster has been examined to a limited extent in Europe, albeit not by any type of rigorous statistical analysis. Ilbery et al. (2006) used graphical analysis of national, regional, and local food directories and food group membership lists to determine whether food producers, processors, and retailers were at all involved in the production of local foods in the Southwest and Midlands regions of England. Based on graphical analysis, they argued that local food systems

tended to cluster in certain areas in both regions. They hypothesize that proximity to higher income, urbanized areas, and certain tourist attractions positively correlate with local food system concentrations, as does the existence of small landholdings and certain types of agriculture, such as vegetable production.

We also expect local foods to be cluster oriented for several reasons. First, cluster development in the Porter model is driven by knowledgeable consumers who interact with producers. In as much as local food systems encourage such interactions, one would expect a tendency for activities such as farmers markets to lead to more farmers markets and to activities such as CSAs. Or, farmers and consumers who interact in a given commercial venue are likely to interact in other ways in similar venues. Further, one would expect local food systems to cluster on the rural-urban fringe, where farmers can have direct or indirect (for example via direct farmer to restaurant connections) to markets of sufficient size and incomes. Finally, Eades and Brown (2007) argue based on county level data that U.S. organic agriculture has a strong tendency to cluster, with especially strong concentrations found in California and the New England States based on Moran I statistics and other evidence. Of course, organic foods does not equal local foods, especially with the movement of organic production into more conventional retail outlets (Stevens-Garmon, 2007) such as large conventional grocery stores and into highly processed forms. Yet, organic farmers still tend to do more direct marketing than conventional farmers, and at least one type of local food systems (e.g., CSAs) remain highly concentrated in organic production (Greene et al., 2001). Arguably, the study by Eades and Brown implies that local food systems tend to cluster. Hence future research

is needed to determine if such clustering is indeed occurring, and if so, what is the nature of local food clusters (farms and organizations merely co-locating or actively cooperating in advancing local food systems).

Local Food and Porter Clusters

Given that local food systems can be viewed as a cluster, can they typically be seen as a Porter Cluster? In our view, local food systems have certain attributes of the Porter model but lack others. For example, local food systems certainly have well engaged or knowledgeable customers, which should drive innovation in the local food system. However, no research per se has looked at the cross-pollination between different forms of local food activities. So, while customers may be engaged, it remains to be seen concerning whether such engagement drives firm and farm innovation.

Porter clusters are also very much oriented toward export activity, i.e., local consumers “help” local businesses develop innovative products supported by innovative processes that are sold to the rest of the world. In this regard, local food systems by definition focus on local markets, which only involve selling to the outside world as a special case (for example, when farmers’ market have a large tourism draw). However, several studies argue that the distinction between local (or alternative) food systems and typical marketing channels is to a large degree arbitrary from the viewpoint of many local food firms. Both Watts et al. (2005) and Ilbery (2006) argue that at least in the UK, firms typically participate in both conventional and local food marketing channels.

If local foods are indeed becoming more conventional, then conditions under which local food systems may be developing could also be expected to change. For example, local

food systems could simply become an “add on” to current concentrations of agribusiness based activity. In this regard, conventional food systems could be modified to also serve local markets. Arguably, such a situation exists in eastern Washington State, where agriculture is concentrated in the production of soft white wheat primarily for export to Asia, but where an emphasis on local foods is at least starting to develop. Columbia Plateau Producers (CPP), a regional farmers’ held business (18 farm operations are currently involved) is providing all of the flour (Shepherd’s Grain) used by the Washington State University Dining Services (Washington State University, Fall 2007). The business also sells flour to other institutions of Higher Education (University of Idaho, Gonzaga University, and Whitworth College) and to regional businesses (Coerud’ Alene Resort and Davenport Hotel). It is also noteworthy that the flour is milled in Spokane, Washington, but at a facility owned by Archer Daniel Midland, the international food conglomerate.

Local Food and Energy Use

Energy use in the production and distribution of food is another consideration in evaluating potential benefits and costs of local food systems, especially in terms of evaluating the effect in terms of sustainability. A significant portion of the potential societal benefits of local food systems arguably arises from transportation cost savings. Local food can serve as a substitute for food shipped from often distant countries or regions. Local food advocates point to the reductions in energy consumption and environmental pollution from meeting local food needs with local products (saving so-called food miles). Such advocates also point to the reduction in the production of

greenhouse gases as food miles are reduced. Critics of the food mile concept argue that the food mile approach is inherently flawed because it does not account for the total energy consumption (and greenhouse production) of the entire farm to market food production and consumption system.

We have not found any regional science literature that speaks directly to the food mile debate. However, the regional science literature has tended to highlight the decrease in real transportation cost as a key long term historic trend. This viewpoint at least implies that transportation cost savings from local foods versus other sources does not provide substantial societal benefits. One can also draw the inference that production centers based elsewhere (where economies of scale in production and industry cluster or agglomeration benefits may hold) will continue to hold cost advantages over local food systems.

In our view, part of the debate centers on the adequacy of market prices to reflect true social costs and benefits, especially in terms of environmental degradation and resource scarcity, in particular in terms of petroleum consumption. Another wildcard is the role of government infrastructure development as a subsidy for transportation systems.

Glaeser and Kohlhase (2004) point out that the cost of many goods declined by 90 percent in real terms in the 20th century. They also argue that “there is little reason to doubt that this decline will continue” (p.197, Glaeser and Kohlhase). They argue that while transporting people remains costly, the movement of goods is now essentially free. In the U.S., the share of GDP in all transportation sectors has declined from seven percent

in 1900 to three percent in 2002. This decline has occurred despite the substitution of more expensive trucks for railroads in moving many products and the introduction of air transportation as a new mode of transportation. Citing a study by Eno Foundation, Glaeser and Kohlhase point out that the decline in percentage of GDP is maintained, even if the movement of products internal to firms (and hence excluded from transportation in GDP accounts) is included. Further, using railroad transportation as an example, their research estimates a decline in real cost per ton mile from \$0.185 in 1890 to \$0.023 in 2000.

Proponents of local food systems (Halweil, 2002; Pirog et al., 2001) agree that shipping levels have increased dramatically for food and other products. Halweil estimates that food travels 50 percent further in the United Kingdom in 2001 as compared to twenty years earlier. Using Agricultural Marketing Survey data for the Chicago terminal market, Pirog et al. estimated that truck travel to the market was an average of 1,518 miles in 1998 (a 22 percent increase from the 1981 average of 1,245 miles) based on a weighted average source distance (WASD) approach. As pointed out by Halweil, innovations in food processing as well as enhanced transportation systems have contributed to the growth in shipping foods. For example, the development of frozen orange juice concentrate expanded the market for orange growers to distant markets from a seasonal market with geographical limits based on fresh produce and juice to a greatly expanded year-round global market. But, Halweil (2002) and Pirog et al. (2001) among others point to the reduced fuel consumption and accompanying declines in greenhouse emissions such as CO₂ emissions when local foods substitute for external supplies.

Critics of the food mile approach claim that merely examining energy use in transportation produces biased comparisons of local versus external sources of food. For example, Wells (2001) and Saunders et al. (2006) argues that a product cradle to grave approach, where energy consumed in the production of farm inputs, energy consumed in farming itself, energy consumed in transporting products to final consumers (including storage), and finally waste disposal should all be included in any analysis of local versus external food systems. A study by Saunders et al. (2006) used a “farm to plate” (cradle to grave without analyzing waste disposal) consumption of energy for New Zealand exports to the United Kingdom versus consumption of in-country production for apples, sheep meat, onions, and dairy products. Their research indicated that New Zealand products consumed in the United Kingdom resulted in lower levels of energy consumption than their local substitutes by very substantial amount for dairy (twice as efficient in terms of energy consumed per ton of product) and sheep meat (four times as efficient). The New Zealand products had relatively lower levels of energy use because much of the transportation was ocean borne (a lower user of energy per ton of product). New Zealand production was less energy intensive in production because, for example, New Zealand sheep are primarily feed through pasture grazing while UK production relied more heavily on feed grains.

The analysis by Saunders et al. is to at least some degree driven by assumptions (for example, New Zealand apples are less than energy efficient than UK apples in meeting UK demand unless the UK is assumed to store surplus for meeting the demand throughout the year) and by “guesstimates” (for example, expert opinion is used deriving

certain coefficients). Still, the work calls into question the basic food mile argument and places the comparisons a proper whole system perspective.

Another aspect of the food mile argument centers comparable versus noncomparable imports (to regional economists). Noncomparable imports exist in interindustry models when a commodity lacks a regional counterpart in industry accounts due to the products specialized nature or to linkages between supplier and customers (Yuskavage et al., 2006). Tropical fruits imported into temperate climates are an example of a noncomparable food import. Another aspect is seasonality, where a product can only be produced by local farmers for part of the year. For example, in their preliminary analysis of a South Carolina buy local campaign for 14 vegetables, Carpio et al. (2007) indicate that seasonality limits what consumers can buy from South Carolina growers (without storage) to an average of 7.2 months. While storage of local production may be an option, storage also involves energy consumption, especially for perishable items.

In response to concerns about noncomparable inputs, food mile proponents (Garnett, 2003 among others) may argue that consumers should forgo consumption, especially when seasonality is involved (e.g., give up peaches when local peaches are out of production). In this regard, local foods could be seen as limiting rather than expanding consumer options.

Conclusion

A review of the literature reveals a strong need for policy analysis based on regional science methods concerning local food systems, especially in the U.S. First, local food systems in several different types of particular regions need to be inventoried and evaluated in terms of level of activities of the various types of local food systems (i.e., farmer's markets csas, direct selling to restaurants and other forms). Such evaluations could provide an indication of the possible current contribution of local foods to local economies and most importantly the potential for such systems to contribute to future growth. Economic impact analysis, like that done for farmers' markets, should constitute part of this research effort.

Another area for future work is the tendency of local food systems to cluster. If such clustering does occur, to what degree do clusters operate as competitive-collaborative entities in the Porter sense? Also, to what degree do firms involved in local food systems also sell in conventional marketing channels, and does a future hold where conventional outlets, such as large grocery store chains, coop the local foods movement? Finally, working with other scientists, regional scientists should assess the potential for environmental benefits through reduced fuel consumption and lower greenhouse emissions that local food systems may be able to provide.

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¹ Interestingly, local foods can also be seen as as the embodiment of the Armington Assumption, which forms the basis for the New Economic Geography usually as a heuristic modeling tool. Arguably, local food systems are an embodiment of Armington, where local consumers hold a preference for locally produced products as compared to regional imports.

² A major problem in evaluating the growth of local food systems is a lack of consistent data generated over time; hence the emphasis on farmers' markets, which have received much more attention in comparison to other forms of local food systems.

³ One also has to careful with language, because a "local food cluster" as discussed here is not the same as a "food cluster", which many regions have attended to stimulate the development of. In fact, the typical orientation of these "food clusters" is the regional export market, not import substitution.