A logic model for responsible entrepreneurship and sustainable development

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Abstract

Purpose – The purpose of this paper is to outline a logic model and analytical framework that can be used to help organize and understand the full range of costs and benefits accruing to firms, consumers and citizens as a result of responsible production systems.

Approach – The framework in this paper uses six capital assets to define quality of life and takes an institutionally-oriented view of results-based management at different hierarchical levels within and along supply chains. Two bread supply chains in Sweden are compared to illustrate how this framework can help build understanding of the environmental, social and business impacts of alternative production strategies.

Findings – In the Swedish case, competing eco-labelling systems and varying levels of human and social capital at senior levels management levels appear to be key differences between the supply chains. Both have important implications for sustainable development.

Practical Implications – Participating in efforts to trace and communicate information about environmentally- and socially-sound production practices is a necessary, but not sufficient, step in achieving sustainability. Being a truly responsible firm implies recognizing and accounting for the wider, external costs of production processes and procurement practices on consumers within the market and on other non-consumers outside the market.

Originality/Value – This logic model and framework is applicable broadly beyond the food sector and encompasses several other frameworks (pressure-state-response, sustainable livelihoods, results-based performance management). It allows for the systematic consideration of multiple investments, at multiple levels, for achieving sustainable development through responsible entrepreneurship.

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Introduction

There is strong evidence that the vast changes in food production, distribution and consumption over the past 50 years are the result of the private sector responding to evolving consumer demand (Antle, 1999). As real incomes have risen, there has been an increasing tendency for consumers to purchase luxury products and 'outsource' their food preparation efforts, either through the purchase of products that can be quickly prepared at home or by eating away from home (Putnam and Allshouse, 1999). Consequently, there has been a shift from raw agricultural commodities supplying comprising most of the value of the final food product to services comprising most of the value-added (Schluter *et al.*, 1998; Heller and Keoleian, 2003) and a radical re-structuring and globalization of food supply chains (Antle, 1999; Reardon and Barrett, 2000) to take advantage of evolving market demands for food convenience and diversity, advancing production technologies, and economies of scale.

Several of the costs associated with modern food production systems are, however, currently unaccounted for (Jeyaratnam, 1990; Pimentel *et al.*, 1992; Pretty *et al.*, 2000; Tilman *et al.*, 2002). Pretty *et al.* (2005) found, for instance, that a move from conventional agriculture to entirely organic production in the U.K. would reduce environmental and health externalities by £1.129 billion (US $1.84 billion) per year. The industrialization of agriculture and the decline in real prices for ex-farm products has also put severe stress on small rural farmers and farming communities (Flora, 1986; Lobao and Meyer, 2001), threatening the viability and resilience of culturally valuable rural communities and traditional lifestyles.

Accounting for the true costs and benefits of food production is a complex task, requiring that we think about the production side of the food supply chain – especially the producer surplus generated by firms all along the chain – and market demand, where consumer preferences for a full range of food attributes influence consumer surplus and the distribution of profits back along the 'value chain' (Cox *et al.*, 2002). From the food supplier's perspective, growing consumer demand for food produced using environmentally- and socially-responsible means has important production implications. The costs of production can rise due to increasing labour inputs, marketing costs, more stringent quality control programs, and/or decreasing productivity.

There are also economic benefits arising as a result of responsible production practices that need to be accounted for. Food production processes can be viewed as extrinsic production attributes of food products; the only way for a consumer to differentiate one product from another is by knowledge of the production process (Caswell and Mojduszka, 1996; Antle, 1999). Societal benefits derived from these extrinsic production attributes are reflected via peoples' willingness to pay (WTP) for various food products. Consumers can, and do, derive personal economic well-being as a result of firms engaging in environmentally- (Eom, 1994; Thompson, 1998; Magnusson *et al.*, 2001; Hu *et al.*, 2004) and socially-responsible (Lusk *et al.*, 2003; Moon and Balasubramanian, 2003; Bennett *et al.*, 2004; De Pelsmacker *et al.*, 2005) production practices along the entire field-to-table supply chain.

From an economic perspective, society as a whole could be better off if market prices were set to take advantage of consumers' WTP for food products that contribute to the co-production of public goods such as ecosystem health, human health, viable rural communities, and cultural conservation. From a responsible entrepreneurship perspective, a proactive move to recognize and account for the full costs of food production can be a signal about a firm's values to consumers and business-to-business clients and can be rewarded by socially responsible consumers and investors (e.g., Renneboog *et al.*, 2006).

The purpose of this paper is to outline a logic model and analytical framework that can be used to help organize and understand the full range of costs that might be imposed on consumers and society as a whole by food producers. I compare two bread supply chains in Sweden to illustrate the potential of this framework to help understand the environmental and business impacts of various production and labelling strategies designed to enhance agricultural sustainability in Sweden.

Analytical Framework

Comparing the costs and benefits of food products and production systems requires systematic use of a comprehensive logic model and analytical framework. The state of the world can be defined in terms of capital assets – natural, manufactured, human, social, cultural and financial – that provide flows of resources that people can use to sustain livelihoods and businesses, and improve their quality of life. People and firms engage in production processes, using various combinations of resources to undertake activities and produce outputs that help them achieve their objectives. Institutions – formal rules and informal social norms – alter incentives and behaviour by imposing financial (or social) rewards or sanctions for desirable or unacceptable behavior or outcomes. Vertical links exist between political, implementation, and operational levels within individual components of the supply chain. Components of the supply chain are connected horizontally via the sale and trade of commodities. Production processes in one part of the supply chain may also impose externalities, costs external to the production process, on other firms or consumers along the supply chain and in other jurisdictions. Economic analysis tallies the incremental costs and benefits to producers (producer surplus) and consumers (consumer surplus) while accounting for subsidies and the transaction costs of governing and managing the food production system. Non-market valuation may be needed to quantify the costs of negative externalities imposed on consumers and citizens or other non-consumers outside the supply chain.

Capital Assets

Capital assets are comprised of any stock that has the capacity to provide a flow of goods and/or services to human society, now and in the future, and that can be combined with other goods or services and transformed into valuable outputs (Castle, 1998). Two factors characterize capital assets: they are not entirely used up in the production of outputs but provide resource flows that people can use over time; and they require investment, reflecting savings or consumption foregone in one time period, so as to be able increase well being in the future. Six kinds of capital assets are now widely recognized:

(1) Financial capital (K_f) refers to the money, property and other financial assets of households, firms, governments and civil society that can be further invested to build and enhance other capital assets or purchase commodity inputs from inside or outside the system;

(2) Natural capital (K_n) refers to the part of the environment (air, water, soil, and ecosystem) that provides people with ecological functions that support living systems, products that can be consumed (source services), waste assimilation (sink services), and nonmarket amenities for humans (Ekins *et al.*, 2003);

(3) Manufactured (or produced) capital (K_m) refers to human-made infrastructural assets (e.g., facilities, infrastructure, equipment, technology) that can be used to produce goods and services that benefit their owners over time;

(4) Human capital (K_h) refers to the health, knowledge, skills, training and competencies embodied in individuals;

(5) Social capital (K_s) is comprised of the social networks in a society that facilitate mutually advantageous collective action by increasing information flow, reducing uncertainty about the world and the behaviour of others, and increasing people's propensity to cooperate (Rudd, 2000); and

(6) Cultural capital (K_s) is the set of beliefs or behaviours which are produced and transmitted socially, that help shape the aptitude or inclination of a group or society to behave in a certain way, and are commonly referred to as heritage or tradition (Cochrane, 2006).

What types of trade-offs people are willing to make between different capital assets and resource flows they use (and hence their quality of life) depends fundamentally on how people frame their goals and objectives. Ethics, values, and mental models of the world shape goals and objectives, as well as personal (and societal) definitions of quality of life and sustainability (Rudd, 2000; Farley and Costanza, 2002; Butler and Oluoch-Kosura, 2006). Threats occur when capital assets are eroded and resource flows become constraining, preventing actors from undertaking activities that help them to achieve their objectives (Rudd, 2004). What poses a threat or opportunity depends on these underlying values and the mental filter through which people view the world.

Institutions

Production processes are shaped and constrained by institutions, the 'rules of the game' (North, 1990), that are comprised of both formal rules and informal social norms. Institutions specify what behaviours are required, permitted or prohibited in a society, and what financial or social rewards are associated with each (Crawford and Ostrom, 1995). Seven key classes of rules can be differentiated (Ostrom 1990, 2005):

(1) Boundary rules specifying whom is allowed to participate in activities of interest (e.g., licensing requirements);

(2) Position rules that specify the role each participant plays (e.g., ‘placeholder’ rules that define the responsibilities and privileges of the Chair of a committee);

(3) Authority rules that specify what actions and activities are permitted, required or forbidden (e.g., when [seasons], where [zones] and how [gear type] fishing vessels are permitted to operate);

(4) Information rules that specify reporting requirements (e.g., nutritional labelling, management performance monitoring);

(5) Aggregation rules that specify how individuals or organizations make decisions (e.g., committee decision-making rules, regulations about public consultation requirements prior to regulatory change);

(6) Scope rules regarding what states of the world (i.e., outputs and outcomes) are permitted, required or forbidden (e.g., pollution discharge limits, water quality standards); and

(7) Payoff rules that specify incentives or sanctions for certain behaviours or outcomes (e.g., subsidies or tax concessions for firms in strategically important industries).

The components of the overall operational-level framework thus far can be synthesized into a basic logic model (Figure 1). Note that two other major analytical frameworks, the pressure-state-response model (OECD, 1993) and the sustainable livelihoods model (Ashley and Carney, 1999), can be explicitly incorporated within this institutional framework (Rudd, 2004, 2007). In addition, standard results-based management performance systems that are framed in terms of inputs, activities, outputs, outcomes and impacts, can be directly integrated within this framework.

Insert Figure 1 about Here…

The combined impacts of internal production processes and external influences are evaluated by actors, and threats or opportunities are identified and assessed using the mental models through which actors view and filter the world. Different people may thus perceive different threats and opportunities in any given situation because of their experience, training, awareness and education (i.e., human capital). When people perceive threats to the various capital assets they can respond in a number of ways: curtailing consumption of constraining resource flows; obtaining better information about the state-of-the-world and how resource flows can be transformed into outputs more efficiently and effectively; obtaining better information about the preferences and behaviour of others (i.e., the market and the competition) to increase the benefits derived from any given quantity of output; undertaking investments that build capital assets and alleviate resource flow bottlenecks; and/or undertaking investments to change institutions.

This framework can be applied at multiple levels of analysis (Ostrom, 1990, 2005; Rudd, 2007) within a single link in the supply chain or within a single organization (Figure 2). Institutions shape behavior just as much at the 'political' level (i.e., senior decision-making level in firms and other organizations) as they do in day-to-day operational situations. In high-level political situations, outputs and outcomes relate to general policy decisions, coarse-scale resource allocations, and setting rules about how lower level rules are formulated and enforced. Actors at the political level rely heavily on financial, human, and especially social capital (social networks). These become extremely important in helping political-level actors reach their goals and objectives (Rudd, 2004). High-level, coarse-scale decisions are then operationalized at an intermediate implementation level, where managers and bureaucrats make decisions about the specific rules that shape day-to-day incentives for operational-level firms and households, and fine-scale resource allocations (Ostrom, 1990, 2005; Rudd, 2004, 2007). The levels are linked vertically (e.g., as operational level firms invest to gain standing in the political process) through feedback mechanisms and have an important influence on the transaction costs of governance and management (Williamson, 1994).

Insert Figure 2 about Here…

Externalities

Externalities caused by one firm or sector can be imposed on other firms, sectors or society, either locally, in geographically adjacent systems, or at global scale. A challenge arising from globalization is the geographic, temporal and conceptual separation of producers and consumers in extremely complex food supply chains (e.g., Raynolds, 2000; Waltner-Toews and Lang, 2000). This is the classic problem, raised by Dewey (1991[1927]), of defining who the 'public' really is and, consequently, the proper scope for policy analysis. Each link in the supply chain (Figure 3) can impose externalities on consumers; it is possible for consumers to pass signals back to firms at various positions in the supply chain via market signals. Externalities may also be imposed on non-consumers or citizens residing in the same geographical-political system, in other systems, or even in future generations.

Insert Figure 3 about Here…

Note that externalities that affect the well-being of consumers can, in theory, be internalized using procedures that provide full information about the production process. If, however, some people being impacted by externalities do not consume commodities produced within the system, they have no way to signal their reduction in well-being to firms in the supply chain as there is no sales transaction taking place. Using only price-based market signals, no matter how effective, can still leave some people suffering a decrease in their well being and bearing unaccounted costs. An implication for responsible entrepreneurs is that participating in labelling or other efforts to trace and communicate information about environmentally- and socially-sound production practices is a necessary, but not sufficient, step in helping to achieve sustainable development in society. Being a truly responsible firm implies recognizing and accounting for the wider, indirect impacts of production processes and procurement practices on people that do not purchase that firm's goods or services.

Economic Analysis

The general principle in economic analysis is that an investment is worthwhile and should be pursued if the discounted benefits of that investment exceed its discounted costs. From a societal perspective, the sum of changes in producer and consumer surpluses should be considered as well as transaction costs of governance (that fall, ultimately, to either firms or households). In the context of responsible entrepreneurship, the salient point to note is that the sum of changes in consumer surplus is dependent on factors other than the generation and accumulation of financial capital. Quality of life can depend on the level of all six capital assets in society. That is, assets other than financial capital – environmental quality, physical infrastructure and technology, health and education, social networks and community, and cultural industries and heritage – are economically valuable in their own right. While it is not reasonable to expect private firms in a competitive industry to forgo profitability for altruistic reasons, it is reasonable to expect responsible entrepreneurs to consider the full costs of their own procurement and production activities. It is also reasonable to expect responsible firms to actively support policy initiatives designed to 'level the playing field' in supply chains that are non-competitive (i.e., recognize the legitimate role of, and facilitate when possible, legitimate public interventions that address market failures).

Nonmarket Valuation

Nonmarket valuation methodologies put an implicit price on non-financial assets and resource flows by examining people's preferences for non-financial aspects of quality of life and the trade-offs they are willing to make between them. As a result, it is possible to account for the economic value of the environmental, human, community and cultural well-being in investment and production decisions that support sustainable development. Much of the empirical work in the valuation field was initiated after the Exxon Valdez oil spill in Alaska (Carson *et al.*, 2003); governments sought to quantify the nonmarket (non-use or passive use) economic loss to all U.S. citizens, even those that would never visit Alaska. Nonmarket valuation essentially seeks to infer changes in consumer surplus by estimating households' willingness to pay (WTP) for improvements, or willingness to accept compensation for degradations, in factors affecting quality of life. While much of the early work relying on contingent valuation methodology was criticized due to potential biases, a blue-ribbon panel (Arrow *et al.*, 1993) found that these theoretically valid survey-based measures of consumer surplus were legitimate and could, subject to some caveats, be used in cost-benefit analysis and for litigation purposes. Theory and methodology have advanced rapidly in the valuation field (Hanley *et al*., 2003; Adamowicz, 2004) and current approaches are much less prone to the biases seen in early work.

Applying the Framework

To illustrate how this institutionally-oriented and capital asset-based framework can be used to analyze and inform responsible entrepreneurship, I use an example of bread supply chains in Sweden, drawing extensively throughout this section on the situation in 1999 as documented in a doctoral dissertation by Heidenmark (2000).

Bread is a staple food in Sweden and overall consumption has increased over past 20 years: the average Swede consumes 38 kg of bread per year (Carlsson-Kanyama *et al.*, 2003), with an increasing trend to whole meal and dark breads (Kihlberg *et al.*, 2004). Sensory qualities – the physical attributes of a loaf – are the most important factor for Swedish consumers (Kihlberg *et al.*, 2004). Bread texture is primarily influenced by wheat type and protein content, and milling process (Kihlberg *et al.*, 2004; Kuktaitė, 2004).

Swedish Bread Supply Chains

One major producer-oriented supply chain is composed of the farmer cooperative, Skånska Lantmännen (SL), the miller NordMills, the bakery Skogaholms Bröd, and the independent food retailer chain ICA Handlarnas AB (ICA). The multinational Cerealia (itself formed by the Swedish Farmers Supply and Credit Association) owns majority interests in SL, Nordmills, and Skogaholms. This supply chain (the 'ICA chain') had a 35% retail market share in 1999. A second major consumer-oriented supply chain is composed of retailer Gröna Konsum (GK), bakery Juvelbagerierna AB, miller Kvarn AB JUVEL (JUVEL), and farmer cooperative ODAL. The consumer cooperative Konsumentföreningen (KF) owned GK, Juvelbagerierna and JUVEL in 1999. This supply chain (the ‘GK chain’) had 19% bread market share in 1999 (the other major private retailer, D&D, had an 18% market share).

Labelling Systems

ICA and GK share similar ‘non-conservative’ customers and both have their own house ecolabels, ‘Sunda’ and ‘Änglamark’, respectively. Besides in-house eco-labels, there are two other important certification and labelling schemes in place in Sweden. One is the KRAV system for certifying and labelling organic products, and the other is the Swedish Seal system for certifying and labelling food from ‘Integrated Production’ systems.

KRAV is an association with 28 members representing farmers, food processing companies, trading companies, as well as consumer, environmental and animal rights groups. They certify organic farms and products, providing standards for farming inputs, processes and outputs. The KRAV label is attached to products that meet their standards and is used by consumers to identify organic products. To fully qualify for organic certification under the KRAV label requires an investment of about SEK 11,000 (about USD $1,350) for small farms and up to SEK 34,000 (USD $4,200) for large farms.

‘Swedish Seal’ is a system that certifies environmentally friendly “Integrated Production” farm practices (i.e., actions, activities), emphasizing documentation and traceability of ingredients, low impact inputs and energy use, measures to protect local biodiversity and water quality, and local procurement. It is the tool to satisfy the Swedish Farmers Supply and Crop Marketing Association’s policy goal of Sweden becoming the world’s cleanest agricultural producer. By 1999, there were 550 farms involved, farming 80,000 ha and producing 150,000 mt of Swedish Seal certified grain. Farmers tend to see Swedish Seal as a compromise between conventional, input-intensive farming and organic farming.

The Producer-Oriented ICA Supply Chain

SL – the Scania (a province in southern Sweden) Farmers Cooperative – is the second largest cereal coop in Sweden with sales of SEK 3.8 billion (USD $494 million), 10,000 farmer members, and 720 employees. Membership is dominated by large, industrial cereal farmers; there is an open landscape and good soil in Scania, allowing large farms to specialize in cereal production. Production from SL is 650,000 mt cereals annually, of which about 35% goes to milling and 65% to fodder. Organic cereal production by SL is only 1,500 mt (0.23% total production); 180 farms in total have 3% of arable land in organic production for all crops.

NordMills is the largest flour milling company in Sweden, with 45% of overall market share, sales of SEK 660 million (USD $86 million), and 155 employees. If runs three mills around the country, producing 300,000 mt annually, including 60,000 mt of Swedish Seal certified flour and 700 mt KRAV certified flour. It is the only company in Sweden producing Swedish Seal flour and its goal was to be producing 100% Swedish Seal flour by 2003. NordMills operates on the spot market and is in a strong bargaining position because of its dominant market share. Local procurement of Swedish grain is important to NordMills, not surprising given that is owned by Cerealia and, indirectly, by Swedish farmers. It pays a small premium, SEK 0.07 (USD $0.01) per kg, for cereals from Swedish Seal certified farms. For KRAV certified products, it pays SEK 0.80 (USD $0.10) per kg premium.

Skogaholms operates a total of 15 bakeries, has sales of SEK 1.2 billion (USD $156 million) annually, and employees 1,384 people. It has a 20% to 25% market share for Swedish bread products and is obliged to buy its flour from NordMills as a result of Cerealia ownership in both companies. Skogaholms does not produce any organic bread but does produce nine Swedish Seal products. Their perceptions of market demand are such that they do not think customers are willing to pay a premium price for organic products. They view organic flour as low quality (due to low protein levels) and note that new, expensive baking processes would be needed for increased organic production. In addition, they would incur higher operating costs for low production runs of organic products.

ICA is a voluntary chain of independent retailers. ICA headquarters provides a centralized procurement function although they are not involved directly in distribution (i.e., bread ships from bakeries directly to independent grocers). ICA has annual sales of SEK 35 billion (USD $4.5 billion), 33,000 employees in 2,050 stores, and accounts for 35% of Swedish retail food sales. While they stock 330 KRAV certified organic products, they do not sell any organic bread. In general, there is a view within ICA that consumers do not understand what organic certification really stands for.

The Consumer-Oriented GK Supply Chain

ODAL is the largest of eleven farmer cooperatives in Sweden, with 25,000 farmers from the middle region of the country and 2,226 employees. It has annual sales of SEK 6.7 billion (USD $870 million) from overall production of 1.5 million mt of cereal production. Approximately 50% of all Sweden's organic farmers are from the ODAL region. There are 1,536 farms adhering to the KRAV certification system and 307 with the Swedish Seal program. ODAL sees organic farming as a financially sound alternative to conventional and sees profitability of the organic sector increasing as production volumes increase. They help reduce risks for farmers by entering into three year supply contracts with guaranteed prices for the farmer, essentially sharing risk with other organizations up the supply chain.

JUVEL operates two flour mills in Sweden, including an older stone-ground mill in Scania. It has annual sales of SEK 307 million (USD $40 million) and a 15% to 20% market share. With its 80 employees, JUVEL produces 115,000 mt of flour per year, including 6,100 mt of organic flour in a line of 15 different products. JUVEL does not sell flour exclusively to Juvelbagerierna, but also to Skogaholms for bread production destined for the ICA chain.

There is a clear demand for organic flour arising from JUVEL's close links with up-stream processing and retailing companies. While organic production is more expensive that conventional, JUVEL maintains the same profit margins on organic flour because of price premiums and successful efforts to streamline production (e.g., organic products are milled only one time per month in order to minimize change over costs). JUVEL sources flour on the spot market from farmer cooperatives.

Juvelbagerierna is the bakery in this supply chain. It is one of the three largest bakers in Sweden with 14% market share, 13 bakeries, and 1,000 employees. In 1999, it had sales of SEK 1.2 billion (USD $156 million). It has essentially been a contractor for GK and is the main supplier of Änglamark bread products. It produces 46,000 mt of bread products annually, including 2,000 mt of KRAV-certified organic breads as 14 different products. A consistent supply of organic flour from JUVEL has been a very important success factor for Juvelbagerierna.

GK is a food retailer (its Swedish name translates to 'Green Consumer' in English) with annual sales of SEK 32 billion (USD $4.2 billion), 19% market share, 1,400 stores and 36,000 employees. It is very close to the market because it is owned by KF, a consumer cooperative with 2.9 million members. GK has a strong environmental corporate culture and its own eco-label, Änglamark. It stocks about 500 to 550 KRAV products, including 21 different organic breads. Organic breads sell for a premium of SEK 1 to 2 (USD $0.13 to $0.26) per loaf and GK covers its costs on organic bread and other products (the premium on bread is proportionally lower that for many other organic products).

Similarities between Supply Chains

When comparing the two supply chains in Sweden, there are many similarities that would not be present if comparing bread supply chains in different sectors or countries. In this case study I only briefly highlight some of the factors that, in other circumstances, might be much more salient.

Institutions

Both bread supply chains in Sweden operate within the same macro institutional environment. It is of interest to note that until 1990 the agriculture industry in Sweden was highly regulated and had few incentives for matching technical capacity to consumer demand. It is thought that the Swedish retailing sector had the capacity to serve 40 million people in the 1990s and that the bakery sector was capable of handling 60 million (the population of Sweden is only 8.9 million). It is apparent that the formal rules governing the industry provided substantial payoffs for investments in technology and infrastructure.

One other important institution that currently affects both supply chains is a payoff rule: farmers meeting EU standards for organic production in Sweden receive subsidies of between SEK 900-1600 (U.S. $111 to $198) per ha annually under the EU Common Agricultural Policy. EU subsidy standards are such that Swedish farmers do not have to be certified organic under Swedish standards to qualify for the EU subsidy. Given the recommendations of both ODAL and SL urging farmers to consider converting to organic, it appears that the EU subsidies fully compensate for the higher production costs incurred by organic farmers.

Producer Surplus

Corporate re-structuring since the time of Heidenmark's (2000) study has led to some reduction in over-capacity but institutional history and path-dependency (Arthur, 1989; North, 1990) can limit options for reducing technical capacity and improving profitability along existing supply chains.

Favourable soils in Scania provide SL farmers an environment in which specialized and large-scale cereal farming provide the best profit margins. ODAL farmers, however, see the economics of organic as more advantageous, due to local topographical and soil conditions, farm size and crop mix, and ODAL's earlier conversion to organic conversion. ODAL does not hold an ideological position on the social desirability of organic farming; the view is shaped by competitiveness considerations for member farmers. Substantial overcapacity throughout the milling and baking sectors implies low producer surplus levels as capital intensive facilities usually have to be operated at near capacity to be profitable.

Physical Externalities

The physical impacts of food production in Sweden are well-documented in a variety of studies using Life Cycle Assessments (LCAs) (Andersson and Ohlsson, 1999; Sundkvist *et al*., 2001; Carlsson-Kanyama *et al.*, 2003; Sonesson *et al.*, 2005). LCA studies typically examine greenhouse gas (GHG) emissions, and the potential for eutrophication of waterways, acidification, and photo-oxidant formation.

In the farming sector, GHG emissions from Swedish agriculture accounts for about 28% of national emissions (Sonesson *et al.*, 2005). Roughly 40% to 60% of total GHG emissions in the bread production process were the result of the agriculture system (Andersson and Ohlsson, 1999). The agricultural system also accounted for about 50% to 70% of the total acidification potential for different bread production systems and 85% to 95% of total potential eutrophication inputs (Sonesson *et al.*, 2005).

Energy use by the milling sector was approximately 2 to 5 MJ per 1 kg bread loaf, 20% to 45% of total energy consumption using the four different production systems examined by Andersson and Ohlsson (1999). The potential for photo-oxidant formation is high in the milling sector, consistently in the range of about 65% to 90% of total bread production photo-oxidant emission potential.

The bakery component of the supply chain accounted for roughly 10% to 30% of total supply chain GHG emissions. The main factor influencing GHG emissions in commercial bakeries (Sundkvist *et al.*, 2001) was their choice of electric versus oil as their energy source (large, industrial bakeries tend to use oil). Bakeries account for about 50% to 85% of total bread production photo-oxidant emission potential in the bread supply chain (Andersson and Ohlsson, 1999).

Transportation from retailer to home consumer dominates energy use at the sales and distribution level of the bread supply chain. About 45% of urban consumers and 95% of rural consumers use their cars for trips for buying food even though approximately 80% of consumers live within walking distance of a food retailer (Sundkvist *et al.*, 2001). For bread delivered via large, industrial bakery supply chains, 46% of energy use for the 1-kg loaf was used by transporting it from producer to consumer. In another LCA study of Swedish food production, 30% to 40% of food energy was found to be used by households for cooking, storage & transportation (Carlsson-Kanyama *et al.*, 2003).

With the exception of pesticide and artificial fertilizer use (heavier on the more intensively-cultivated SL farms), there is no reason to believe that the physical externalities from either one of the supply chains in substantially higher than the other. These physical externalities may or may not have associated non-market costs, depending on the magnitude of the physical effects and the complexity of the causal chain linking farming outcomes with environmental attributes salient to consumers and citizens.

Differences between the Case Study Bread Supply Chains

Seven of ten Swedes buy at least some organic food every week (Heidenmark, 2000) and 6% to 8% of Swedish consumers say they always or often buy organic bread (Magnusson *et al.*, 2001). About 50% of consumers in Nordic countries have said they wish to have more information on ethical issues, environmental concerns and animal welfare, and 70% feel they should demonstrate environmental ethics through their food choices (Nordic Council of Ministers, 2001). Consumers generally seem to be more interested in environmental and animal welfare issues compared to personal health issues (Heidenmark, 2000).

Given this environmentally- and socially-responsible orientation of Swedish consumers, Heidenmark (2000) was puzzled by the fact that the consumer-oriented GK supply chain had a wide selection of 21 organic bread products offered for sale in retail stores, while the producer-oriented ICA supply chain retail stores did not have any organic products, despite ICA and GK having very similar clientele. Why had one chain developed a strong focus on organic bread while the other had not? Because both supply chains operate within an institutionally similar environment and there appears to be little difference in producer surplus accruing to firms along both supply chains, the answer requires an examination of other factors that differ between supply chains and impact the behaviour of firms.

Impacts of Labelling on Consumer Surplus

In Sweden, the KRAV label message is simple: no synthetic fertilizers and pesticides were used in the production of this product. In reality, there are deeper implications regarding production processes but this is the KRAV 'brand' for consumers. Consumers believe KRAV, finding the label to credibly communicate key information about the product they are considering buying. Swedish Seal is a primarily a business-to-business oriented label and there seems to be limited knowledge and awareness amongst consumers about how food is produced. Thus Swedish Seal is unlikely to provide producers with long-term competitive advantage as it is likely to become the definition for minimal acceptable farming practices in Sweden (Heidenmark, 2000).

A key question, which cannot be answered without primary nonmarket valuation research, is how much extra value the KRAV organic label provides to consumers over and above the value provided by the integrated production message of the Swedish Seal certification? Consumers often have difficulties understanding environmental claims by producers but the practically-oriented KRAV label is highly trusted and provides simple information to compensate for any lack of environmental literacy in consumers. Nonmarket valuation estimates of consumer surplus, being based on consumer preferences, are obviously dependent on the level of education and awareness (i.e., mental models) of Swedish consumers. Investments in consumer-level human capital – increasing environmental literacy at the consumer level – will likely further increase levels of consumer surplus as there are positive feedbacks in the dynamic policy system (recall the flows in Figure 1). Consumer surplus is a function of underlying preferences and, as public environmental awareness about the benefits of particular types of farming practices increases, WTP will also tend to rise. As WTP rises, the benefits of labelling may be recognized more widely and the business case for implementing and expanding labelling becomes stronger, in a potentially self-perpetuating cycle.

Developing a sophisticated understanding of consumers' WTP for the extrinsic attributes of bread production will require targeted research on consumer and citizen preferences in order to quantify the trade-offs that people are willing to make regarding food production, food consumption, food system-induced impacts on the environment and socio-cultural factors that influence quality of life for Swedes. This would likely mean developing in-depth surveys that combine data from stated preference surveys (e.g., Carlsson *et al.*, 2005) asking hypothetical questions specifically about bread purchase intentions with tracking of actual purchase behavior over time or experiments with real consumers (e.g., Arnot *et al.*, 2006). In the only nonmarket valuation study that focuses specifically on bread, Hu *et al.*, (2004) identified four distinct segments of Canadian consumers who differed in their WTP for various health and environmental attributes of bread production processes. On average, GM bread would need be discounted by Cdn $0.50 (US $0.36) per loaf to attain the same market demand as non-GM bread. This, however, only tells part of the story because there are strong differences in preferences (i.e., people have very different mental models of the world, ethics and underlying values): over half of the sample exhibited $0 WTP for GM-free bread (i.e., they did not care about GM ingredients) while just under half of the sample would require steep discounts of $1.66 to $2.46 (US $1.18 to $1.76) per loaf to induce them to purchase it because of their strong aversion to consuming bread containing GM ingredients.

Returning to the original question posed about how much extra value the KRAV label provides over and above the Swedish Seal certification, it is clear that further research will be needed to assess the economic value of labelling systems individually and to consider the potentially complex interactions between them and evolving social norms and ethics of the Swedish population over time.

Human and Social Capital at Senior Levels in the Supply Chain

The producer-oriented ICA supply chain is controlled largely by farmers. There is strong support for the Swedish Seal program, which is viewed as a logical and economical alternative to

KRAV. The primary challenges in this chain relate to: the lack of feedback about market demand for organic products at the retail level back through the supply chain; and the seeming lack of awareness or concern amongst senior management of firms within the chain that this is even a problem. The consumer-oriented GK supply chain, on the other hand, is largely vertically integrated, has strong inter-link communications and relationships, uses contracting to assure planned production of organic products, and is close to the market. The vision and goals of different organizations along the GK chain are highly aligned. This is largely due to very knowledgeable (i.e., high levels of human capital) and influential senior managers who have good contact networks (i.e., high levels of social capital).

In the milling sector of the consumer-oriented GK chain, JUVEL's CEO was a founding member of the organic cereal marketing organization Eco-Trade, so there is strong corporate buy-in for organic production in JUVEL. The consumer cooperative KF also owned JUVEL at the time of Heidenmark's (2000) study, so there was clear transmission of environmental priorities from the citizen cooperative to the mill's management. JUVEL has a strong commitment to organic flour production and sees itself having a competitive advantage in this sector. NordMills, on the other hand, was anticipating a move to 100% production of Swedish Seal flour. As they are the only mill producing this flour, they perceive it as providing a competitive advantage. NordMills plays the role of 'chain designer', promoting Swedish Seal products in the production-driven supply chain while JUVEL plays a much less prominent role in the consumer-oriented GK chain.

The Juvelbagerierna bakery also shares the same strong environmental vision, a function of KF ownership and direction at multiple levels in the supply chain. Heidenmark (2000: 123) summarizes that "the main difference between these two companies [bakeries Juvelbagerierna and Skogaholms] are their attitudes and beliefs, where the decision-makers within the two companies and their owners perceive two different environmental product development strategies and agricultural practices to be the way for the future, both in economic and environmental terms." Skogaholms perceives no customer (i.e., retailer) demand for premium-priced organic bread despite ICA's repeated requests for it. They actively promote the Swedish Seal certification as a cheaper alternative to organic and internally subsidize the program to some extent to ensure prices are on par with conventional breads. Juvelbagerierna, on the other hand, has a strong organic focus and perceives strong demand at the retail level. Organic bread is thought to help provide competitive advantage to the bakery.

At the retail level, ICA has relatively weak ties with downstream suppliers. As a group of independent food retailers, conditions and purchasing decisions vary from store to store. ICA finds it difficult to access organic bread given its reliance on Skogaholms and its need for sales volume. GK has maintained a strong organic presence as part of its business, both for ethical and financial reasons. As a consumer coop, it is very close to the market and has responded to consumer demand for organic products. Organics provide a way for GK to differentiate itself in the market; even if just covering costs on bread sales, strong organic product lines help build the overall reputation of the retailer, increasing customer loyalty (and presumably WTP for a full range of non-organic products). GK plays the role of chain designer in the consumer-oriented chain.

Conclusions

It is clear that the competitiveness of firms along the food production chain depends on their ability to source ingredients and engage in efficient production processes, but it also depends on the ability to exchange information along the supply chain, and the human and social capital assets that are used to access resources from all along the food value chain. Government policies in Sweden have traditionally focused on the farming sector, trying to encourage farmers to adopt sustainable farming practices. A second perspective (Heidenmark, 2000) maintains that government policy should instead focus more on consumers, educating them and building awareness about sustainable agriculture and healthy food, so that market demand will drive changes in the production system.

An alternative third perspective that I am suggesting here is that consumer demand is already driving food production systems. A key message from the Swedish case study is that the senior executives and management of various firms play an extremely important role in the bread supply chains, using their understanding of consumer demand to shape visions for the future and the practical implementation of responsible behaviours in firms all along the supply chain. They use their skills and knowledge (human capital), contact networks (social capital) and their firm's financial capital to respond to opportunities for enhancing sustainability.

This implies that strategic investments in capacity-building at higher levels in the private (and public) sector may well prove to generally be highly effective and efficient investments for achieving sustainable development through responsible entrepreneurship. It is the people making senior decisions about implementing environmentally- and socially-responsible business strategies (and policies) who need to be most in tune with market demand and alternative production possibilities. As mental models of the world shift within the upper echelons of the private sector (and government), as is the case in the Swedish consumer-oriented bread supply chain spearheaded by GK, firms will be much more open to market-driven opportunities and much more capable of taking full advantage of the shifting social values and norms that we currently see in global society.

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Figure Captions:

Figure 1 – An operational level logic model and framework for policy analysis (after Rudd, 2007)

Figure 2 – Vertical linkages between political, implementation and operational situations within a single component of the supply chain (after Rudd, 2007)

Figure 3 – Supply chain horizontal linkages and externalities.

Figure 1

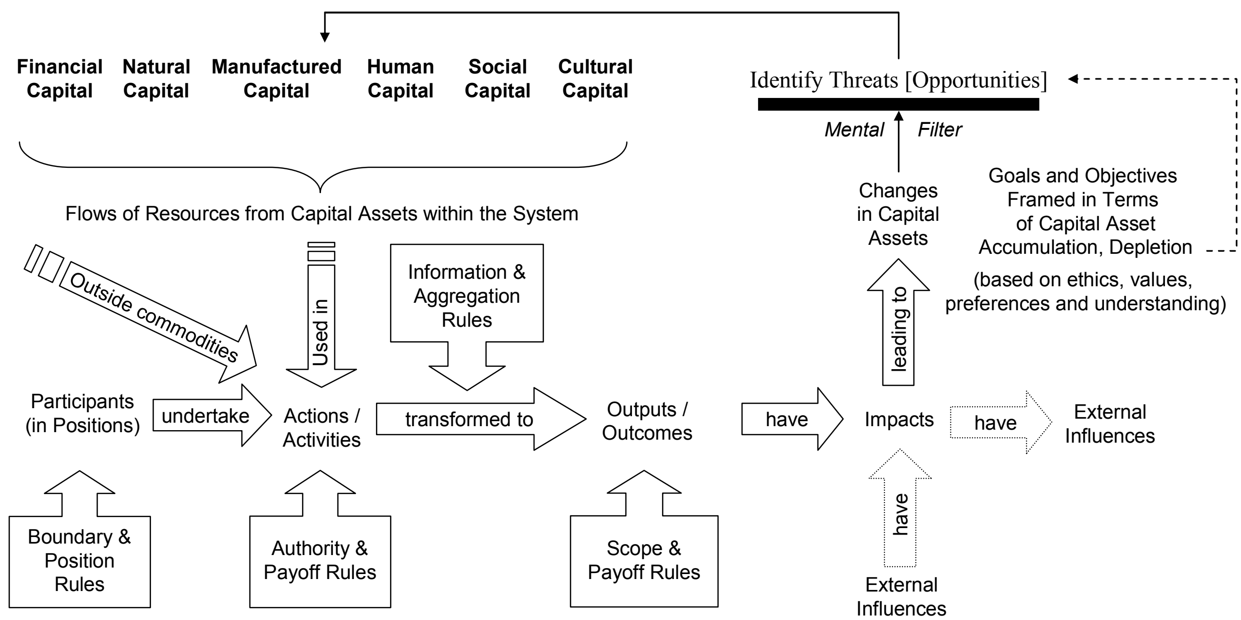

Financial Capital
Natural Capital
Manufactured Capital
Human Capital
Social Capital
Cultural Capital
Identify Threats [Opportunities]
Mental
Filter
Flows of Resources from Capital Assets within the System
Changes in Capital Assets
Goals and Objectives Framed in Terms of Capital Asset Accumulation, Depletion
(based on ethics, values, preferences and understanding)
Outside commodities
Used in
Information & Aggregation Rules
leading to
Participants (in Positions)
undertake
Actions / Activities
transformed to
Outputs / Outcomes
have
Impacts
have
External Influences
have
Boundary & Position Rules
Authority & Payoff Rules
Scope & Payoff Rules
External Influences

Figure 2

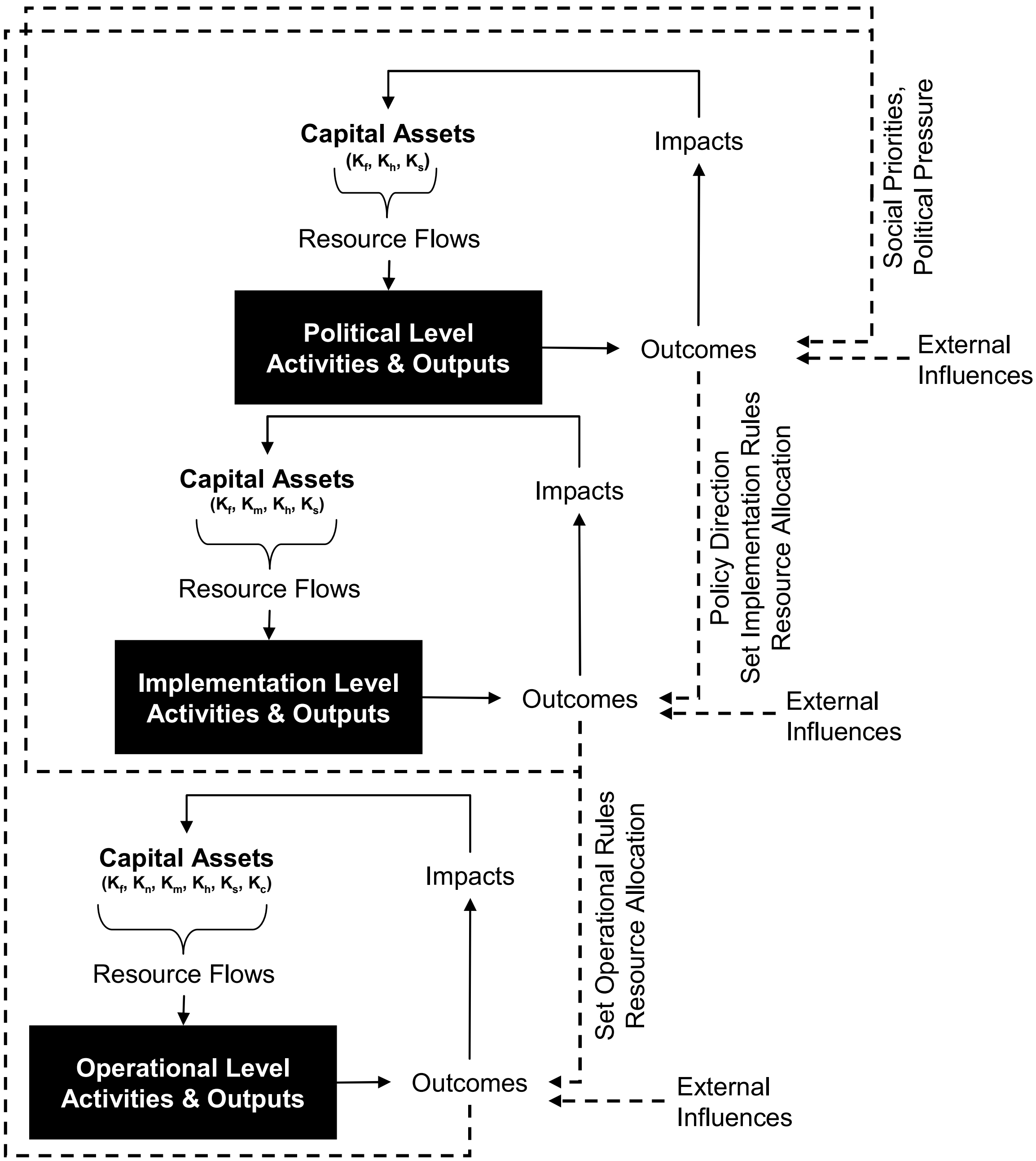
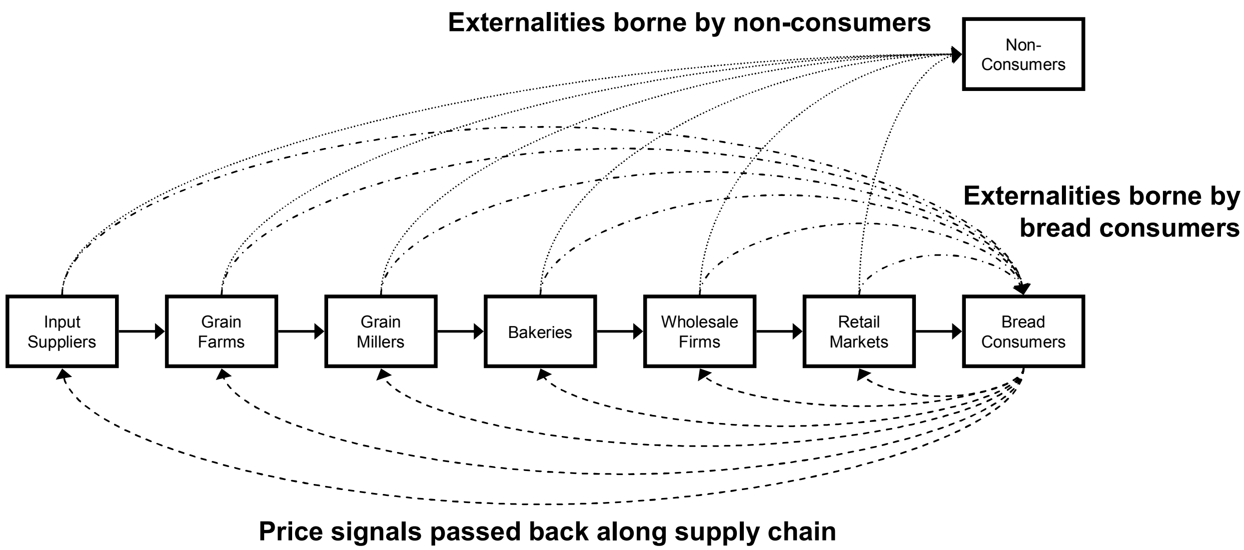

Capital Assets
(K_f, K_h, K_s)
Resource Flows
Political Level Activities & Outputs
Outcomes
Impacts
Social Priorities, Political Pressure
External Influences
Policy Direction
Set Implementation Rules
Resource Allocation
Capital Assets
(K_f, K_m, K_h, K_s)
Resource Flows
Implementation Level Activities & Outputs
Outcomes
Impacts
External Influences
Set Operational Rules
Resource Allocation
Capital Assets
(K_f, K_n, K_m, K_h, K_s, K_c)
Resource Flows
Operational Level Activities & Outputs
Outcomes
Impacts
External Influences

Figure 3



Externalities borne by non-consumers
Non-Consumers
Externalities borne by bread consumers
Input Suppliers
Grain Farms
Grain Millers
Bakeries
Wholesale Firms
Retail Markets
Bread Consumers
Price signals passed back along supply chain