



Values based supply chain management and emergent organizational structures

Madeleine E. Pullman and Jesse Dillard

*School of Business Administration, Portland State University,
Portland, Oregon, USA*

Abstract

Purpose – The purpose of this paper is to describe an emergent supply chain management system that supports a sustainable values based organization (VBO) using a structuration theory-based framework.

Design/methodology/approach – A case study of a sustainable beef cooperative employing a structuration theory framework provides insights into sustainable supply chain management models.

Findings – The supply chain design and management afford the key to the VBO's success. In order to attain the necessary price premium, the unique product attributes acquired through the natural beef production process must be sustained along the entire supply chain and communicated to the end customer. Structuration theory is useful in understanding supply chain management in VBOs.

Research limitations/implications – The paper has implications for studying VBOs, particularly those prioritizing sustainability values. The descriptive model presented is useful in settings where organizational structure and the supply chain are needed to support sustainable products and processes and whose success is facilitated by establishing strategic partners, especially those that make possible economies of scale. The study is limited to one, privately owned firm, operating in a specialty industry sector.

Practical implications – The paper has implications for those entities with an identified values set that endows the product with unique characteristics that must be conveyed to their end consumer in order to command a price premium and/or differentiate the product from a commodity. The case study provides an example of how a unique product as well as a facilitating organizational structure and supply chain emerge out of the application of a set of core values.

Originality/value – Little previous research focuses on implications of supply chain management in VBOs. In addition, the paper contributes to both the supply chain management and sustainability literature by relating supply chain management to a more comprehensive sustainability agenda including social, environmental, and long-term economic sustainability and by a theoretically based structuring.

Keywords Sustainable development, Supply chain management, Food industry, Organizational culture, Animal husbandry

Paper type Case study



1. Introduction

The economic success of values based organizations (VBOs) often depends on the communication of critical product attributes acquired and sustained throughout the supply chain. These credence attributes[1] differentiate products or services along characteristics that cannot readily be discerned by the end customer (Golan *et al.*, 2004). In this study, we consider a VBO differentiating itself through sustainable social and environmental business practices (Gladwin *et al.*, 1995; Jennings and Zandbergen, 1995;

Kleindorfer *et al.*, 2005; Starik and Rands, 1995). Positive market place impact requires that the integrity of the people and processes be assured and communicated to the marketplace. We describe how such product attributes are maintained throughout the supply chain by paying attention to how structures and production processes shape and are shaped by core sustainability values.

Although the literature evidences a significant increase in work related to environmental concerns, such is not the case for more comprehensive agendas that include social sustainability and long-term economic viability. Within this more comprehensive context, the full supply chain must be considered for the successful implementation of values based business practices. In the past, we could meaningfully focus on one supply chain function or activity because they were seen as generally independent elements (Rao and Holt, 2005), providing no product differentiating characteristics. There were quality considerations and arrival time stresses, but the relevant product and process characteristics were not affected to any great extent by supply chain elements nor was there a need to communicate product and process characteristics beyond the next immediate customer. Such is no longer the case, especially with products differentiating themselves on credence attributes.

The long-term success of VBOs differentiating themselves on product and process attributes arising out of their core values depends on infusing their products with value related attributes and transmitting and communicating these attributes to the targeted end customer. Infusing products with value related attributes requires designing and implementing supporting supply chain process and management systems that embed the core values. Transmitting and communicating these credence attributes require traceability and transparency throughout the supply chain and rely heavily on operations and supply chain management to implement the requisite systems and practices. Roth *et al.* (2008) show that these issues are particularly salient for food supply chain management suggesting that the role of value chains and their management within this sector represents a timely and important research area.

We begin our inquiry surveying the existing literature linking values to the subsequent production and supply chain practices and systems. Next, we describe the organizing structures, operations, and operational context of our subject organization, a natural beef company in the Western USA. This discussion is followed by a brief explanation of structuration theory and its use as an organizing framework in the case analysis. We then describe the development of the organization wherein the core values inform the emergence of its systems, processes, and methods. Through this description, we contribute to the supply chain literature concerning the emergence and maintenance of supply chain systems and processes for values-based organizational practices.

2. Literature review

The supply chain management literature has rarely addressed comprehensive sustainability issues with a few exceptions. In their recent study of best practices of companies with sustainable supply chains, Pagell and Wu (2007) found that the best companies had alignment between all three aspects of sustainability, incorporated this sustainability focus into their daily conversations, and included a guiding sustainability value system or “guardrail.” This “guardrail” described the organizational values and informed all decisions both within the organization and across their supply chain.

Moving to the management literature with sustainable supply chain implications, Shrivastava (1995) called for more research on how organizations can develop systems of production that are in alignment with the precepts of ecocentric management. Traditional management theorists describe organizations as economic or legal entities created by groups who have common or compatible goals. Typically, the economic dimension of business organizations (profit maximizing corporations) have dominated the operations and supply chain literature while the more inclusive sustainability perspective often has been neglected, as a number of studies noted below indicate. The traditional viewpoint assumes a de-natured view of organizational environment, a production/consumption and financial risk bias, and anthropocentrism. These assumptions are less appropriate for groups of people organizing around sustainability values or ecocentricism where the focus shifts to management of organizational elements that have an impact on nature and society (Shrivastava, 1995).

Several researchers have examined how management's personal values have influenced organizations. Here, values are defined as "desirable trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity" (Schwartz, 1994, p. 21). For example, Egri and Herman (2000) found that leaders of environmental product and service organizations had values that were more ecocentric, open to change, and self-transcendent. Linking top management's values to production practices and systems has been the subject of several studies related to environmental sustainability. In their study of furniture manufacturers, Klassen and Whybark (1999) found that management's proactive stance toward the environment led to increased efforts to be more environmentally sustainable via investing in pollution prevention and control systems, increased interaction with, and awareness of, external stakeholders, and increased involvement in environmental legislation. Ramos and Steger (2000) studied employees of environmentally proactive European companies and found that those companies with a strong written environmental policy and supportive supervisory environmental behaviors led to increased eco-initiatives from employees. Here, these initiatives refer to any action taken to improve the environmental performance of the firm.

Most of the previous research expanding the traditional perspective has focused on environmental sustainability because many of the most competitive and successful multinational companies have embraced this particular value system (Berry and Rondinelli, 1998). However, research on the social aspect of sustainability has been neglected in comparison with economic and environmental sustainability (Dillard *et al.*, 2008). Notably, researchers have paid little attention to how companies that espouse socially sustainable values organize their processes and systems. Social sustainability refers to one of the components (in addition to economic and environmental) of what has come to be known as the triple bottom line (*Global Reporting Initiative Guidelines*, 2006; Elkington, 1999; Kleindorfer *et al.*, 2005).

While social sustainability represents a primary focus in studying values-based social systems such as an organization, there is no widely accepted definition. Here, we will use the following working definition: social sustainability connotes the processes by which social health and wellbeing are initiated and nourished both now and in the future. To facilitate social sustainability, these processes must motivate, and be motivated by, social institutions that initiate and nourish economic and environmental sustainability. These processes are both the means and ends of social sustainability. For example, a set

of cultural values can be formative and supportive of the organizational type that emerges. Here, organizational structures are an end motivated by the social values of those who populate it.

Several authors have evaluated the characteristics and structures of socially sustainable organizations. They tend to be smaller, highly responsive entities and allocate power to the individuals and local communities to create their agenda (Hoffman, 1997; Korten, 1996). According to Griffiths and Petrick (2001), three alternative organizational structures best align with sustainability values: a network organization, a virtual organization, and communities of practice. A network organization is created by a number of interconnected units with a flat hierarchy, usually working collectively to obtain economies of scale and scope. Typically, a virtual organization forms to solve or address important issues and disbands once they have been resolved. Communities of practice form around areas of interest, expertise, or project orientation (Brown and Duguid, 1991).

In summary, a review of literature has failed to identify previous work linking values other than economic ones to the subsequent supply chain design and practices. We attempt to fill this lacuna in the literature by undertaking an in-depth case study of a values-based company. Exploring supply chain management with a single case and a theoretical framework has become more common particularly in emerging research areas. For example, Hämäläinen (2006) employed a network dynamic framework to explain industrial ecology practices of an energy supply chain. Holweg and Pil (2008) applied three different theoretical lenses (resource-based view, complex adaptive systems, and adaptive structuration theory) to case study findings to explain the evolution of supply chain coordination. Similarly, our research uses structuration theory with a case study to understand supply chain management of a VBO.

3. Case study: Country Natural Beef

Identifying an exemplar of a values based sustainable supply chain organization, we interviewed 40 US sustainably certified food and beverage production companies (Food Alliance, 2007) located in the Western USA between 2006 and 2008. We found that several cooperatively structured food businesses had progressed further than their counterparts in developing and implementing comprehensive sustainability programs into their operations. In the food processing industries, there are many examples of cooperative groups that have organizational structures that share various features of network, virtual, and communities of practice. One approach in launching a food cooperative is for growers with shared values to come together as a community to obtain economies of scale and scope via either buying a processing facility or leasing production space and to market their products themselves to retain the unique identity of the product (USDA, 2006).

The chosen case study organization is the largest sustainably certified beef producer in the USA, Country Natural Beef (CNB, 2008), currently generating close to \$50 million in sales. While the company includes ranches from many of the Western US states and Hawaii, it is headquartered in Oregon and is one of a handful of certified sustainable beef producers in the USA (Food Alliance, 2007).

3.1 The industry: generic beef supply chain

The beef industry is one of the largest segments of the US economy with retail sales of \$78 billion in 2006 and a beef cow head count of 42 million animals in 2007 (USDA, 2007).

All 50 US states have cattle operations totaling more than 800,000 farms or ranches. These operations have predominately been owned by the same family for more than 25 years with more than 10 percent of those remaining in the same family for more than 100 years (www.Beefboard.org). The beef supply chain has five key components (Table I). The first link in the chain, cow-calf operations, raises mother cows that produce calves. The pairs generally graze on the ranch land grasses, and weaned calves are then sold directly to a feedlot or to an intermediary operator who will put weight on them until selling them to the feedlot. This intermediary step has declined since 1976, when US cattle production peaked at roughly 45 million animals (Goldberg *et al.*, 2005). In the feedlot, cows are fed various grains, corn, and supplements until they reach the desired finished weight and are then sold to the packing/processing plants. These plants slaughter, pack and market various parts of the animal to retailers and other institutional end-users.

Traditionally, the five parts of the supply chain have operated independently with minimal vertical integration and the lack of information-sharing, trust, and supply chain coordination has often resulted in product inconsistencies and opportunistic behavior amongst chain members (Goldberg, *et al.*, 2005). Many of the inputs to the chain are commodities and range from the raw materials used for feed to the cow sale price received at the processing facility. The cow-calf operators do not know the ultimate disposition or quality of their beef. Raw material prices represent the key to profitability for most members of the chain, and increasingly the ranchers' margins have declined while the retailers' share increased. During 1980s, the beef industry faced declining demand and rising interest rates. Beef faced harsh criticism from the health community; ranching practices were seen as abusive to the land from the environmental community; cattle handling and slaughtering practices were equally criticized by the animal interests groups; and as a commodity, beef prices fluctuated dramatically from year to year. Increasingly, many small family ranches struggled to survive and often sold out to larger operators that not only were well positioned for the land- and capital-intensive nature of the beef industry, but also benefited from significant economies of scale for feedlot and processing facilities.

Supply chain member	Traditional beef characteristics	Traditional ownership	CNB characteristics	CNB ownership
Cow/calf operator	Cattle graze on ranch for 12 months	Rancher	Cattle graze on ranch for 12 to 18 months	Rancher
Stocker operator	Cattle graze or feed for 12 to 20 months	Operator		Rancher
Feedlot	Cattle feed for 180 days on corn and grain (500 lb average gain)	Feedlot	Cattle feed for 90 days on potato waste; small amounts grain and corn (300 lb gain)	Rancher
Packer	Heavy cows and high fat marbling, unknown history	Packer	Lighter cows, lean meat, individual history on ear ID tag	Rancher
Retailer	Different quality characteristics desired depending on final retailer	Retailer	Healthy, natural beef with consistently lean characteristics	Rancher and retailer partnership

Table I.
Traditional versus CNB supply chain models

3.2 Natural beef supply chain

During the difficult time of the mid 1980s, a group of 14 ranchers got together and decided to differentiate themselves from this “generic beef” model, which was forcing people into desperate economic conditions and often off their family ranches that had been in their families for up to five generations. Led by Doc and Connie Hatfield, a ranching couple from eastern Oregon, the group formed a cooperative in 1986, Oregon Country Beef, to sell natural beef (free of antibiotics, growth hormone implants and feed additives). In order to retain their ranches and to perpetuate the family ranching culture, they set a goal to provide a sustainable means to “profitably market quality beef products desired by the consumer while retaining every possible bit of independence.” They emphasized the cooperative’s holistic values reflected in its management model (i.e. rancher as the key decision maker, sustainability of the land and health of the animals).

It was the original families’ vision to found the co-op as a “brick-less organization” of ranch families with a shared set of values. With zero net assets, and zero net liabilities, the co-op is an organization founded on the principles of good stewardship and an appreciation for the land. It remains the individual rancher’s responsibility to raise and care for the cattle from birth to the store. All producers are certified by a third party group, the Food Alliance (2007) (a non-profit sustainable food certification organization) and are required to manage by graze-well principles (Appendix 1). They formed strategic partnerships with several businesses who share their values to fulfill their operating needs. These include a partnership with one member’s feedlot, who supplies the finishing feedlot services that allow the co-op to provide a consistent product, and another with a large processor that slaughters the animals, then cuts, packages the meat, and interfaces with retail customers. The majority of the beef is sold through partnerships with natural foods grocers, institutions such as universities, hospitals, and restaurants.

Over the years, the cooperative has grown from the original 14 to 100 ranchers from all the Western US states. With the addition of geographically diverse ranches, the group eventually changed their name to CNB. Recently, the ranches range in size from 60 to 18,000 mother cows with approximately 180,000 mother cow-calf pairs raised annually on 500 million acres of rangeland. As a rancher-owned cooperative, the organization spans the beef supply chain from ranchers (birth of cattle and grazing) through to the processing and purchase by retailers.

CNB was chosen as an exemplar and focus of our study for several reasons. First, it had the most clearly articulated and fully implemented sustainability system. Second, local newspapers, business and agriculture periodicals had discussed many of the firm’s sustainability practices. Third, it appears to have been successful as a producer of natural beef. One indication is that whole foods, the largest US natural foods retailer and one of the strictest on purchasing animal products with socially and environmentally responsible practices, purchases CNB products for the majority of their beef needs in the Western USA. Finally, CNB is predominately a “supply chain” organization having as its primary function, the management of the natural beef supply chain for the benefit of its members. In so doing, it insures that the sustainability credence attributes are acquired by the product, maintained throughout the process, and communicated to the consumer.

4. Structuration theory

Lewis and Suchan (2003) suggest that structuration theory is a useful framework in logistics research. The authors apply the theory to logistics following its successful application in the management information systems field (DeSanctis and Poole, 1994; Orlikowski, 1992, 2000, 2002). Holweg and Pil (2008) employ adaptive structuration theory to investigate firm level change activities associated with implementing information technologies in supply chain systems requiring information flow and exchange. We extend this line of research by applying the theory in understanding the emergent organizational structures within a supply chain organization. While adaptive structuration theory was formulated and applied to study organizational change resulting from information technology implementations, we look at organizing structures associated with supply chain management. As such, we take a more macro perspective focusing on the different structural types and their interactions, a position more akin to the initial formulation of the theory. Specifically, we contend that structuration theory provides a framework for analyzing and making sense of the data we collected related to how CNB constructs and manages its supply chain in order to produce and transmit the requisite (credence) attributes throughout the entire chain.

As originally formulated by Giddens (1976, 1979, 1984), structuration theory explicitly recognizes the central responsibility of the individual actor in the constructing and reconstructing the organizational structures that in turn enable and constrain action. Giddens' refers to this as the duality of structure. Structuration is the structuring of social relationships across time and space in virtue of the duality of structure. The duality of structure is central to our application of structuration theory as a sensitizing device in interpreting our case study. We focus specifically on the different types of organizing structures specified by the theory: legitimation, signification, and domination. And, we examine how through their instantiation by organizational actors, the particular structures emerge within this supply chain focused organization.

Giddens postulates two general types of structures: rules and resources. Rules provide normative legitimacy (legitimation) and meaning (signification) with respect to the actions engaged in by organizational actors. Resources (domination) include both human and material resources within the organization's sphere of influence. The norms and values represent the general rules that are translated into specific rights and responsibilities. These rights and responsibilities provide the bases upon which goals are formulated and rewards and sanctions are determined. Within business organizations, these norms and values address three general, interrelated areas: the natural environment, the social context, and the economic system. The rules that facilitate understanding generally are symbolic representations such as language, scripts, and frames that articulate how to achieve the organizational goals and that convey current knowledge in the form of plans, operating procedures, and evaluation mechanisms. Their application results in communication among the participants. Resources provide the means by which goals are pursued and actions are carried out. The way in which resources are allocated facilitates or impedes action and supports or retards development of signification and legitimation structures. Framed within the perspective of structuration theory, the individual's understanding and values initiate and direct resource expenditures toward the accomplishment of the goals. However, these individual values and understandings are enabled and constrained by the social systems within which the person resides and the resources available.

Human actors make these structures real by acting in concert with them. As a result, the structures are reinforced. If the actors act in ways inconsistent with the structures, there is pressure either for the structures to change or for the actor to change or leave the organization. Organizational structures exist in the minds of the knowledgeable actors and are made real in their actions. These organizing structures are both the medium and outcome of the actor's actions, and structuration is the creation and recreation of the organizational context by these actions across time and space.

The framework is, of course, not without its critics (Held and Thompson, 1989; Clark *et al.*, 1990; Bryant and Jary, 1991, 2001; Mouzelis, 1991, Craib, 1992; Archer, 1995; Stones, 2005). However, we see much to commend it especially as refined and extended by Sewell (1992) and Stones (2005). Not only has the theory been proposed and applied within the logistics literature (Lewis and Suchan, 2003; Holweg and Pil, 2008), but it also has been broadly applied in organizational studies (Orlikowski, 1992, 2000, 2002; Macintosh, 1994; DeSanctis and Poole, 1994; Huff *et al.*, 2000; Dillard and Yuthas, 2002, Sarason *et al.*, 2006) as well as sociology and cultural studies (see Stones, 2005 for a review).

5. Methods

We are attempting to understand the role that organizations play in achieving collective values and how these values influence the design and implementation of sustainable work organizations, production processes, and operating systems using a case study. As a research strategy, the case study focuses on understanding a single setting. Case research and field work are particularly useful when examining new areas in the field and for developing new theory or testing/refining existing theory and have been underutilized in supply chain (Voss *et al.*, 2002) and operations management research (Swamidass *et al.*, 2001).

The research process typically combines data collection methods such as archival and publicly available information with interviews, questionnaires, and observations. Such studies can accomplish various aims including providing a description, applying a theory, testing a theory, or generating a theory (Eisenhardt, 1989; Yin, 1994). This methodology has certain advantages over less interpretive methodologies because it is more process or means oriented and aids in the comprehension of why certain characteristics or effects occur or do not occur (Meredith, 1998). In addition, a process orientation is more compatible with our conceptualization of social sustainability. There are very few examples of supply management systems that have conceptualized, designed, implemented, and operated long-term with this type of focus. Thus, the strengths of case methodology fit this exploratory study: improving relevance and understanding through observation of actual practices, increased ability to understand the why rather than just what and how facilitating a more complete understanding of the phenomena, and an enhanced exploration of unknown variables and phenomena (Benbasat *et al.*, 1987; Yin, 1994).

5.1 Data collection

The data collection phase followed those suggested by Eisenhardt (1989), Lindloff (1995), McCutcheon and Meredith (1993) and Meredith (1998). According to those authors, qualitative researchers generally use more than one method of data collection. Starting with observation, one generally moves into structured and/or open-ended interviews and supplements this data with archival data. We selected this particular

company after surveying 40 other sustainably certified food and beverage companies randomly selected by sector from the only sustainable food certifier, Food Alliance's (2007) database. The chosen company was one of the longest operating using sustainability principles, referenced frequently by other food companies as the leader, and had major coverage in the media, sustainable business and agriculture supply chain literature.

After receiving approval for the study by the company, we asked for and received permission to collect three types of data: observations of member meetings; interviews with key board, organization and ranching community members; and artifacts (e.g. previous meeting minutes, membership handbooks, financial statements, etc.).

We observed and collected field notes from the biannual meetings from 2006 through 2008, followed by multiple in-depth interviews with a primary informant (a rancher, board member, and owner of the feed lot). Additionally, of the 100 ranch families, we randomly selected 25 other rancher members and interviewed them either at their ranch or a neighboring town. The interviews were semi-structured with protocol questions outlined in Appendix 2. While certain questions were exploratory and descriptive, others have some theoretical basis for being included in the set. Throughout the interview, probes and follow-up questions were used to encourage the interviewees to provide detail and to help them reflect on their own experiences; especially concerning the values, practices, and systems. One of the authors and trained research assistants conducted all the interviews. The interviews, lasting 60-90 minutes each, were taped and transcribed, which resulted in over 500 pages of transcripts. In addition, the membership materials, previous yearly meeting minutes, popular press, web site and other marketing materials comprised over 150 pages of additional material. Data collection took over 36 months.

5.2 Data coding

After data collection, two researchers independently coded the interview transcripts and then compared coding schemes (Strauss and Corbin, 1998; Miles and Huberman, 1994). The theoretical framework provided the basis of the initial coding scheme. Through a constant comparison method (Glaser and Strauss, 1967; Strauss and Corbin, 1998), data were grouped into categories and developed labels for the categories or themes. This involved the stages of open and axial coding. Open coding is an inductive process in which data are compared to prior data, looking for similarity or difference. As data are judged to be different, a new coding category is added. Open coding is iterative, and categories are added, combined, and revised in an emergent manner until the coding categories do not require further modification (Creswell, 1998). Difference in data interpretation and definitions of the codes were resolved through further discussions between coders. Once open coding was completed, axial coding began. In axial coding, the researcher seeks connections among the open coding to identify emergent themes while continuously comparing them for similarities and differences. Each time a new theme emerges, a new category is created (Creswell, 1998). Several iterations of coding and recalibration insured consistent construct classifications. ATLAS.ti (2006) software allowed the researchers to simplify and reduce the numerous pages of transcripts to key construct ideas and instances showing corresponding relationships between value constructs and process and system constructs.

6. Analysis

In our analysis, we are primarily concerned with describing the existing structures within CNB as they relate to supply chain management. We identify organizational structures that enable and constrain the ranchers' actions as well as being constructed and reconstructed by these actions consistent with Giddens' duality of structure. These organizational structures, made up of rules, represent a matrix of admissible transformations – a framework that describes things such that they appear logical, correct, or appropriate. We identify the ranchers' rights and responsibilities (graze-well principles) and how they are operationalized and implemented through accompanying sanctions and rewards (bonus system based on delivery time and beef quality). The reward/punishment mechanisms reflect both the formal and informal manifestations of collective organizational structures within CNB and are the bases of distributing resources. Our analysis considers legitimation, signification, and domination structures, keeping in mind that they can only be separated analytically because in the flow of social action, they are highly interrelated, interdependent, and inter-influential.

The primary finding indicates that social values associated with sustaining the family ranch constitute the basis upon which CNB was founded and provides the context wherein the organizing processes emerge. Over time the processes reinforce, or reconstitute, the structures that provide for governance, operating processes, sustainability practices, and resource allocations. The processes are codified into representations (signification structures) describing the application of the core values (legitimation structures) and instantiated through the organizational practices and procedures. The organizational form emerges as signification structures represented as the mission statement, operating principles, and compensation schemes and constitute the means by which resource allocation decisions are made. These resource allocation decisions, in turn, reinforce the values as well as the representations used to make the allocations. Figure 1 shows our depiction of CNB using the structuration theory framework.

6.1 Norms and values: what is important

Enabling the ranching culture is the core value of CNB. Economic sustainability and environmental conservation are the subsidiary means obtained by the core value. These values are embedded within the organizational structures. For a rancher to become a member, the applicant must commit to endorse the values articulated in the central mission statement:

The purpose of CNB is to provide a simple, stable and profitable means for its members to produce for a CNB consumer market. CNB as an organization will excel at developing markets which best utilize practical ranch cattle and at translating cost and carcass data into information which assists members in making sound management decisions. By striving to market our livestock in a sustainable manner, the members of CNB will take care of and respect the customers, communities and lands which sustain us.

This statement articulates the member's responsibilities in terms of caring and respecting the land, the community, and customers. In response, CNB manages the natural beef supply chain by providing management, marketing, and information services. As shown in Figure 1, the organization espouses a three part sustainability model in which the different ranchers participate.

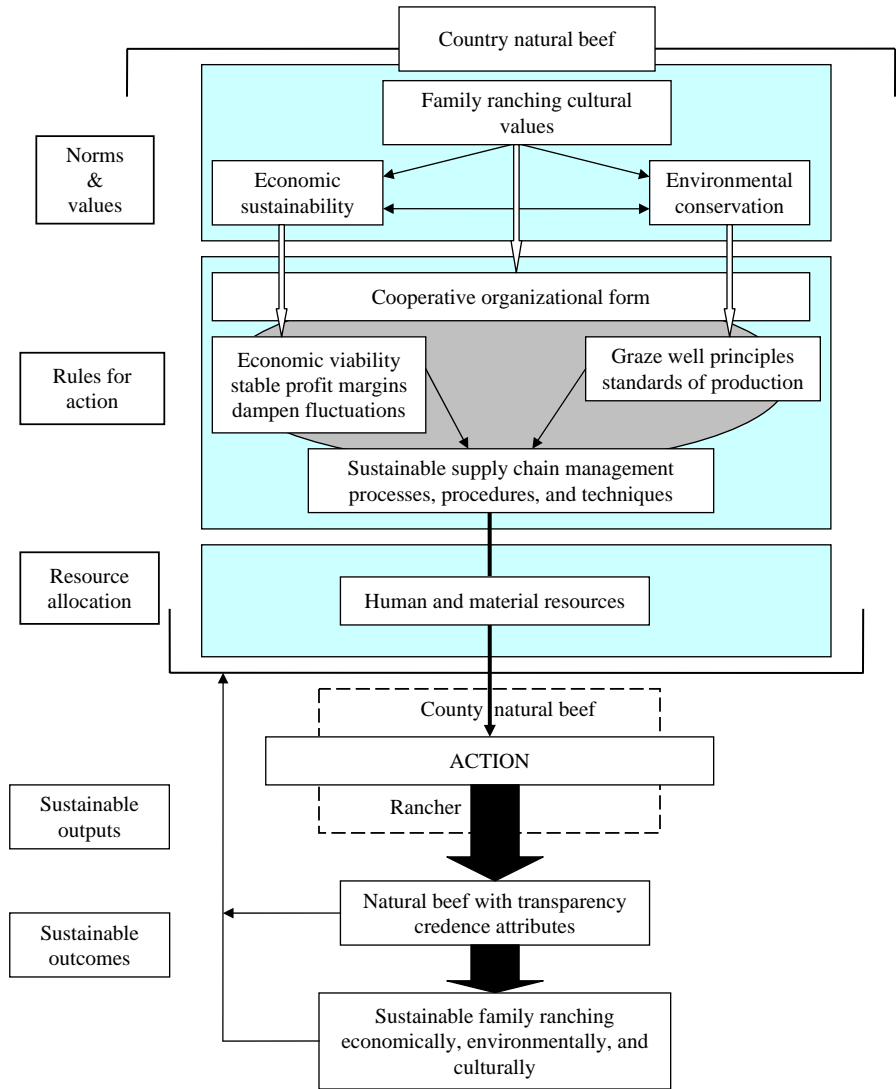


Figure 1.
CNB as a value-driven
organization

The interviews indicated that the ranchers' primary goal is for sustainable ranch operations so that their children can have the option of carrying on the ranching life style. As a means to this end, the ranchers hold environmental and economic sustainability as facilitating, recognizing how tightly the three are intertwined: the cultural aspect of ranching life (social sustainability), keeping the ranch viable for raising cattle (environmental sustainability), and financially surviving (economic sustainability).

One sentiment commonly put forth is that if the rancher treats the natural environment well, the natural environment will treat the rancher well. Environmental

sustainability addresses all aspects of ecological stewardship particularly for water, land, and biodiversity. Since many of the ranches are in dry parts of the Western USA where water is relatively scarce, these three elements are tightly intertwined. As many of the ranching families have lived on their lands for multiple generations, they are keenly aware of how important it is to preserve these resources. Water values concern using water prudently, keeping the water safe from contamination, and improving riparian areas rather than letting the cattle destroy those zones. Land values predominately revolve around healthy grazing practices to build better grass quality rather than overgrazing and causing soil erosion. Biodiversity values address an appropriate balance between different plant and animal groups rather than sacrificing birds and other animals and their habitats for cattle and their respective habitat.

According to its founding members, the co-op formed to keep the family ranch viable economically, but the environmental aspects are essential to the health and longevity of the land, animals, and people. Economic sustainability is a value for all ranchers, but generally, the economic goal is not profit maximization but rather financial solvency, debt avoidance, and maintaining a livelihood so they can continue ranching.

A synthesis of our interviews and other information reviewed indicates that each of the three key aspects of sustainability involves multiple, interrelated values. We conclude that generally the core value set includes individualism, egalitarianism, trust, family and ranching community, and health (human and animal). These values represent secondary credence attributes associated with CNB meat products – beef raised on family ranches by ranchers who hold, and act in accordance with, the associated values.

Individualism refers to the rancher's independence and ability to makes the decisions about stewardship of the land and raising the cattle rather than having them dictated by regulatory bodies and the commodities market. Egalitarianism implies that all participants are equal and have a voice regardless of age, gender, or class. To the ranchers, it is important that ranching does not become an elitist activity or that only the elite have access to, or the ability to pay for, sustainable meat products. To some extent, this value is related to trust or believing in others. Here, trust is seen in relationships with other people or trusting them to do the right or appropriate things, trusting the individual to take care of their own ranch, and building business relationships and practices that are trustworthy. The family value is multi-faceted. The ranch is a place to raise a family; all family members are involved with the process; it should stay in the family for multiple generations; and the ranch lifestyle should be maintained for the family. Similarly, the ranching community is an extension of the family values but goes beyond one's own family to encompass similar values for the larger community. Since beef is a food product, health, is an important value for society. Not only should the meat be as healthy as possible for people to consume, but also the animals should be raised in the most healthful way in terms of their mental, emotional, and physical health.

The organization must be designed to reflect these values of the ranching culture. The governing and management structures and the related information systems of the organization facilitate individualism, egalitarianism, trust, family and ranching community. The health of the land and the animals are facilitated through a set specified set of environmental sustainability principles and production, operating standards, and target markets monitored by CNB. From a supply chain perspective,

these values can be viewed as requisite inputs in the production of natural beef whereby the product acquires the expected attributes. Supply chain management by CNB must ensure that the inputs (rancher) possesses the required attributes (values) such that the product (natural beef) possesses the required credence attributes, and these attributes must be engendered, supported, and transmitted throughout the supply chain.

Unlike traditional representations of supply chain attributes such as costs, arrival times, and payback, these credence attributes represent subjective traits requiring different facilitating mechanisms. It is particularly challenging to integrate these facilitating mechanisms into the concrete world of supply chain management. The current challenge is to design and implement the processes and procedures facilitating these subjective, conceptual attributes, ensure that they are maintained along the entire chain, and then communicate them to the end customer whereby the consumer vicariously embodies them. These attributes provide the parameters and the evaluative criteria by which the supply chain is designed, implemented, and evaluated.

The values (legitimizing structures) are translated into processes, procedures, and techniques through representations (signification structures) that direct actions and resource allocations (domination structures) and constitute the social organizing principles (social and system integration) of the organization, CNB. These representations articulate the production processes and management systems that make up, and are implemented in, managing the natural beef supply chain. They provide the means by which organizational objectives are pursued; the credence attributes acquired by the product and subsequently transferred and communicated throughout the supply chain.

6.2 Rules for action: ways to achieve what is important

To implement the aforementioned values, CNB has multiple procedures (signification structures) in place. First, ranchers cannot join the organization without certifying that they can, and will, implement the “graze-well principles” (Appendix 1). These principles provide an example of enabling and constraining characteristics of the structures as they facilitate the multifaceted organizational values. The parameters for environmental conservation, health of the land and animals, are specified, constraining the rancher’s actions. On the other hand, the means by which these objectives can be accomplished are also outlined, and individualism fostered by allowing each rancher to attain these organizational values in the way he or she chooses. Our analysis indicated extensive sharing of ideas, information, and processes among the ranchers, facilitating, and facilitated by the community values, an environment of trust, as well as the egalitarian values embedded within the governance structures.

The ranchers’ conceptualization of the family and community values must be set out in written goals that describe the desired health and appearance of the land they manage and live on, the desired products they hope to derive from the land, their animals, and themselves, and the type of lives they wish to lead. Guided by the parameters set forth in the graze well principles, these written statements cover how natural resources should be protected and used sustainably facilitating the long-term health and productivity of the land. On the preventative side, both water and land should be used with care and protected from damage from cattle production. On the proactive side, streams and grazing land should be continuously improved through maintenance and recovery of grasslands, growth of plants near water resources, improving and

enhancing biodiversity on the land, and elimination of erosion. The supply chain must be managed so as to ensure that the proper inputs having the appropriate characteristics are acquired. With respect to CNB, these characteristics include qualitative, values based attributes as well as the more traditional quantitative characteristics associated with quantity, cost, and delivery times.

Not only must the supply chain be managed to assure that the proper inputs are acquired, but also the production processes must be developed and carried out to ensure that the production related product attributes associated with natural beef are acquired. As noted above, raising “natural” beef in a sustainable manner is the general production strategy driven by the values of sustainable ranching and economic viability. This requires both sustainable ranching operations that facilitate the ability to sell the product in the higher margin niche natural beef consumer market. The processes associated with maintaining the health and well-being of the animal without compromising the natural beef requirements represent one example.

The rancher’s written goals address the (cattle) production process to be implemented in meeting the physical, biological, and health requirements of natural beef in a manner consistent with the environmental, economic and social values espoused by the group. Producing healthy animals sustainably is central to achieving CNB’s stated values and objectives and yields a product having the desired attributes. The interviewees stated that ecologically healthy land creates healthy, naturally cultivated animals that do not require antibiotics or growth hormones. No CNB program calves can receive antibiotics, growth-stimulating hormones or steroids. If an animal gets sick enough to require an antibiotic, it must be pulled out of the CNB program. Program cattle can only receive a vegetarian diet with no feed-additives or ionophores. By using both ecological and humane feedlot and slaughter practices, the animal’s stress is reduced, and this improves their physical and mental well-being. As a means for facilitating these requirements, all animals in the CNB program are managed from birth until death by the CNB rancher with no supply chain handoffs.

Motivated at least partially from valuing animal health, the members of the cooperative have developed several innovative production practices that break with long held traditions in the beef industry. For example, stressing the animal’s comprehensive health, alternative processes were developed in raising and weaning calves. These processes shift the typical birth season and allow calves to stay with their mothers for longer periods; weaning occurs in the summer when the grass is highly nutritious and plentiful. From a physiological and emotional stand point, both the mothers and calves are better off; this situation is also economically beneficial because the likelihood of healthy animal remaining in the program is increased.

After the calves graze for 12 to 18 months, they are shipped to the “gathering point” feedlot managed by a member rancher, representing an intermediate stage in the natural beef supply chain. This stage represents point at which the rancher loses physical control of the animal, but unique to CNB’s operating procedures, maintains ownership and responsibility of its disposition (Table I). The feedlot feeds all the cows the same diet to improve product consistency and to increase their weight.

As part of their supply chain management activities, CNB developed their own unique sustainable standard operating procedures for the mill, cattle handling, trucking, office and every facet of the feedlot. Not only are the food rations different, but separate trucks, loaders, and holding tanks for the vitamin and mineral supplements are used.

Though not always explicitly stated, the conversations with the ranchers as well as the organizational processes procedures indicate that these production and supply chain procedures follow directly from the central organizational values. When asked to justify the more extensive and expensive procedures, the justification moves quickly to the health and well being of the animal and the credence attributes associated with the family ranching culture as well as the economic implications.

Facilitating trust and accountability as well as providing certification of the credence attributes along the supply chain, twice a year the feedlot is audited by a third party certification group, progressive beef, to both monitor cattle handling practices and insure standard operating procedures are being followed. Using requirements similar to ISO 9000 standards, the auditing group makes sure that “what you say you’re doing is what you’re doing.” The actual product handling procedures are based on those developed by veterinarian, Tom Nofsinger and herding expert, Williams (2008). They developed an entire psychological profile system for cattle and how cattle need to be handled including natural medical techniques for sick animals. In general, the CNB supply chain management approach involves considerably more paperwork because of the traceability requirement (tracking and documentation in the feedlot and subsequent processing).

When the cattle have reached an appropriate weight and body composition, they move to the processing plant, another supply chain partner. According to CNB’s management, the plant is a large packer that offers efficiencies of scale that small packers are not able to deliver especially when it comes to selling ancillary products such as hides and other meat products not typically purchased by grocery and restaurant retailers. Each processed CNB cow has its specifications recorded in the organization’s supply chain information system and emailed back to the feedlot and rancher (weight, rib-eye size, non-fat percentage, and fat/lean grade). Based on these results, the rancher is paid for achieving various targets for that individual cow. This information is very useful for ranchers to in managing their herd as illustrated by a rancher:

We usually average about 90 to 92 percent hitting the target. For example, this animal of D’s was in this lot. Every animal has a number so D might have this animal data and take back to the mother cow on his ranch. And he can say, “ok, she had a 15½ inch rib eye, 2% kidney fat, 3/10 back fat, it was a choice minus (a yield grade), her carcass weight was 749” [. . .] The point I was making though is back to our niche in the supply chain, individual animal management. The industry is not focused this way. The supply chain of the industry is a pen of cattle (200 cows). In our case, we’re micro-focusing on the individual. In most natural feed programs, the feedlot does own the animal. CNB is a real rarity in the fact that the individual ranchers own the animals all the way through.

The graze-well principles provide the parameters that encourage certain types of production processes while economic viability provides the economic context within which the production process is undertaken. These dimensions provide the means by which the overall values are to be attained. As the production process is carried out, the underlying central values become less visible but still provide the legitimating basis for the more applied components of beef production. The ranchers must balance environmental sustainability with economic viability. At times these are complementary and at other times not, but there is a tension between the needs of the environment and the cost of producing quality product. The organization facilitates trust by establishing accountability networks requiring that ranchers indicate the action

to be taken in achieving the goals they have specified. Following the duality of structure, the ranchers act in this context, either reinforcing or changing the extant production process. While the operating processes would be expected to be more specific, they too follow from the core values. Signification structures specify processes for setting goals. Resource allocations are authorized based on representations, and rewards and sanctions are imposed in relation to the actual outcomes of actions. While performance evaluation and compensation schemes are organizational representations (signification structures), for economy of presentation, we discuss them in the follow section describing the resource allocations (domination structures). Again, it is important to recall that these constructs are highly interrelated and can only be separated analytically.

6.3 Resource allocation: means for achieving what is important

Organizational values and the associated management and information systems frame and reframe the way organizations are comprehended and constructed, and subsequently, the way resources are allocated. Referring to Figure 1, we can see how values central to the successful implementation of sustainable supply chain related practices are integrated into representational schemes (i.e. supply chain management systems) so that through the facilitating allocation of resources the anticipated outcomes are attained. In this section, we consider the resource allocation systems and practices in light of organizational values and how decisions are made and, thus resources allocated in attaining the organization's objectives. First, we consider governance structures and related organizational hierarchies that provide the context for decision making and resource allocations.

Consistent with a commitment to egalitarianism and community governance, each ranch family has a seat, and full voting rights, on the board of directors. Over the years, the members have found that the most effective way to set policy or solve problems is by reaching consensus. During the board meetings, the members sit in a large circle and discuss the opportunities and issues until everyone is comfortable with the outcome. This format allows, and at time requires, every member to contribute their ideas and provide input with the whole group present (as many as 200 people including spouses and some children). The process often seems inefficient, time consuming, and at times, tedious. However, they agree that the process is consistent with the group's egalitarian and community values and that it has allowed the ranchers to develop and maintain an organization possessing an unusual level of trust and openness, which, in their opinion, contributes substantially to its ongoing success.

Consistent with the values of individualism and independence, CNB is organized as a network organization of ranch families. As such, there is minimal administrative hierarchy and no net long-term assets or liabilities. The individual rancher retains responsibility for rearing and caring for the animal through the entire supply chain. Thus, at the operating level, the ranchers are free to allocate their resources as they perceived to be most effective and efficient for their ranching operations. However, this is done within the context of consensus based goals and guidelines that constitute the basis for CNB's resource allocations systems.

Next, we consider CNB's reward systems. Resources are Giddens' second primary category of structures and include both allocative (material) and authoritative (human) resources. According to the interviewees, a key to CNB's success is its accountability and

reward system that links individual animal ownership directly to the desired product characteristics throughout the natural beef supply chain. For example, the rancher is held accountable by both the organization and their customers for product quality. According to a rancher:

What CNB has done is tried to take that individual rancher and give him a vehicle where he doesn't lose his identity but allows him to get his produce through a fairly intricate system to the consumer which he couldn't do alone on a large-scale.

Implementing the reward system represents a critical inflection point in the supply chain process where the facilitating systems turn back on themselves and become evaluative instead of facilitative. What are initially proactive means and guidance for designing and implementing processes and procedures become the ends, at least intermediate ends, focusing on the characteristics of the outputs that are most highly valued. These representations now create the context for providing feedback and attaching resource distributions to performance. If these rewards and sanctions are well designed, they reflect the organization's values, both intermediate and core, and thus are instrumental in achieving the values through motivating and facilitating actions by the participants. Values, representations, and reward/control systems work together to enable and constrain action. In analyzing the systems documentation, it appears that these systems are reproduced or modified by the members' actions over time consistent with the duality of structure. One unique feature of CNB is the intention and ability to connect and maintain the integrity of these systems throughout the supply chain evaluating and rewarding the quality output characteristics of the end product's production and delivery cycle as opposed to at some intermediate hand off point, thereby maintaining both the desired physical as well as the credence attributes throughout the supply chain.

It is noteworthy that at this level, the focus of the formal reward system is almost solely on the specific output – the animal. The animal represents the culmination of all that has gone before – land management, livestock management, and ranching culture and are required for the output to have the necessary credence characteristics. Morphing into an evaluation and reward system, the supply chain management system facilitates the future by evaluating and rewarding the past. The resources applied provide the means by which the future is created.

A central element in the reward system is CNB's pricing procedures, which are tied directly to its strategy of targeting the niche natural beef market. Rather than allowing the commodity cattle market to dictate the prices, CNB sets their own selling prices. These prices are based on cost accounting models developed by CNB based on cost averages of two dozen of their cattle ranches, plus a small profit (8 percent), and additional bonuses for achieving various quality and delivery target goals. Typically, beef prices are negotiated 12 to 18 months in advance with large retail customers. CNB normalizes their prices so that ranchers are not subjected to the fluctuations in commodity prices over the year. This eliminates market fluctuation as a financial driver and makes the rewards simple and based on the quality of the beef. According to a rancher:

That eventually brings our ranchers back what they need on a sustainable basis. We've established a system that eliminates the greed and the poverty and said ok, this is what it costs to produce and we need a small profit margin on top of that to stay in business.

The ability to set the product price depends directly on that ability to provide a product in a timely manner that possess the requisite physical and credence attributes demanded by the natural beef market. Each rancher must commit to delivering a minimum full truck of cattle that meet specifications, placing them in an available slot on the CNB's annual feedlot schedule.

Since the niche natural beef market yields higher margins for cattle owners, ranchers are rewarded for maintaining a certain quality of cattle and cattle raising practices so they can fetch the higher price.

The compensation system is illustrative of how the core values of those who comprise CNB, and are valued in the market, are reflected in, and implemented through, the organizing systems throughout the supply chain. Ranching values are supported through a viable economic system that provides resources sufficient for economic viability of the family owned ranch if they can operate within the parameters set collectively by the organization. Thus, CNB creates a rewards system based on performance and quality of an individual rancher's cattle, and creates a financial system that re-enforces quality production and quality control.

Quality control ensures that both the desired physical and credence attributes are acquired and sustained. The individual cow management systems ensure quality of the product and adherence to sustainability goals, and quality control requires that there is a system in place to reward outcomes that support sustainability philosophies and quality products.

7. Conclusions and implications

CNB provides one of the few examples of a VBO whose primary activities are associated with, and whose success literally depends on, supply chain management. The principal organizational purpose of CNB is managing the natural beef supply chain to achieve the owners' values-driven goals. We describe CNB's way of constructing and managing this supply chain using structuration theory, particularly the duality of structure. CNB has constructed an integrated supply chain wherein the producer of the core product (beef) maintains ownership of the product throughout the process as summarized in Table II. This arrangement facilitates the direct linkage between core values and the ultimate marketing of, and compensation for, the end product. Structuration theory provides a useful framework for specifying and understanding the interrelatedness of these processes.

We describe how the values (legitimation structures) of the co-op owners are translated through various levels of processing ultimately to be restated in specific output criteria (the characteristics of the beef) that facilitate the core values. The refinement and application are accomplished through the organizing medium of the cooperative. Standard production processes are specified, product quantity and quality characteristics are articulated, and reward systems are formulated and applied (signification structures). The operators allocate resources (domination structures) based on these parameters and specifications, and the organization distributes its resources based on the compensation and reward systems. The analysis notes how the structures circumscribe the operating context and how the context enables and constrains the actors whose actions in turn construct and reconstruct the circumscribing structures consistent with structuration theory's "duality of structure" concept.

Table II.
CNB supply chain
management activities

Beef supply chain	Cow/calf	Stocker operator	Feedlot	Packer	Retailer
Operating unit CNB	Ranch Graze-well principles and product/production guidelines	Ranch Rules for in plan/out of plan cattle	Beef NW Negotiations with feedlot, dietary regime	AB packing Negotiates with processor based on CNB cost models ^a , receives final product specs, receives compensation for beef, distributes specs, and revenues to rancher ^b	Retail distributor Markets product, negotiates contract with retail distributors, monitors transparency of credibility attributes
Rancher	Cow/calf timing	Steer pasture, grass, natural, no antibiotics, no growth hormones, graze- well principles	Responsible for feedlot costs	Receives revenues from beef (commodity and placement) ^c	Product demonstrations, interaction with customers
Verification agency	Food alliance certification	Food alliance certification	Feed lot audit		

Notes: ^aDevelops cost models as a basis for setting price and profit margins; the model and its parameters are reevaluated annually; ^balso calculates and pays bonuses to ranchers at the end of the year; ^creceives bulls eye and target bonuses from CNB annually

Our findings build on existing sustainable operations and supply chain management research on several fronts. First, there is a dearth of studies on VBOs particularly for-profit organizations and supply chains. While Pagell and Wu (2007) also found that the best sustainable supply chain organizations have values characteristics similar to our case company (considering all three aspects of sustainability, daily sustainability conversations, and a guiding sustainability value system), they do not offer a theoretical framework for how these values emerge, are sustained, or altered by the organization and its supply chain partners. Our work supports their findings and extends them by illustrating the application of a theoretical lens through which to view sustainable organizations and supply chains. Structuration theory explicitly recognizes the central place of values and norms in the specification of organization social systems, representations, resource control and allocation and could be used to investigate the organizational differences identified by Pagell and Wu (2007).

Second, as Lewis and Suchan (2003) emphasize, structuration theory should be applied to supply chain research, particular those supply chains where the relationships between organization members and supply chain members are complex. Most supply chain research relies on variance theories, models which assume that a cause is necessary and sufficient for the outcome. But as a process theory, structuration theory postulates that causes result from socially constructed subjective experiences and that the networks or linear links (from variance theories) over-simplify complex interactions and behaviors in the supply chain (Lewis and Suchan, 2003). Several supply chain researchers have recognized the limitations of variance theories when viewing the behavioral aspects of supply chain management. These researchers have adopted structuration theory to examine the role of advanced information systems in organizations (Lewis and Suchan, 2003) or the evolution of supply chain coordination (Holweg and Pil, 2008). Our work is the first research to apply structuration theory to sustainable supply chains and more broadly, VBOs, thus supporting and extending Lewis and Suchan's proposal for process-based theory in supply chain management research, particularly structuration theory.

Third, the vast majority of the previous research on sustainable supply chain management has focused on the environmental rather than social aspects of sustainability. Our work expands the perspective toward total sustainability rather than the previous over-emphasis on the environmental side. Because of the static nature of its measurement, environmental research has relied on variance theories and an emphasis on the resource-based view of the firm or stakeholder theory. This work has been helpful in articulating relationships between measurable constructs such as environmental performance and firm performance (Pagell *et al.*, 2004; Sroufe, 2003; Russo and Fouts, 1997) or firm size and stakeholder influence and environmental practices (Sharma and Henriques, 2005). Clearly, moving the research toward understanding comprehensive sustainability issues in the supply chain (both social and environmental) will require alternative theories and perspectives.

Fourth, this research goes beyond viewing supply chain management (including operations) in an atomistic or linear fashion which is particularly important in studying VBOs. While research using social network theory does address multidirectional flows of communication of supply chain, structuration theory is a more appropriate theory for incorporating the unique values of sustainable organizations and emergent supply chain structures. The values must provide the context, and through acting consistently with

these values, they are reinforced along with the organizational and resource distribution systems that support these values. Our case findings emphasize the theory's hypotheses of interrelationships among legitimation, signification and domination structures and the necessary congruence if the values are going to be achieved.

Our research highlights other opportunities for future research in sustainable supply chains and operations. Our work suggests that one VBO (CNB) has been successful in sustaining its primary core values (family ranching) by implementing its secondary values (graze well principles, economic viability) through progressive supply chain management techniques. Further research is needed to more explicitly articulate how the supply chain management processes support the organizational values. For example, how do we translate what is important into processes that yield the desired outcomes as well as convey the credence attributes? CNB has done it by translating graze well principles into standard operating procedures. We propose that applying structuration theory in this way may be useful in other domains such as coffee roasting companies with social sustainability missions, who purchase directly from developing world farmers rather than brokers, pay farmers a premium over commodity prices, and subsidize community projects. Typically, these companies have struggled to convey the mission's benefits to consumers who are asked to pay a premium for the products particularly with grocery and institutional channels.

Another example where structuration theory might be useful is where organizations such as retailers, Wal-Mart or Tesco, are incorporating carbon footprint measures into their evaluation system for selecting vendors, labeling products for consumers, etc. One might ask how these measures embody the organization's values, how they will affect the management and design of the supply chain, how these values are infused into the supply chain, and how are the forms of the supply chain management systems affected by the values via these measurements?

Our in-depth study of a cooperative organization raises other questions worthy of further research. Our analysis indicates the possibility of designing core values into the supply chain processes. We are currently undertaking research using structuration theory to confirm this and to identify the specific mechanisms whereby these values are linked via signification and domination structures through the supply chain to yield the desired product attributes. More generally, future research is needed to evaluate if publicly owned, VBOs can survive given the demands of the equity markets. Alternatively, how efficacious is such a structure for a not-for-profit, non-government organization, or a for-profit organization with a decidedly social objective? Along those lines, is there a practical size limit to a successful VBO? A critical component in the success of a VBO within the current market based environment appears to be the ability to establish strategic interfaces with partners that competitively participate in the sectors of the supply chain where economies of scale are critical. It remains to be seen if a VBO can thrive without these scale partners in an economy dominated by cost minimization players.

Note

1. Credence attributes refer to physical product attributes such as genetic modification, exposure to pesticides, melamine, or lead and process attributes such as fair-trade, no till, ethical labor practices, or sustainable harvesting (Golan *et al.*, 2004).

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Further reading

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Appendix 1. Graze-well principles

The following principles are an affirmation of what the members of CNB strive for in the management of their resources:

- (1) We believe good management is goal driven. Each member ranch in CNB has a written set of goals that describes the desired health and appearance of the land they manage and live on; the desired products they hope to derive from the land, their livestock and themselves; and the type of lives they wish to lead. In addition the members describe the actions they are taking to achieve these goals.
- (2) Water is our most limiting natural resource. We manage the land to get the precipitation we receive into the soil that it falls upon and make it available for plant growth for as long as possible. To achieve this we strive for a dense stand of perennial plants with the spaces between plants occupied by decaying litter. When water enters streams we want the streams to flow year-round and have a minimum of sediment in them. We want the streams to be lined with shrubby vegetation.
- (3) Grazing by our livestock during the times of year when grass plants are growing is done in a manner that minimized the re-biting of plants after they have been grazed and maximizes the time of rest between grazing. On our non-irrigated rangelands, we minimize the amount of time we are in a particular area when plants are growing. Once cattle leave an area they have grazed we maximize the period of time before they return. In areas where re-biting of growing plants does occur, we defer those areas from grazing during the next growing season. When plants are growing we leave enough vegetation behind that the plant has photosynthetic area with which to re-grow.
- (4) We recognize that truly healthy and productive land is biologically diverse. We prefer a diversity of grasses, forbs shrubs and trees over a monoculture. Rodents, insects, birds, predators and other grazing animals all have their role in a healthy ecosystem. We adapt our management to fit our individual environments rather than fitting the environment to our management. Grazing is planned in advance to coordinate livestock presence and forage removal with watershed, wildlife and human needs.
- (5) Our land management decisions are based on the long-term health and productivity of the land rather than the maximization of short-term gain. In order to make sound decisions we make sure our decisions are in accord with our long-term ranch plans and that they are economically, ecologically and socially sound.
- (6) By grazing livestock on land that is ecologically healthy and in a manner that is compatible with the environment, we rarely have the need for antibiotic treatment and eliminate the use of growth hormones and feed additive antibiotics. Routine immunizations and sound management are all our cattle require to flourish. By grazing well we hope to benefit not only the land and our families, but also our society as well. We want our final product to be good food at a reasonable price that is an integral part of a healthy diet. We want our customers to know that their purchases are helping the land as well as people.

Appendix 2. Beef supply chain member interview protocol

General issues

- (1) Is there a business model that is generally accepted in your industry? How does your business model differ? Is there a supply chain model that is generally accepted in the industry? How does your supply chain model differ?
- (2) Over what parts of beef supply chain do you control?
- (3) What is your overall strategy and business model?
 - Is there an analogy that you would use to capture the essence of your model?
 - What do you see as your strategic strength – innovative processes/products/logistics or adopting and refining existing processes/products/logistics. Is your primary strategy to provide a quality product, to compete on price, both?
 - How is the business organized? Generally, how would you describe it? (teams, hierarchy, flat, span of control).
- (4) *Process:*
 - For your main processes, to what extent are they automated? To what extent, and in what positions, are skilled tradespersons required/employed.
 - Generally, how would describe the work flow within the production processes? Is it mass production, batch, job shop, or craft/customization?
 - What is your management and/or leadership style?
 - How would you describe how your business functions?
- (5) *Human/cultural:*
 - If you were to compare your organization to something else (an analogy), how would you describe the roles that people take here?
 - Along those lines, how would you describe the role of your suppliers? Your relationship with your suppliers?
- (6) *Environment:* what is your perception of the market that you are in? Competitiveness, stability and uncertainty, market or customers?
- (7) What are the most important changes taking place in your industry and how are they affecting your production and distribution model?

Sustainability

- Can you explain to me what “sustainable or values-based practices” means to you?
- What types of practices do you use here that might be considered sustainable or values-based?
- How long has your company been concerned with these issues? What has been the primary driver for action?
- Overall, what do you see as the tangible and intangible benefits?
- Who in the company is concerned/involved with these issues? Your and other’s relevant background?
- What percentage of your time is spent on these issues?
- What is your influence on the selection of grain growers? When choosing growers, how influential are you in choosing those with sustainable policies?
- How much control does your company have over the characteristics of the incoming products?

- Are your company's sustainability efforts publicized or marketed? In what way?
- How do you identify and prioritize sustainability issues? What role does the consumer play in this process?
- What are your sources of sustainability information?
- What analogies would you use to explain your sustainability strategy?
- What waste streams are generated that your firm needs to control/regulate?
- Have any processes been redesigned to reduce waste?
- What areas of your business have the most difficulty to complying sustainability practices?
- Have you considered third party certification for your sustainable practices? Why (market advantage, requirement of buyer, etc.) or why not (perceived costs, inability to leverage in the marketplace, concerns about meeting standards)? Which ones?
- Which products are used in the greatest volume and which are the most costly?, i.e. different kinds of agricultural products or added ingredients to the final product.
- Are there seasonality issues?
- What is the potential for growth in sustainable beef? New trends?

Appendix 3. Standards of production

- All cattle placed in the CNB program will be managed from birth by an CNB member.
- Any calf that receives antibiotics at any stage of their life will be identified and removed from the CNB program. Background lots and the Beef Northwest feedlot team will identify and remove from the CNB program any calf that is treated with antibiotics.
- Freshly weaned calves may receive a coccidiostat but not for more than a five-day period.
- Feed-additive, sub-therapeutic antibiotics, including ionophores, are not to be given at any stage of production.
- Animals will never be given growth-stimulating hormones.
- Each animal entering the feedlot-finishing phase will be given an CNB approved ear tag.
- Animals entering the feedlot-finishing phase must be less than 22 months of age.
- Cattle in the CNB program will be in the feedlot-finishing phase for a minimum of 60 days.
- All cattle in the CNB program will be raised on a vegetarian diet – no animal derived feeds or feed additives are to be used.
- All animals will be dehorned.
- Heifers entering the CNB program should be open.
- Bulls or stags should not be placed in the CNB program. Bulls should be castrated at less than 12 months of age, at a weight of less than 800 pounds and be healed before being placed in the feedlot.
- All injections should be given in the neck area of the animal.

An affidavit will be signed to insure that the following steps have been taken when applicable

- Each ranch will sign an affidavit which states: "I/We certify that cattle entered in the CNB program from my/our ranch operation have never received antibiotics or any form of growth stimulating hormones or steroids."

- Any cattle that are back-grounded in a feedlot will have an affidavit from the back-grounding lot owner which states: "I certify that no antibiotics or animal by-products were used in any feed fed to CNB cattle. No growth promoting hormones, steroids, or antibiotics were administered to any CNB program cattle." This affidavit will be kept on file with the Financial Accounting Office of CNB.
- The finishing feedlot operator will sign an affidavit, which states: "I certify that no feed additive antibiotics or animal by-products were used in any feed fed to CNB cattle. No growth promoting hormones or steroids were administered to any CNB cattle. No antibiotics of any kind were administered during the finishing period." The finishing period is further defined to be a minimum of 60 days on feed.

Appendix 4. Important factors in CNB membership (from CNB, 2008, *New Member Orientation Manual*)

- Willingness to attend meetings and make decisions using the consensus process.
- Willingness to interact and learn from retail partners and our customers.
- Ability to provide truckload quantities of antibiotic and hormone free cattle and identify the cattle that received antibiotics and are out of the program.
- Quality of cattle – uniformity of size, adequate frame, ability to hit grid.
- Cattle availability – do they fill months needed by CNB? Cattle are particularly short in the months of November through February.
- Financial ability to grow cattle to 800 lb. weights and pay for feedlot period.
- Land management ability – have an understanding of how to manage ranch on a sustainable basis.
- Connection of ownership to land – is applicant owner, renter, absentee owner or manager for absentee owner.
- Continuity of ranch into the future – is there a second generation that will manage the ranch in the future?

Corresponding author

Madeleine E. Pullman can be contacted at: mpullman@pdx.edu

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