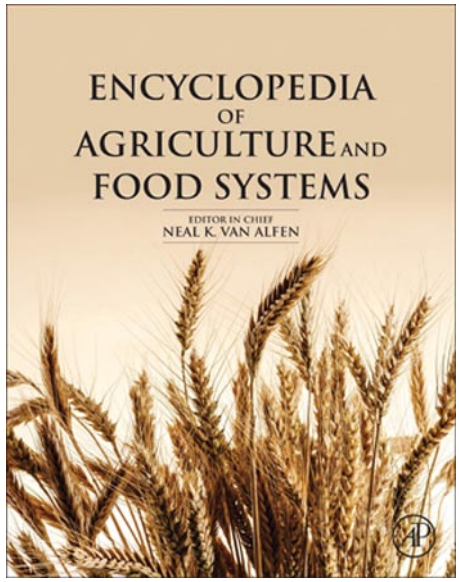

Gunderson M.A., Boehlje M.D., Neves M.F., and Sonka S.T. Agribusiness Organization and Management. In: Neal Van Alfen, editor-in-chief. Encyclopedia of Agriculture and Food Systems, Vol. 1, San Diego: Elsevier; 2014. pp. 51-70.

Agribusiness Organization and Management

MA Gunderson and MD Boehlje, Purdue University, West Lafayette, IN, USA
MF Neves, University of São Paulo, Ribeirao Preto, SP, Brazil
ST Sonka, University of Illinois, Champaign, IL, USA

Glossary

Agribusiness The sector of the economy that is the sequence of interrelated activities made up of genetics and seed stock firms; agricultural input suppliers, agricultural producers, agricultural commodity merchandisers, food processors, food retailers, and food consumers.
Capital structure The mix of debt and equity used by a firm to finance its purchase of assets.
DuPont analysis of profitability A financial management tool that decomposes return on equity into its component parts: operating profit margin, asset turnover, and financial leverage.
Entrepreneurship The capacity and capability to identify new business opportunities and to successfully bring that opportunity to market and generate superior financial performance.
Porter's Five Forces analysis A strategic framework useful for assessing industry structure and profitability that includes industry rivalry, power of buyers, power of suppliers, threat of substitutes, and threat of new entrants.
SWOT analysis A strategic assessment at the firm level that includes an analysis of the firm's internal strengths and weaknesses in addition to the firm's external opportunities and threats.

Introduction

The purpose of this article is to discuss contemporary topics in food and agribusiness research with a focus on a definition of agribusiness, a description of the global agribusiness environment, and a discussion of the roles in managing an agribusiness firm.

Concept of Agribusiness

The agribusiness sector is comprised of interrelated subsectors working in concert to provide goods and services to consumers around the world. With the need to accommodate economic, social, and environmental concerns, organizations and managers in the sector share many of the challenges that exist in other business value chains. However, food is an economic good with distinctive cultural, institutional, and political aspects shaping the economic environment of the sector, the organizational structure of its firms, and the choice set available to its managers. Further the fundamental uncertainties emanating from weather and other sources of variability within biology-based production sectors add to the complexity of management in the sector.

Food and Agribusiness Value Chain and Sectors

As depicted in Figure 1, the sector can be thought of as a sequence of interrelated activities made up of:

- Genetics and seed stock firms
- Input suppliers
- Agricultural producers
- Merchandisers or first handlers
- Processors
- Retailers
- Consumers

This, of course, is a general listing and finer distinctions, for example, separately identifying wholesaling and food service, could be done. Supporting these activities are firms that provide services, financing, and research and development to the sector. Also, as indicated in Figure 1, the sector operates in an international context with substantial levels of both imports and exports.

This perspective of the agribusiness sector is not new (Davis and Goldberg, 1957; Sonka and Hudson, 1989). However, there are important differences between this depiction and many that are traditionally offered. First, the depiction in Figure 1 explicitly includes agricultural production, thus eliminating the artificial exclusion of farming enterprises. A second distinction relates to the inclusion of consumers in the diagram. This recognizes the increasing demand by consumers for new products and the resulting impacts on the production, processing, and distribution of food, fiber, biofuel, and other bio-products. Success in the sector requires an understanding of the needs and desires of consumers in both domestic and world markets.

Distinctive Challenges Faced by Food and Agribusiness Firms

There are at least five distinctive characteristics of the sector:

1. Unique cultural, institutional, and political aspects of food, domestically and internationally,
2. 'Uncertainty' arising from the underlying biologic basis of crop and livestock production,
3. Alternative 'forms of political intervention' across subsectors and nations,
4. Institutional arrangements that place significant portions of the 'technology development process' in the public sector, and
5. Differing 'competitive structures' within the stages of the sector.

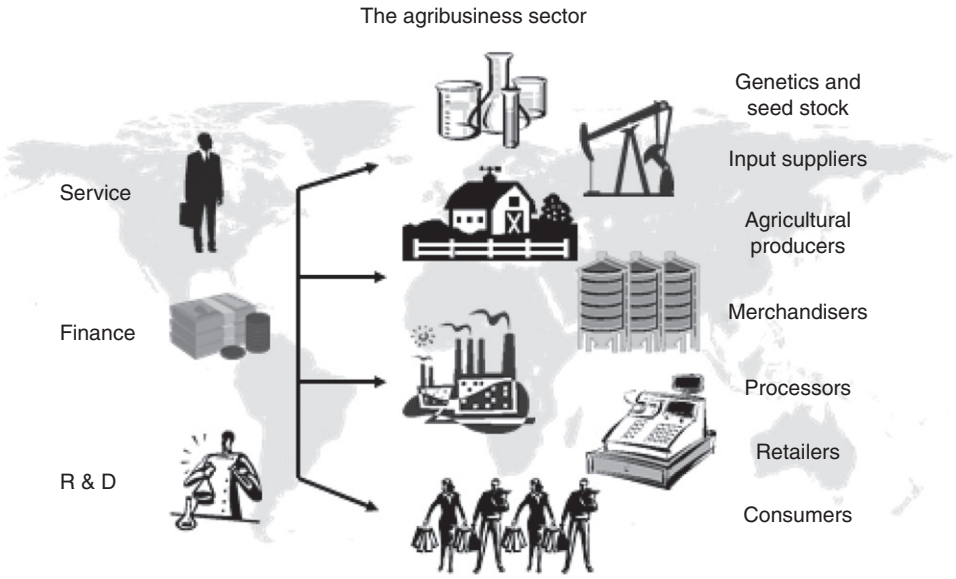

Figure 1 The agribusiness sector. Adapted from Sonka, S.T., Hudson, M.A., 1989. Why agribusiness anyway? Agribusiness 5, 305–314.

These five characteristics suggest the need for targeted managerial skills and knowledge to facilitate effective operation within the sector.

We all understand that food is a necessity for human life. Therefore, assuring adequate amounts of safe, nutritious food (e.g., food security) is a priority for all societies and governments. But food and its consumption are integral parts of the culture of human society. Indeed, anthropologists note that cooking food is one of the actions that uniquely define the human species (Murcott, 1986). Differences across nations and cultures relative to the role of specific foods are critical in understanding the agribusiness sector. For example, although wheat and rice are both food grains, rice in the Japanese culture is far more than just the staple food item that wheat is in the Western nations. The key role of international trade requires that sector managers be aware of these cultural differences.

As evidenced on an increasingly routine basis, the forces of nature (e.g., weather and pests) can overwhelm even the sophisticated technology of modem agriculture. Production, marketing, and financial structures to accommodate normal aspects of 'uncertainty' need to be understood by sector managers. The potential for infrequent but massive deviations also must be appreciated. Plans based on alternative uses of low-priced agricultural commodities, for example, must have contingency options available if the supply of those commodities suddenly is limited. Indeed, strategies for biofuel-based alternatives, developed when commodity prices were low, were severely challenged when food prices sharply increased.

'Political intervention' is a reality of the agribusiness sector. The motivating force for that intervention, however, is not limited to assuring food supplies and maintaining farm income. Issues such as food safety, resource conservation, farm worker safety, and the economic well-being of rural communities are also important. Sometimes seemingly operating at cross-purposes, governmental intervention often is disruptive to operations and markets. Further complications arise because of differing attitudes and forms of intervention internationally.

The potential for major change because of advances in 'technology' seems especially likely within the agribusiness sector. For example, applications of biotechnology both had material market effect and captured media headlines in the past two decades. Application of information technology through precision farming and enormous data sets (known as 'Big Data') may have as pronounced an effect. Globally, major research investigations are pursued in both the private and public sectors. Historically, considerable developmental research has been conducted within public sector institutions and that continues to be the case in developing countries. The management and introduction of new innovations in this sector, therefore, is subject to differing processes than would be the case if developmental research was confined solely to either the private or public sectors.

The agribusiness sector depicted in **Figure 1** is comprised of 'competitive structures' that differ across and within its subsectors. The relatively unique structure of the production sector (large numbers of relatively small units) is widely recognized. At the same time, many agribusiness firms are large and multinational in scope. Organizational structure can have major influences on competition within an industry. Managers within the agribusiness sector must operate within the competitive structure of their subsector while understanding the implications of alternative structures for suppliers and customers.

The five distinctive characteristics just noted do not include several issues normally cited. For example, international trade is not listed because international trade is vitally important in numerous economic sectors. For a manager in the agribusiness sector, however, distinctive features of international trade include cultural attitudes regarding food; the range of political influences; and the potential for sudden supply shocks domestically, among competitors, or within customer nations.

Also noteworthy is that this article proposes that the uniqueness of food in combination with the physical, economic, and social attributes of the agribusiness sector provide important challenges and opportunities for sector managers. This article's focus on food differs from the narrow perspective on farm production with price as the primary measure of performance. Today's agenda does include basic food security for many consumers and nations. However, in other instances that agenda must focus on a consumer who demands a changing variety of food products. Often those products must be attractive to a concerned consumer informed by the media about food safety. Food products must be attractive both in terms of the manner in which they are produced and their long-term effect on human health and the environment.

Global Agribusiness Environment

The agribusiness environment simultaneously is extensively global and intensively local. Trade in agricultural products and the operations of multinational agribusiness suppliers and branded food manufacturers extend around the world. Conversely, even today considerable amounts of agricultural production are originated and consumed in villages and local regions following patterns that have existed for centuries. However, as the world's population increasingly lives in urban settings, the need for effective transportation, processing, and distribution intensifies. National and local government policies and regulations have a strong influence within countries around the world. However, their nature and effect can have markedly differing dimensions. Further the organizational forms and the scale of individual firms often differ markedly between the subsectors that comprise agribusiness. The culmination of these, and other, factors add to the challenge and excitement of managing in the agribusiness sector.

Agribusiness Markets in Developed and Developing Countries

The world economy can be understood as several markets, intercommunicated and linked in different blocks, with totally different dynamics in a much more complex environment.

To simplify, markets can be divided into two major groups: those already developed and mature represented by countries belonging to the European Union, Canada, USA, Japan, and South Korea, for example, and those under development, called emerging economies or countries. Brazil, India, China, Russia, and South Africa (the so-called BRICS) are examples that can be classified in this emerging category as are several other Asian, African, Eastern European, and Latin American economies. These markets differ in important aspects that are summarized in Table 1.

An analysis of this table shows that developed markets are more mature and stable, and have relatively predictable characteristics with very well-established aspects, such as logistics, retail, and institutional environment. This maturity is reflected in the population that tends to search for differentiated products and services, featuring various niches seeking healthy products, environmental and social trends, among others.

Consolidation, Concentration, and Structural Change in Linkages along the Food Value Chain

Changes in the economic environment have incented companies to their activities on core competencies, outsourcing others, and therefore reducing diversification. Concentration

Table 1 Major differences among developed and emerging economies

Developed countries	*Parameter of analysis*	*Emerging countries*
Stable	GDP	Growing
Relatively stable	Population	Growing
Relatively stable	Urbanization of population	Urbanization growing fast and emerging of mega-cities
Mature or declining	Food markets	Sales are booming
Small effect on consumption	Income growth and income distribution	Huge impact on consumption (still a high percentage of income spent on food)
Well educated	Consumer profile	Being educated
More homogenous group	Countries characteristics	Different segments of emerging economies, difficult to aggregate
High quality and sophisticated markets	Quality (food safety) in markets	High level of informal markets and food safety under construction
High percentage of consumption (expenditure) in foodservice	Food service share in food consumption	Smaller participation of expenditure in food service
Quite stable	Retail systems	In transformation
Limited possibility	Expansion of commodity production	High possibility
High sensitivity of population and severe laws, recycling, and consciousness	Environment and preservation issues	Low sensitivity of population and regulation being built
Growing faster	Adoption of biofuels	Low growth
Healthy, veggies, fruits, and organics, among others	Consumption directed to:	Quantity and animal protein
Developed and mature	Logistics and transport systems	Early stage of development, immature
Consolidated, respected, and well known	Institutional environment	Being built with high transaction costs

Source: Adapted from Neves, M.F., 2014. The Future of Food Business, second ed. Singapore: World Scientific, 336 pp.

occurrs in several stages of the food chain participants as suppliers, farmers, food industry, retailers, and foodservice. Concentration and consolidation are rules of the game.

The so-called 'hybrid forms' of supply chain coordination are increasingly replacing open-access markets. As hybrid forms are mostly implemented by contracts, one sees the emergence of collaborative networks based on relationships.

Interorganizational relationships can be formal (based on written contracts) or informal (oral agreements), depending on the institutional environment. Some societies value oral agreements and participants have reputation, and a formal document is not needed to make transactions happen and to guarantee behavior. Other countries need formal documents, and in some countries with weak institutional environments, even these written documents do not have value.

Farms Go beyond Food and Fiber: Energy, Nutraceuticals, and Industrial Products

From a traditional perspective of a farm producing food, recent technology innovations and other advancements are enabling farms to be multiproduct and service suppliers. At least 13 industries increasingly source their raw materials from farms:

1. Food and beverages: to produce human food, including grains, fruits, eggs, vegetables, juices, milk, beef, fibers, and others to an increasing and richer population demanding quantity, quality, procedures, conservation, environment, animal welfare, and others.
2. Feed: food for the animal's growth and development, involving nutrition of larger animals, for pets and others.
3. Fuel: biofuels blending programs, which means fuel coming from the farm using corn, wheat, sugarcane, sugar beet, grasses, residues, and other sources.
4. Pharma-medicine: the growing end-use called 'nutraceuticals,' which means food products together with medicine, it involves producing products that have health benefits, like juice with calcium, lycopene, vitamins, proteins, omegas, and several other merged products.
5. Pharma-cosmetics: products from food/farms that have benefits in terms of beauty, skin, tanning, and other characteristics desired by consumers ('nutricosmetics').
6. Electricity: farm products used as a renewable source of electricity, burning biomass in boilers and generating heat that is transformed into electricity, sold to the power network.
7. Plastics: replacing plastic coming from oil with renewable plastic coming from green and farm materials, like plant-based bottles produced from cane or corn.
8. Environment: farms are being used in the battle against global warming, recovering forests, creek surroundings, rivers, and even benefiting from participation in carbon credit markets.
9. Entertainment/tourism: use of farms and rural lands for tourism, weekend rest for urban families, festivals, educational purposes for kids in schools, hunting, and similar recreational services.
10. Textiles and clothings: natural fibers used to produce textiles and clothes for the fashion industry, like cotton and others.
11. Shoe and leather: leather comes from cattle and other animals.
12. Construction and furniture: wood from planted farms using eucalyptus, compensated woods, and other sources.
13. Paper and packing: materials come from processed farmed wood, producing a pulp that is transformed into paper products.

Uncertainty and Volatility

Uncertainty and volatility could endanger the world's food and agribusiness environment. For example, uncertainty surrounding the outbreaks of foodborne illnesses can have large impacts on the firms that have established a brand reputation for safety. Additional examples of uncertainty are provided in Table 2.

Sustainability and the Triple Bottom Line

Sustainability, broadly defined as 'responsible use of exhaustible energy resources and raw materials' has gained increased awareness around the world. Sustainability has three major dimensions or pillars: the economic dimension (profit), the environmental dimension (planet), and the social dimension (people).

On the economic (profit) front, the major factors to be considered are how companies, networks, and production chains deal with margins, profit, compensation, losses in the chain, communication issues for end-consumers, capital investments and funding for sustainable projects, risk management, technology adoption, and overall strategies to reduce costs and achieve economic sustainability of the business. Without economic sustainability, the other dimensions are difficult to support.

On the environment (planet) front, the major factors to be considered are the impact of the company on the environment, the impact of the company's integrated suppliers, the impact of transport (food miles), packaging (trying always to recycle/reuse/rebuild – using renewable materials and less materials), waste management (less waste; separating and recycling; energy/fertilizers from waste), use of energy, water management (protecting water and adapting best practices), green and environmentally oriented buildings and facilities, carbon emissions/neutralization (carbon footprint), among others.

On the social (people) front, the major factors are working conditions for employees, including the company's suppliers and distributors, health and safety, usage of child labor, working climate, safety equipment, commitment to the local community, facilitate cooperation, smallholder-friendly initiatives, improving local companies' capacity, and promoting product line benefits for consumers, more nutritional and healthy.

Agribusiness Firm Management

Industry-Level Analyses

A firm's strategy can be viewed as how it combines its resources to 'go to market' – to supply products/services to

Table 2 Uncertainties and risks in the business environment

	Examples
Political-legal system	● Risks to democracy in some countries; ● Populist measures of some governments and its impact in social expenditures; ● Terrorists and political attacks using food or other sources; ● Global arming (even atomic) procedures and weapons availability taking to unexpected local or regional wars; ● Riots and other challenging political systems; ● Increase in corruption within political systems; ● Labor laws decreasing work productivity and increasing costs and strikes; ● Growth of illegal crime systems and parallel states (drug cartels, nonlicit trade groups and others); ● Declining support to world's organizations and institutions (e.g., World Bank, ONU, FAO, etc.); and ● Immigration and also migration to urban areas threatening infrastructure.
Economic and natural system	● Fiscal debt crisis in some countries; ● Inflation threats in some economies; ● Not sufficient economic growth mostly in poor and emerging economies pressuring governments; ● Supply chain inefficiencies (poor use of land and other resources); ● Infrastructure collapse; ● Financial systems inefficiencies, failures, and lack of financing capital; ● Controlling diseases spreading among human, animal, or plants; ● Over usage of nonrenewable resources (oil and some fertilizers); ● Water shortages and excess causing droughts and flooding (disasters); ● Temperature changes in some regions, with extreme situations; ● Increasing carbon emissions and its effects over pollution; ● Potable water availability; ● Climate change and other planetary threats; ● Food safety risks due to poor management of food supply chains; ● Natural risks of earthquakes, tsunamis, hurricanes, and other extreme events; and ● The impact of fracking technology and shale gas on production costs and the environment.
Sociocultural system	● Fast changes in consumption behavior; ● Consumer activist movements; ● Environmental movements; ● Nationalistic movements; ● Food security concerns increasing inefficiencies in nonadequate producing areas; ● Food waste concerns; ● Nontolerance in some aggressive religious movements; ● Increase in xenophobic movements; and ● Consumer preferences for credence attributes such as organic, humane, and local production.
Technological system	● Digital systems operation (web-based companies, operational systems, and government systems); ● Data piracy, data frauds, and personal privacy issues; ● Viral communication exposure of individuals, companies, and governments; ● Not controlling new high tech innovations, such as genetically modified, nanotech, and others that may get out of control; and ● Traceability of food products from the farm to the final consumer.

Source: Adapted from Neves, M.F., 2014. The Future of Food Business, second ed. Singapore: World Scientific, 336 pp.

customers. Developing a successful strategy requires thorough assessment of the market forces the firm faces as well as the internal competencies and capabilities of the firm. The market assessment will include evaluation of the overall business/economic conditions, competitor actions and positions, and customer expectations using appropriate analytical framework such as Five Forces models and value chain analysis.

Value chain analysis

Value chain analysis assists in understanding the linkages among activities and processes (and thus stages) from initiation of economic activity to create a product or service to the eventual provision of that product/service to the final consumer/user. Boehlje (1999) identifies six critical dimensions of a value chain reaching from (1) the processes and activities that create the products or services demanded by consumers or end users, (2) the product flow features, (3) the financial flows, (4) the information flows across the chain, (5) the incentive systems to reward performance and share risks, and (6) the governance and coordination systems.

Agribusiness value chain for food could be described as two chains that become one at the consumer end (Figure 2). One value chain follows plants and plant products, and another chain follows animals and animal products. These two chains blend into one chain at the processing and retailing stages of the chain. Value chains can be as simple as five

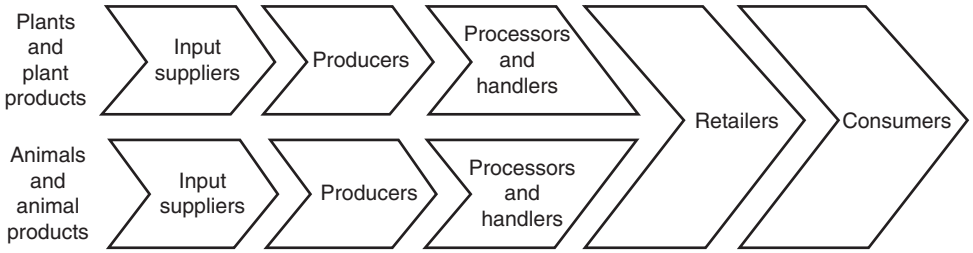

Figure 2 Value chain for plants, animals, and their products.

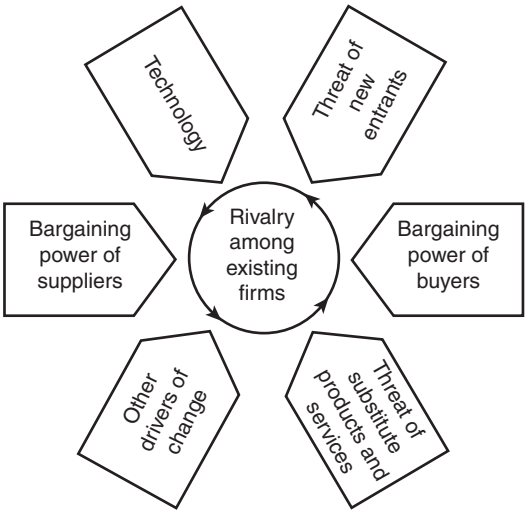

Figure 3 Porter's augmented Five Forces model.

stages: (1) input suppliers; (2) producers; (3) processors and handlers; (4) retailers, and (5) consumers.

Value chain analyses are useful to analyze the structural changes that come along with increased interdependencies of two or more related value chains. For example, due to the application of similar technologies in different sectors (e.g., biotechnology); formerly distinct, value chains are becoming increasingly interlinked and interdependent. Value chain analyses can be used to understand how complexity increases, who will hold the needed competences, how and why vertical integration will occur, and what is needed for successfully managing systemic innovations that affect multiple steps of the supply chain.

Porter's Five Forces

Michael Porter's Five Forces analyses framework is useful to assess industry structure and competitive landscape (Figure 3). Two additional forces affecting competition have been added to Porter's model adding an external dynamic: (1) technology and (2) other drivers of change.

Rivalry among established firms: The level of rivalry within an industry can depend, in large part, on the number of firms, demand conditions, and exit barriers. Owing to the number of firms involved, many agricultural industries are often described as perfectly competitive – as opposed to monopolistic competition, oligopoly, or monopoly. However, government regulation and intervention, as well as the size and dominance of a few firms, can provide different degrees of perfect competition.

Bargaining power of suppliers: Suppliers have power if they are more concentrated than their buyers, do not receive a high percentage of their revenues from one industry, have customers with high switching costs to change suppliers, have a differentiated product, have a product with no substitutes, through either real differences or patent protection, or could integrate forward into additional stages in the value chain.

Bargaining power of buyers: Fewer buyers mean they have greater power. If sellers cannot easily ship their products to other markets, or they do not have price information from other markets, local buyers can have considerable power even though the total number of buyers is large in the wider market. In ways similar to suppliers, buyers have power if they are few in number or a few buy a large percentage of the product in the market, products are undifferentiated commodities, or buyers could integrate backwards in the value chain. Buyers will also bargain harder if the product constitutes a major portion of the buyer's total costs, or if the product has little effect on the quality of the buyer's product or other costs.

Substitute products and services: Substitute products limit the price that producers can seek or ask for without losing customers to those substitutes. Competitive pressure comes from the attempts of the producers of the substitutes to win buyers to their products. The advertising campaigns of the pork, beef, and poultry industries are an obvious example of the competitive pressures due to substitute animal products; each industry feels forced to advertise to keep customers, and cannot charge as much as they would like without pushing their customers into buying other products.

Threat of new entrants: If the costs for new firms entering into an existing industry are sufficiently low, the threat alone may limit the price dominating firms charge to the users. In agribusiness, many subsectors have large initial investments. For example, machinery manufacturing requires large investments in factories to achieve scale economies. The large investments serve as a barrier to entry for new machinery manufacturing companies. Further down the value chain closer to the consumer, established firms invest in branding to create barriers to entry and limit the threat of potential entrants.

Technology: Changes in technology can have a large impact on the production of and demand for a service or product of a firm. The risk from technological change depends on the size and the role of technology in the industry, as well as the speed of technical change. Advances in technology can be disruptive; they can cause leaps that leave users of old technology far

behind. New technology can alter not only the efficiency and cost of the production process, but also the actual products and services offered and demanded by others in the value chain. New chains may be created due to a new technology in communication as well as in products and services.

Other drivers of change: Other drivers of change include changes in government policy and regulations, changes in international trade agreements, demographic changes, and other factors not included in the first six forces. Competitive pressure comes from differing abilities of firms to respond and adapt to these changes. The impact of these forces depends on the scope of the change, the speed at which change is anticipated or actually felt, and the depth and breadth of the responses needed to adapt to these changes.

Market structure and structural change

Useful conceptual frameworks that help understand and explain the structural changes (consolidation, vertical integration, and changes in the vertical and horizontal boundaries of the firms) in agribusiness include: (1) industrial organization and structure, conduct, and performance analysis; (2) transaction cost economies; (3) negotiation/power and trust; (4) strategic management; and (5) risk sharing.

Industrial organization and structure, conduct, performance analyses: One common paradigm used to understand and analyze the competitive characteristics of markets and the firms in those markets is the Structure, Conduct, Performance paradigm. 'Market Structure' refers to the competitive nature of the market. It is characterized at one extreme by many firms of similar size and similar information about market conditions including supply, demand, and prices, which is described as perfect competition; at the other extreme is only one firm with unique information that is a monopoly; or something between these extremes with few firms of different size and information/characteristics, which is described as an oligopoly or monopolistic competition market structure.

As to *conduct*, the prime focus is that of pricing behavior and pricing power. In perfect competition markets, firms have no pricing power. They are price takers with no one firm having the ability to set prices higher than their competitors and continue to sell their product. In a pure monopoly, the firm has no competition and thus it has the power to set high prices without any concern that competitors will take some of the market by charging lower prices. Firms in oligopolistic and monopolistic competition markets have some pricing power depending on the size, information access, and other characteristics of their competitors, and thus have some power to set prices without losing significant market share.

Performance is measured primarily by profits. Perfect competition markets, profits as measured by returns above all costs are zero or minimal because firms will expand output or continue to produce as long as they cover all costs, and no firm has the power to set prices above those costs without losing sales to their competitors. In a monopoly, the firm can generate profits well in excess of costs because of their pricing power, and they do not face the market discipline and competitive pressure to control costs, so monopolies typically have excess profits and may also have higher costs and relatively inefficient operations. Because of the opportunity for a monopoly firm to charge higher prices and extract excess profits from their customers, such behavior is restricted or regulated by antitrust and other laws and regulations. Oligopoly and monopolistic competition industries have modest 'pure profits' (returns above total costs) depending on how competitors respond to each other's pricing or output decisions.

Transaction cost of economics: The concepts of transaction costs and principal-agent theory as conceived by Coase (1937) and expanded by Williamson (1979) and others indicate that structure in terms of the form of vertical linkages or governance in an economic system depends not only on economies of size and scope, but also on costs incurred in completing transactions using various governance structures. Furthermore, these costs and the performance of various governance structures depend in part on the incentives and relationships between the transacting parties in the system: the principal and the agent. Under various conditions, the agent may exhibit shirking behavior (i.e., not performing expected tasks) or moral hazard behavior (i.e., the incentives are so perverse as to encourage behavior by the agent and results that are not consistent with, or valued by, the other party to the transaction, viz. the principal).

Negotiation, power, and trust: More hierarchical governance structures are replacing markets as the coordination mechanism in the agrifood industries. In such systems, negotiation strategy and skill, power, conflict resolution, trust, and performance monitoring and enforcement become central to effective and efficient functioning of the economic system and the sharing of risks and rewards in the system.

Strategic management: strategic management arguments emphasize various approaches that firms must adopt to develop a strategic competitive advantage and to consider in the make or buy decision. In general, the arguments are that competitive advantage is driven by: (a) internal considerations of costs, technology, risks, and financial and managerial resources; and (b) external competitive considerations of synergies, differentiation, and market power and positioning (Harrigan, 1988). The dynamic capabilities approach offers a framework to mitigate changes in the business climate and renew a firm's resources for a sustained competitive advantage in fast changing unstable environments such as those that characterize the agrifood sector (Teece *et al.*, 1997). In fact, given an increasingly turbulent business environment, there are reasons to question the basic concept of a sustainable competitive advantage and replace it with a rather 'temporary' competitive advantage.

Risk sharing: Apgar (2007) argues that value chain partners are critical sources of risk and uncertainty, and they can also provide the potential to mitigate risks and capture opportunities that result from uncertainty. Given the difficulty of establishing sustainable risk/reward sharing arrangements, it is not uncommon for one firm in the chain to become the chain 'captain.' The chain manager or 'captain' may choose to become the residual claimant on profits from the chain as well as assuming a major share of risk, or to share a greater fraction of the profits while shifting more of the risk to the other participants. Failure to find a risk-/reward-sharing arrangement that provides appropriate incentives and is perceived as fair encourages ownership integration of stages by one firm.

Gray and Boehlje (2005) suggests that, in general most tightly aligned supply chains that seek to share risk and

rewards among participants will be increasingly dominated by larger firms at both the buyer and supplier level – leading to more consolidation, particularly at the production end of those industries.

Firm Strategy

Agribusiness firms can employ a number of concepts and tools to craft the best 'fit' between their strengths and the current and future needs of the market. These efforts focus on resources, competencies, and capabilities that create a sustainable competitive advantage, contributing to superior financial performance and mitigating risk from changing market conditions.

SWOT analyses and the value plate

Strategic assessment at the firm level invariably includes analysis of the firm's strengths, weaknesses, opportunities, and threats (SWOT). The opportunities and threats components of the analysis can be directly derived from an effective industry analysis. Although the strength and weakness elements are internally focused, this analysis must consider market and consumer needs and competitor capabilities. In assessing skills and assets, it is critical to candidly evaluate their relevance relative to the following questions (Aaker 1995):

- Why are successful (unsuccessful) firms successful (unsuccessful)?
- What are the key customer motivations?
- What are the large cost components?
- What are the industry mobility barriers?
- Which components of the firm's value chain can create competitive advantage?

Across the sector, assets essential to be successful vary widely. For example, scale and low cost are critical for established grain merchants whereas differentiation and access to specialize skills are critical for high-tech startups. Motivations differ between the farmer and the consumer as customer. Access to safe, affordable food is the need for large segments of the world's population but those characteristics are taken for granted among higher income consumers. Focusing on cost reduction is an important managerial emphasis, especially if the cost component being addressed is substantial. Mobility barriers (both entry and exit) are important because they can indicate the speed at which current and potential competitors can execute strategically.

Assessing capabilities requires detailed examination of the firm and its operations. The internal value chain (or value plate) is a useful tool in this process (Porter). In Figure 4, the firm's primary activities are indicated by the vertical sections within its lower portion. Supporting activities within the firm are represented by the rows across the figure's upper segment. The very right-most section, labeled margin, indicates the goal of profitable operations. It is critically important to recognize that one firm's value plate is linked to its suppliers' value plates and to its customers' value plates.

The importance of each component differs significantly within the sector. Service is critically important in the farm equipment sector whereas inbound logistics is a major success determinant for food processors. Although vastly different in orientation, technology development is a continuous challenge for biotechnology-based input manufacturers and for branded food companies.

The effective use of the skills and assets of agribusiness firms, relative to their competitors, determines the size of the margin component of the value plate. Efforts to increase the margin have traditionally emphasized enhancing efficiency (shrinking the cost components) or increasing revenues (growing the size of the plate). Especially in recent years, outsourcing of support activities has been an important tactic to reduce costs. Aggressive implementation of information technologies has occurred both in the support segment and in the operational components of the primary activities.

Value creation and capture

Value creation, providing goods and services that earn revenues that exceed the cost of doing so, is an elemental reason for a firm to exist. As detailed by Schumpeter (1942), competitive economies rely on market entry and the creative destruction of innovation to shift value to consumers. Value

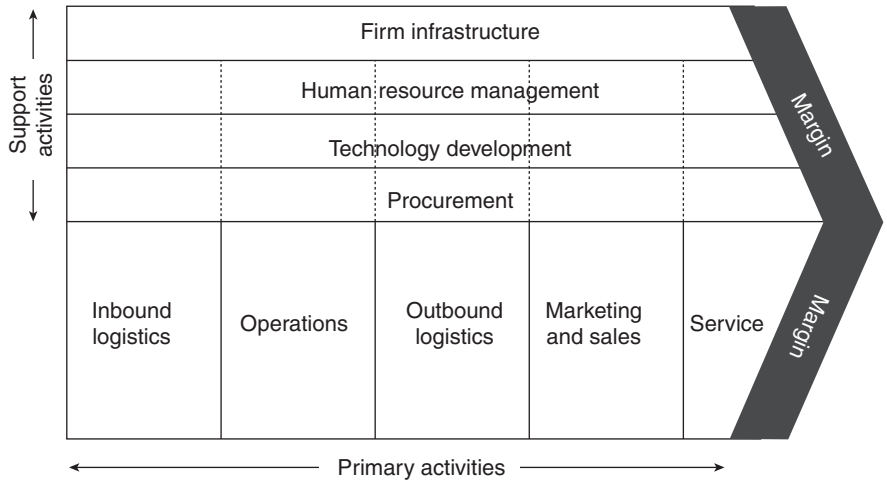

Figure 4 The value plate.

capture emphasizes the extent to which firms, over time, can retain value for their shareholders.

Although value is measurable in financial terms, in today's economy the factors that drive value creation, innovation, people, ideas, and brands, are increasingly intangible in nature. Advances in the capabilities and use of information and communication technologies (ICT) and of science throughout the economy have shifted competitive dynamics, increased the pace of change, and altered the sustaining value of skills and assets. In addition to physical sources of advantage, a long list of categories of intangible assets have advanced in importance, such as technology, innovation, intellectual property, alliances, management capabilities, employee relations, customer relations, community relations, and brand value. As a result, value capture often involves sharing across multiple firms in the value chain.

Agribusiness managers have been adept at integrating science-based innovations as well as ICT-based advances. The future dynamics of the sector are particularly intriguing because successful innovations will need to excel within the 'cyber-physical' context that characterizes operations and markets within agribusiness. Although the advance of cell-phone use has been a recent feature in developing nations, agricultural production (fruits, vegetables, grain, and livestock) still needs to move from rural to urban areas. Unfortunately that process is all too often hampered by inadequate physical infrastructure. Intangible drivers of value creation and capture will be a feature of change within the global agribusiness sector. However, the most substantial gains will accrue to the successful implementation of those drivers in the physical reality of the sector.

Growth

For long-run success, growth is a necessary consideration for the agribusiness manager. Growth introduces vitality into an organization. Further, competitors can be expected to attack the weaker product offerings of the firm. Therefore, growth in some dimension is almost always necessary just to stay even. Although profitable growth is a key managerial focus, sustained profitable growth has proven difficult to achieve – with an estimate that 90% of companies worldwide failed to achieve sustained profitable growth in recent years (Zook, 2010).

Typically, approaches to growth are categorized along the following dimensions:

- Growth in existing product markets
- Product development
- Market development
- Diversification (either in related or unrelated markets)

Bain and Company (Zook, 2010) extends this framework in the context of 'profit from the core,' where successful growth strategies are found to:

- Reach full potential in the core business,
- expand into logical adjacent businesses surrounding the core, and
- preemptively redefine the core business in response to market turbulence.

A recent case study of the Center for Food and Agricultural Business at Purdue University highlights successful firm growth within the sector (Sonka, 2011). JBS United is a diversified mid-sized agribusiness firm, known for its use of R&D to drive innovation that fosters success for its customers. Since its establishment in 1956, it has been headquartered in Sheridan, Indiana. However, its products are employed in animal agriculture throughout the world. In 2010, its sales exceeded US$450 million. As shown in Figure 5, growth has been a constant feature in the firm's history.

In 1956, John Swisher decided to become an entrepreneur and with two colleagues started the firm that has grown into today's JBS United. They chose to initially focus on providing feed for one species, swine, as it would be too difficult to provide high-quality products across species.

Based on the value delivered to its customers, the JBS United firm grew through expansion of market share in its original geography. Over time, friendly acquisitions expanded the market scope for the firm to extend across the Midwest. At the same time, value chain expansion occurred as the firm expanded its farming operations to support applied research and expanded into grain procurement to support its feed milling operations. The acquisition and geography expansion led to entry into dairy nutrition.

Recognizing the dynamic growth opportunities for animal protein globally, JBS United entered the swine nutrition market in the Philippines in the mid-1980s, which was followed

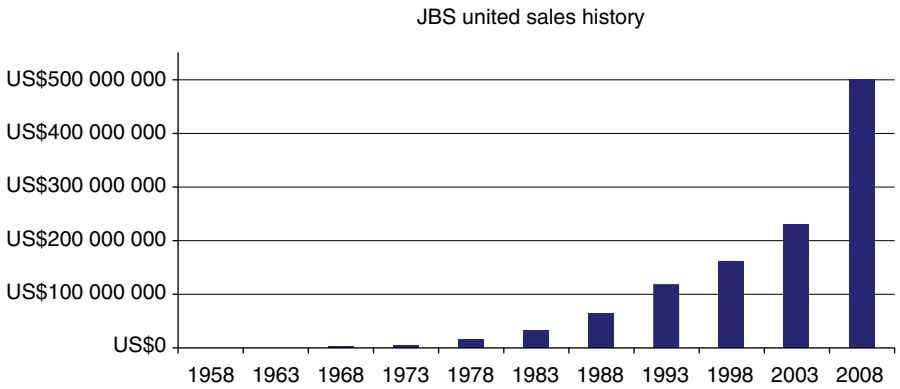

Figure 5 Growth of sales at JBS United, 1956–2008.

by expansion in Southeast Asia and then Central and South America. Since 2000, the firm has participated in successful joint ventures in China, the world's largest pork-producing sector.

Relatively early in the company's evolution, its management team recognized that employing an effective, applied R&D capability would be a key enabler to achieve its market philosophy.

Today, JBS United has an extensive R&D system serving animal agriculture. Research and development capabilities and their value led to establishing the Emerging Technologies Division within JBS United. The division's overriding goal is to advance and develop technologies that will better serve customers and environmental needs worldwide.

Both swine and poultry need phosphorous for bone and muscle development, however, only 20–30% of phosphorus in feed grains is digested. In collaboration with university researchers and by employing its internal capabilities, JBS United brings products to market to dramatically improve the proportion of phosphorous digested. This reduces both costs for the producer and the environmental impact of animal production. Additional products are being developed through joint ventures, which again build on advances in basic science.

The JBS United experience demonstrates the importance of long-term growth for firms in the agribusiness sector. This experience illustrates growth through existing product markets, product and market development, and related diversification. Further it documents that aggressive expansion from the core is possible for small- and medium-sized agribusiness firms.

Marketing

Marketing is one of the most important activities for food and agribusiness companies. Marketing is the relationship development, or the 'contract building' process with possible customers. Successful companies are the ones 'driven by demand,' or companies that pay attention, innovate, and build strong and stable relationships with customers.

Perreault *et al.* (1997) state that if the majority of people, including managers, were forced to define marketing they would say it means 'sales' or 'advertisement.' This answer is not completely true. Sales and advertisement are just two parts of a broader set of marketing strategies. Thus, marketing is defined as "a social and managerial process by which individuals and groups obtain what they need and want through the creation, offer and trade of products and values with others (Kotler, 1997)." Thus, it is a process that aims at satisfying the needs of the customers through trade.

Marketing activities can be divided into two blocks: understanding food and agribusiness customers and performing to meet customers' needs and wants. Understanding the food and agribusiness customers requires firms to assess the needs of the final consumers and intermediaries through a research process. The firms analyze the behavior of consumers to gauge their needs and wants. The firms also scan the macroenvironment (political-legal, economic, natural, sociocultural, and technological) to anticipate changes. The firms also react to competitors' moves in the market. The goal is to identify opportunities to create additional value for customers. The firms will choose among these opportunities based on which consumer market segments the company targets.

Performing is the action the firm takes based on its understanding. Firms offer products that are differentiated from competitors' products. The firms also use the information to generate new and adapt to existing products, brands, and packages to satisfy consumer needs. Firms price the innovative offerings to capture the value created. Firms also implement distribution strategies ensuring products are available to customers at appropriate times and conveniently. Firms communicate the additional value created through advertisements, publicity, and other tools. Now these major marketing performing decisions in food and agribusiness will be addressed.

Performing via product, services, packaging, and brands

Products represent the group of attributes, functions, and benefits that consumers buy. Goods, services, packages, brands, and ideas compose a product, forming a company's offer, trying to meet successfully a consumer need (Perreault *et al.*, 2010; Kotler, 1997). According to Garvin (1987), for an offer to be perceived as 'high quality' by the consumer, the following factors must be considered:

- Performance: refers to the product's capacity of doing well as per expectations;
- Characteristics: concerns the number and complexity of characteristics that differentiate the product;
- Reliability: reflects the possibility of a product failing within a certain time frame;
- Conformity: degree to which the design and operational characteristics of the product comply with preestablished standards;
- Durability: involves the time frame it takes to be replaced;
- Rendered services: development, quickness, and effectiveness of the offered services before, during, and after the purchase;
- Aesthetics: the design, the color, the product's taste, and other more subjective aspects;
- Quality perception: reputation, product, or brand perceived image.

A product, often, comes with a brand. According to the American Marketing Association (AMA) a brand is a name, term, symbol/sign, or a combination of all these, which is associated with different products or services of a specific company. Customers use brands as sources of information, simplifying choices and reducing acquisition risks. They capture beliefs about the attributes and general image of the product among the clients. Manufacturers are more and more interested in selling new products under the protection of well-established brand names, familiar to consumers, increasing their acceptability (Iacobucci, 2001).

Brands allow customers to associate functionalities, images, and experiences. In a competitive market, products become more uniform; therefore, brands evolve to offer differentiated value. The success of the brand depends on associations made only in the customers' minds (**Figure 6**).

Packaging is also an important decision in the product offering. Technological improvements in packaging have made it possible to extend the shelf life of food products. Other

Figure 6 Example logos of food and agribusiness firms.

packaging has enabled consumption on the move, which can alleviate time pressures for the consumer. Innovative packaging has also addressed challenges associated with the negative impact on the environment. Renewable sources of packaging are gaining attention, such as plastics made from cane and corn.

Performing via price

Price can be defined as a relationship that indicates the amount necessary to acquire a given quantity of goods or services (Lambin, 2000). Although other variables of the marketing mix have become important recently, price still remains one of the fundamental elements in setting market share and profitability in companies. Price is also one of the most flexible elements. It can be altered quickly, unlike the other components, such as altering a product or a commitment with a distribution channel.

Even with such an importance, many companies do not set prices well. According to Kotler (1997), the most common errors are: prices overly oriented to costs, prices do not have frequent enough revision to capture market changes, and the price setting does not depend on the rest of the marketing mix and variation not according to different product items, market segments, and purchase occasions. With the information widely available for consumers via the internet, pricing strategies have become much more important and sophisticated.

Food prices are a very sensitive issue, and commodities face huge price variations. For lower income populations, the percent of their income expended on food is higher. Thus, price increases attract substantial media and consumer attention.

Performing via distribution channels (wholesalers, retailers, and logistic operators)

According to Stern *et al.* (1996), distribution channels are a group of interdependent organizations (wholesalers, retailers, and logistic operators) involved in the process of making the company's products or services available for use by customers. The emphasis is on how to plan, organize, and control alliances between institutions, agencies, and internal capabilities in companies. When dealing with channels, it is important to:

- Analyze channels for the company's products and seek new channels, defining distribution objectives, such as: market presence, type and number of points of sale, services offered, market information, product promotion, and incentives.
- Define opportunities and threats of the current distribution system.
- Define the way of entering into markets, if it will be via franchises, joint ventures or other contractual forms, or even via vertical integration; elaborate national or international contracts with distribution channels.
- Determine the annual distribution budget and implement the plan.

In food, due to perishability and the weight/value ratio of all that is being carried, distribution channels and logistics are very sensitive issues.

Performing via integrated communications

Marketing communication consists of efforts made by a company for the transmission of its information to others, seeking to influence attitudes and behaviors. More specifically, communication strives to tell the target customer segments that the right product is available, at the right price, in the right place (Perreault *et al.*, 2010). All modern organizations, private companies, and nonprofit entities, use different forms of marketing communication to promote their offerings. The communication assists firms in achieving financial and nonfinancial objectives. In setting a communication strategy, the following activities should be done:

- Identify the target public that will receive the communication and develop the desired objectives (brand knowledge, brand memory, and persuasion, among others).
- Define the communication mix that will be used: the advertisement plan, public relations and publicity plan, sales promotion plan, as well as direct marketing actions, and web activities, among others.
- Budget and possibly determine the expected return for these investments, measuring well these activities and their impact.

- It is more than just brands in the store and in advertisements, electronic communication is more pervasive and provides more opportunities for communication. For example, firms maintain their own websites and maintain fan pages on social media websites.

In food and agribusiness, communication is an issue that is receiving more media attention. Because of concerns regarding food marketing, human health, and childhood obesity, regulations in food communications are being considered and in some instances implemented.

Performing via sales force and people

The sales force are the people involved in making sales happen. Increasingly, selling is a team activity involving technical, relationship, and commercial skills. The sales force has an immense potential for raising a company's sales; however, it can ruin the whole marketing planning that was made (Zoltners *et al.*, 2001). These decisions are establishing criteria for operation of the sales force in the market, implementation of the sales force, which will be referenced as 'human resources in sales' topics, how to acquire and maintain a well prepared and motivated sales team and, finally, the ways of control in sales. The products and services offered must be attractive to both the end user and the distribution channel.

In marketing, these five blocks of decisions for performance (product, prices, channels, communications, and sales force) is what a company has to beat its competitors in and succeed in the market place. It is very important to have equilibrium in the five elements in order to build stable relationships with customers, and as a manager, keep pressure over the marketing team because markets and customers change and competitors are willing to win over these customers. This understanding is vital for food and agribusiness companies.

In food and agribusiness, the role of the sales force in crop and livestock input suppliers is a fundamental source of knowledge extension to farmers. Several studies have indicated that a company having a strong marketing orientation (that is, a company driven by demand) has better performance in the market place.

Finance

Firms use finance concepts to measure the efficiency of investments and the profitability of operational decisions. Finance is concerned with the sources and uses of cash in the business and the returns to assets (Brigham and Ehrhardt, 2009). Generally speaking, riskier investments should generate higher expected returns to investment. Thus, when agribusiness firms consider investment opportunities, the cost of financial capital is the benchmark return that the investment must return. Once investments are made, managers of agribusinesses use financial statements (income statement, balance sheet, and cash flow statement) to measure, monitor, and correct operational decisions.

Financial statements, financial metrics, and profitability analyses

There are four key financial statements that serve as the basis for tracing the financial performance of the agribusiness firm: the balance sheet, the income statement, the cash flow statement, and the statement of owners' equity. Each of these documents is typically prepared annually, with quarterly updates provided for at least earnings. Corporations are typically required to share an annual report every year with its shareholders. Nearly always these statements are available electronically from the firm's website in the 'Investor Relations' section. Preparation of these documents is completed using the Generally Accepted Accounting Principles or the International Financial Reporting standards, and is typically verified by an independent accounting firm.

Three of the statements report the operations and flow of cash for a period of time: the income statement, cash flow statement, and statement of owners' equity. The balance sheet is prepared for a particular date, and takes stock of the asset, debt, and equity position of a firm on that day. As such the balance sheet can differ substantially depending on the date of preparation in businesses dominated by seasonality, such as they often are in agriculture.

The four financial statements serve as the foundation for the basis of financial performance analysis. These historical documents assist managers in evaluating historical financial performance (trend analysis and benchmarking) and improving future financial performance.

Comprehensive analysis of the financial statements typically focuses on four key dimensions of financial performance: profitability, asset management, liquidity, and solvency. Each manager might tailor particular ratios to his or her firm, but generally aims to improve profitability and asset management while maintaining satisfactory levels of liquidity and solvency.

The most important financial metrics are return on equity (ROE) and return on assets (ROA). As the agribusiness competes for equity investments, it must generate sufficient returns to compensate investors for the level of risk incurred. Return on equity provides a benchmark ratio for which investors compare management's performance with other investment opportunities. Return on equity is impacted by the return on assets of the firm and the financial leverage used (see Section Capital structure), and is often analyzed using DuPont analysis of profitability linkage (**Figure 7**).

ROA measures the operating income generated for the investment in current and noncurrent assets. In the DuPont analysis, ROA is broken down into profit margin (or return on sales) and asset turnover. Profit margin measures the percent of revenue left to compensate financial capital. Asset turnover concerns the ability of management to generate sales (revenue) from the assets employed. Some firms pursue a low margin, high turnover strategy (often employed in retail firms). Other firms pursue high margin, low turnover strategies (often prevalent in manufacturing businesses). The ideal scenario would be to have a high margin, high turnover business.

The capital structure of the firm is concerned with the mix of debt and equity used to purchase the assets (see Section Capital structure). The financial leverage increases when more debt is used, and as a result there is more financial leverage applied to the return on assets of the business. Two broad financial concepts are of importance when considering the use of financial leverage: liquidity and solvency. The earnings leverage refers to the sharing of operating profit margin among lenders and equity holders.

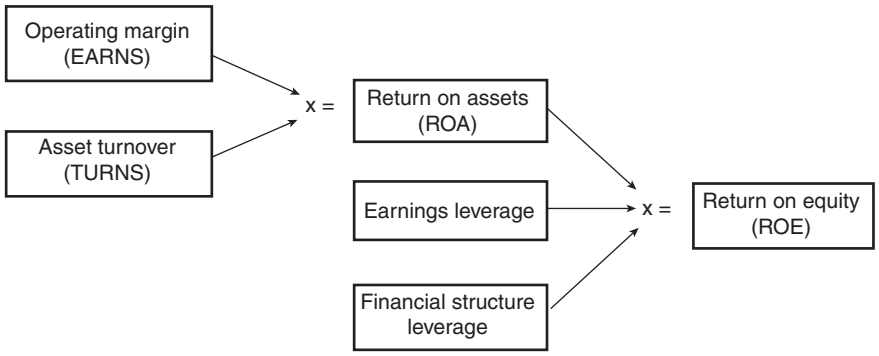

Figure 7 DuPont identity of return on equity.

Liquidity concerns the ability of the agribusiness to generate cash flows to service its debt obligations as they come due in the near term. Working capital, working capital turnover, the current ratio, and the quick ratios are all frequently employed to assess liquidity. Solvency concerns the ability of the agribusiness to meet its long-term debt obligations and is frequently measured by considering some form of the debt-to-asset ratio. Some research has considered the impacts of working capital and accrual changes on the profitability of agribusiness firms (e.g., Trejo-Pech *et al.*, 2009).

Investment analysis and capital budgeting

Agribusiness firms may seek opportunities to acquire assets to grow the business and create additional customer value. The process of evaluating these opportunities is known as investment analysis. Typically, the process involves assessing the likelihood of generating additional revenues into the future and comparing that to benchmarks for returns.

The investment analysis tool that most finance professionals would suggest using is net present value analysis (NPV) or discounted cash flow. The approach requires projection of cash inflows and outflows into the future, the determination of an appropriate discount rate, and typically some level of sensitivity analysis. The projection of cash flows typically begins with the initial outlay to acquire assets and tracks annual cash inflows and outflows related to the project. One must also make an assumption about the time frame of the project and determine a terminal (or salvage) value of the project. The lengths of projections vary, but typically are done for 5–10 or more years of cash flows.

The discount rate must be set to account for the time value of money and the required return needed to compensate the risk involved in the project. Many firms use their weighted average cost of capital (WACC) as the discount rate. This requires the project to generate sufficient returns to compensate financial capital at its current expected returns. Thus, if NPV is positive the firm should accept the project, otherwise reject the project.

Because the process is pro forma in nature, many analyses include testing the sensitivity of the results to important assumptions made in projecting the cash flows. Increased sophistication in spreadsheet programs has allowed sensitivity analysis to become rather detailed.

Firms can also choose to compute and report an internal rate of return for a project. This method uses the same techniques as the NPV analysis, but reports the discount rate that causes the NPV to be zero. This approach is appealing because it reports a rate of return that can be compared to rates of return in other investments or the hurdle rate set by company management. It has drawbacks in that some analyses may have more than one rate that causes NPV to be zero.

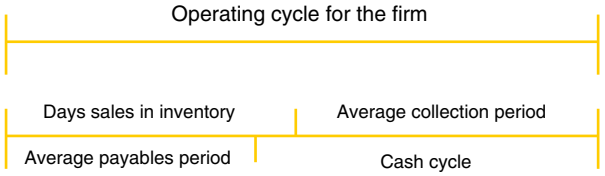

Figure 8 Operating and cash cycles for a firm.

Cash management

Short-run cash management requires agribusiness firms to have the cash necessary to settle accounts as they come due. The firm must have sufficient cash to pay suppliers, employees, management, and other expenses to continue daily operations. Typically, holding large amounts of cash to meet these needs is inefficient because cash held in checking accounts typically generates insufficient return for the firm to compensate the suppliers of cash. Investments in inventories, accounts receivable, and other current assets are additional important uses of cash that are part of operating cash flow. Firm will need to optimize investments in current assets and use of current liabilities to meet the operating needs of the firm. The management of these accounts is related to the cash conversion cycle (Figure 8).

Long-run cash management requires agribusiness firms to have sufficient cash or rapid access to sufficient cash to invest in long-term growth opportunities. Investments in fixed assets, typically termed investing cash flows, can require large amounts of additional capital to acquire the new, long-term assets.

Capital structure

The mix of debt and equity used to finance the purchase of assets is termed as firm's capital structure. The firm must balance the relatively lower cost of debt with the increased financial risk of borrowing. Firms should choose capital structure such that the WACC is minimized, which maximizes the value of the firm. An additional important consideration

in determining optimal capital structure is the tax shield benefits of using debt.

Agribusiness firms may raise financial capital in the form of debt from retail investment banks, the bond markets, and suppliers among others. The firms may also raise financial capital in the form of equity from private investors, the public equity markets, and retained earnings.

Financial risk increases as the debt-to-asset ratio increases. The increased borrowing demands greater cash flows from the business to service the debt. The increasing likelihood of the business being unable to meet the financing demands adds to the financial risk. If the business is unable to meet the demands, the borrowers will move to minimize the losses associated with a bankruptcy, i.e., dissolution of the business.

Operations

The operational activities of the firm are the set of actions taken to transform strategy and plans into deliverable products and services to generate financial and performance results (e.g., customer satisfaction). Operations activities include the full spectrum of work done in a business – running the manufacturing plant, shipping or transporting the product to the customer, sourcing the raw materials to produce the product or service, organizing and implementing the product/service sales activity, etc. Efficient and effective operations require an understanding and assessment of, for example, costs and cost components, product and work force flow scheduling and logistics, inventory management, sales and customer relationship management, selecting and managing the workforce, and capital access and financial management.

Economies of scope and scale

Firms often benefit from being large in terms of their assets and revenues. This happens because short-run fixed costs can be spread out over greater units sold, thus reducing overall average cost per unit. Firms of substantial size may gain cost advantages relative to smaller peers, particularly in industries with large fixed costs. Production of agricultural grain commodities exhibits this feature as land and equipment represent substantial costs. The same can be said for many agribusiness firms, particularly those involved in manufacturing and research and development activities.

Economies of scale refer to the cost advantages accrued to spreading the fixed costs of producing and marketing a singular product. Economies of scope concerns the ability of spreading shared fixed costs over the production and marketing of two or more products. Because many agribusiness sectors have large fixed costs, one often notes that the market has characteristics of a natural monopoly. Rapid consolidation in many sectors has left some with just a few firms operating in an oligopoly. Even in agriculture, the size of farms has grown as the number of farms has declined and acreage farmed has been held steady for about a century (Figure 9).

Logistics

Given the highly perishable nature of many agricultural products, regional production of some widely distributed products and the biological processes that govern agricultural production, excellent logistical management is very important for most agribusiness sectors. Moving products through time and space so that they reach the end consumer is the essence of logistics. Optimizing logistics focuses on reducing waste (shrinkage), minimizing transportation costs, and ensuring timely delivery.

Given that many agricultural products are very perishable, such as raw milk, many sectors are dominated by time specificity. Products must reach the end consumer when they are most desirable and useful, within a relatively limited period of time. Delays can cause enormous losses to the product.

Many agricultural sectors are dominated by complex distribution systems, which further complicate logistics. This interdependent network can delay important customer feedback along the supply chain. For example, many manufacturing sectors, such as farm equipment manufacturers, rely on others to distribute their products to the end users. Farm

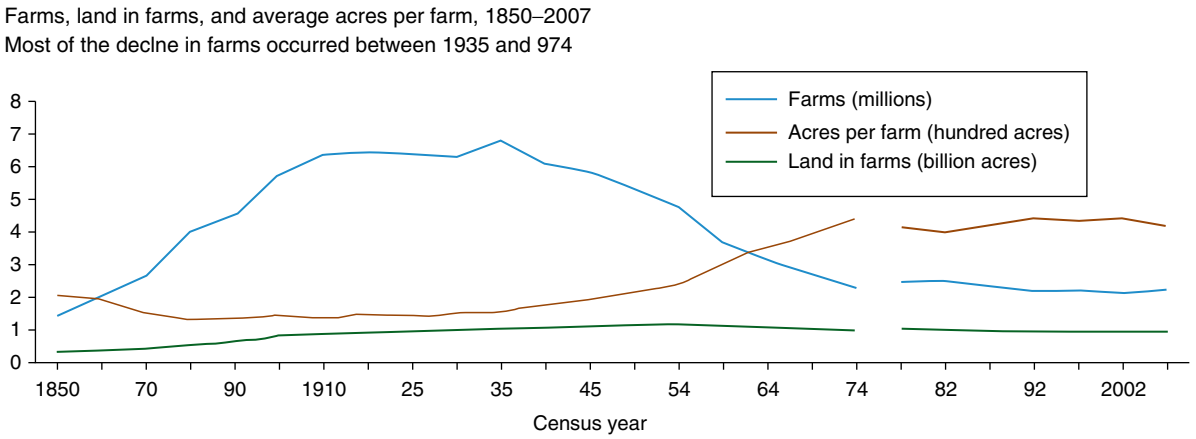

Figure 9 Farms, land in farms, and average acres per the US farm, 1850–2007. The break in the lines after 1974 reflects the introduction of an adjustment to estimates of the farm count and land in farms. Beginning in 1978, the data are adjusted to compensate for undercoverage by the Census of Agriculture. For more information, see Allen (2004). Reproduced with permission from Hoppe, R.A., Banker, D.E., 2010. Structure and Finances of U.S. Farms: Family Farm Report, 2010 Edition, EIB-66, July. U.S. Department of Agriculture, Economic Research Service, compiled from Census of Agriculture data.

equipment retail has been dominated by independent, equipment dealerships that have regional operating territories. To address the lack of communication between end user and manufacturer, increasingly sophisticated technology is being used on tractors to assess performance in the field. Specifically, engine sensors on farm equipment can transmit data for use by the producer, equipment dealership, and equipment manufacturer. This stronger integration of information across the value chain has the potential to greatly enhance the ability of the manufacturer to address user concerns as and when they arise.

Inventory management

Inventory management can play a large role in the success of agribusinesses. Production along the entire chain, particularly in the grain sectors, is dominated by the weather. As a result seasonality has a large impact on inventory management. Agribusiness firms growing seed for future crops must predict several years in advance to have the correct hybrids on hand for agricultural producers.

Inventory management should minimize total inventory costs by considering both carrying costs and opportunity costs. The carrying costs of inventory include the cost of storage facilities and equipment, the interest cost of inventory investment, and shrinkage of inventory. The opportunity costs of inventory are largely composed of missed sales due to insufficient inventory on hand to meet customer demands.

Inventory management can be complicated by the distribution channel. Given that each stage of the supply chain will hold inventories, communication along the chain will be critical in managing inventories of the sector.

Statistical process control and process mapping

Many agribusiness firms use statistical process control to assist with managing quality of products and services (Deming, 1982). Examples of process control include Total Quality Management and Six Sigma initiatives in these firms. The objective is to minimize waste in the production and processing of goods by ensuring that outputs meet certain specifications. One of the distinctive challenges faced by agribusinesses is the uncertainty surrounding the biological processes of production. This makes statistical process control both more challenging and more critical in the success of the value chain. In producing row crops, substantial data is collected and analyzed to help ensure large yields. For example, producers obtain information regarding nutrient health for soil samples. Pests and weeds are closely monitored and addressed as necessary.

Process mapping can also help to ensure the safety and quality of food as it moves through the value chain to the end consumer. In the food processing industries statistical quality control helps to reduce the incidence of foodborne pathogens. For example, food processors use Hazard Analysis and Critical Control Points (HACCP), International Organization for Standardization (ISO) certifications, and Clean in Place (CIP) processes to ensure food safety. The Food and Drug Administration and the US Department of Agriculture (USDA) work together to enforce HACCP systems in the meat and juice systems, whereas many other food industries voluntarily use the systems. The systems require firms to identify, set limits for, and monitor points in the production process at which control can be applied.

Human Capital Management

Human capabilities are essential for agribusinesses to transform assets and raw inputs into products and services that create value for consumers. Successful agribusiness firms have grown beyond the sole proprietorship with just one or two employees to become large, complex organizations that require communication and coordination to execute the firm's operational, financial, marketing, and research and development strategies. Managers throughout the organization need leadership skills to motivate and retain valuable employees. Firms often create a division of human resources to assist with identifying needed competencies and responsibilities of employees and employee competency development.

Organizational structure

As a firm moves beyond an entrepreneurial owner–operator size to a larger, more complex organization, frequently a corporate organizational structure emerges. The organizational structure varies by firm needs, but typically there is a hierarchy of responsibility and authority. At the top of the organizational structure is the President/Chief Executive Officer of the firm, which is hired by a board of directors to lead all functions of the business. Many firms then organize the structure around functional areas. They do so by having a senior manager (often with the title, vice-president) in charge of each functional area, who would report to the CEO. Many of these vice-presidents would have titles such as chief marketing officer, chief financial officer, and chief operating officer, among others. Additional members of the senior leadership team would be added as specific to the firm, such as a vice-president for human resources, vice-president for research and development, or a chief information officer. Firms might also have each of these roles for significant geographical areas or other market segments. One potential drawback to this particular structure is that the functional areas become silos that do not collaborate well with each other.

For the largest organizations the structure might become very complex. Each vice-president might have additional mid-level managers reporting to them that would be responsible for specific divisions within the functional role. These mid-level managers are termed middle management and can serve as a pool of candidates for senior leadership. Additional layers of management may be added between senior management and 'frontline' employees (i.e., factory line workers, sales and service representatives, etc.). The number of layers between the president and frontline employees is an indication of whether the firm has a vertical or flat reporting structure. Vertical structures are very hierarchical with clearly delineated reporting and authority relationships. Flatter structures tend to empower lower-level employees to a greater degree, which might negatively impact firm performance if the employees make poor choices.

Skills and competencies

Employees must come equipped with the requisite skills and competencies needed to maximize the efficiency and

effectiveness of physical assets used by the firm. Employees must be able to execute the implementation plan as it relates to the agribusiness's strategy. To do so, the agribusiness firm will attempt to share knowledge across employees and generations of employees. This can be a challenge though, as some knowledge is explicit whereas other knowledge is tacit. Explicit knowledge can easily be communicated from one person to another by writing it down. Explicit knowledge is often shared in user manuals and company onboarding programs.

Tacit knowledge was first identified by Michael Polanyi. In *Personal Knowledge*, Polanyi (1962) suggests that skills such as riding a bike and hitting a nail with a hammer are difficult to communicate in written form. Rather, the learner must acquire this knowledge by performing the action. Activities in the agribusiness firm that require tacit knowledge can be acquired through training programs that allow the learner to practice the skill in a low risk setting. Strong need exists for experiential learning in agribusiness given the tacit nature of much knowledge in agriculture.

Leadership

As employees move from a frontline role up the organizational structure, they may become managers and acquire direct reports. Direct reports are employees for whose actions the manager is responsible. Becoming a manager requires employees to develop a set of skills that will allow them to motivate their direct reports to maximize productivity for the firm.

Empirical studies by Lombardo and Eichinger at Korn/Ferry International have led to the Lominger Leadership Architect. This leadership development program identifies 67 competencies that are part of eight factors and 21 clusters (**Figure 10**). The eight factors are strategic skills, operating skills, courage, energy and drive, organizational positioning skills, personal and interpersonal skills, trouble with people, and trouble with results. The clusters help to identify skills that are closely related. Many of the competencies identified in the Lominger Leadership Architect are closely related to the development of the managers and executive leaders of food and agribusiness firms.

Currently, little empirical research has been done in the food and agribusiness industries to identify the application of these principles. The opportunities are abound as there has been documented need for additional human capacity to manage and lead the food and agribusiness sectors. Some data indicate, however, that an agribusiness talent gap exists and that the demand for professionals in the sector exceeds the amount of graduates from colleges of agriculture in the United States (USDA National Institute of Food and Agriculture). The USDA issued a report indicating that between 2010 and 2015 an estimated 54 400 jobs would be created annually in agricultural, food, and renewable natural resources. Only approximatey 29 300 students, however, are expected to earn degrees in traditional agriculture and life science-related fields during that same time span.

Human capital development

Firms often invest in the most recent technology for their physical capital. To gain the maximum benefit of this technology, the human capital employed by the firm must be able to implement and exploit this technology. Thus, large firms invest in educational programs for their employees that equip them with additional skills and competencies they may not have had when joining the firm. The ongoing educational, development, and training programs serve to strengthen the organization and its strategic mission.

As agribusiness firms move beyond training for frontline employees, they may begin to invest in educating employees to analyze and address complex problems. Very large agribusiness firms have learning and development departments that create and execute such programs. Some agribusinesses may turn to executive education programs offered by university and consulting firms. For example, the Center for Food and Agricultural Business at Purdue University partners with agribusiness firms to design, develop, and deliver such programs.

In addition to firm investments in human capital, individuals may choose to invest in their own education. One frequently acquired credential is the master of business administration or, specific to agribusiness professionals, a master of agribusiness. For example, Kansas State University offers a Master of Agribusiness degree focused on management education for agribusiness professionals. Other universities offer courses on agribusiness in their more general MBA programs (**Table 3**).

Entrepreneurship, Innovation, and Research and Development

Innovation is essential for meeting changing consumption patterns and improving efficiency along the food chain. Innovation is needed among input suppliers, plant and animal agricultural producers, food distributors, and food retailers to satisfy consumers. Efficiency will come from diffusion and knowledge transfer. When properly produced and used, agricultural inputs help farmers improve yields of high quality products that allow consumers safer, more wholesome, and cheaper food. When considering animal and plant production, agribusinesses need to work in tandem with producers to increase land productivity, shorten plant production cycles, increase efficiency in land operation and management, search for lower environmental impact technologies, have more efficient and conservative soil operations, have localized and adapted solutions and use renewable energy sources for fueling the high energy demanding agricultural activities. Feeling the pressure for more environmental friendly, healthier, and distinguished products, the agro-industry has invested on ecological packing, products with different or enhanced flavor, products that satisfy appetite and work as medicines or cosmetics. The food retail innovation brings us to supermarkets promoting new buying experiences, such as tasting areas, new ways to offer the products, offering complete solutions, increasing benefits for consumers, supermarkets becoming a place of knowledge transfer, where the consumers learn about the products they eat, becoming a place where the industry communicates with its final consumers. Supermarkets are trying to regain some market share that they have been losing to foodservice, such as restaurants, by adding more of the home meal replacement strategies.

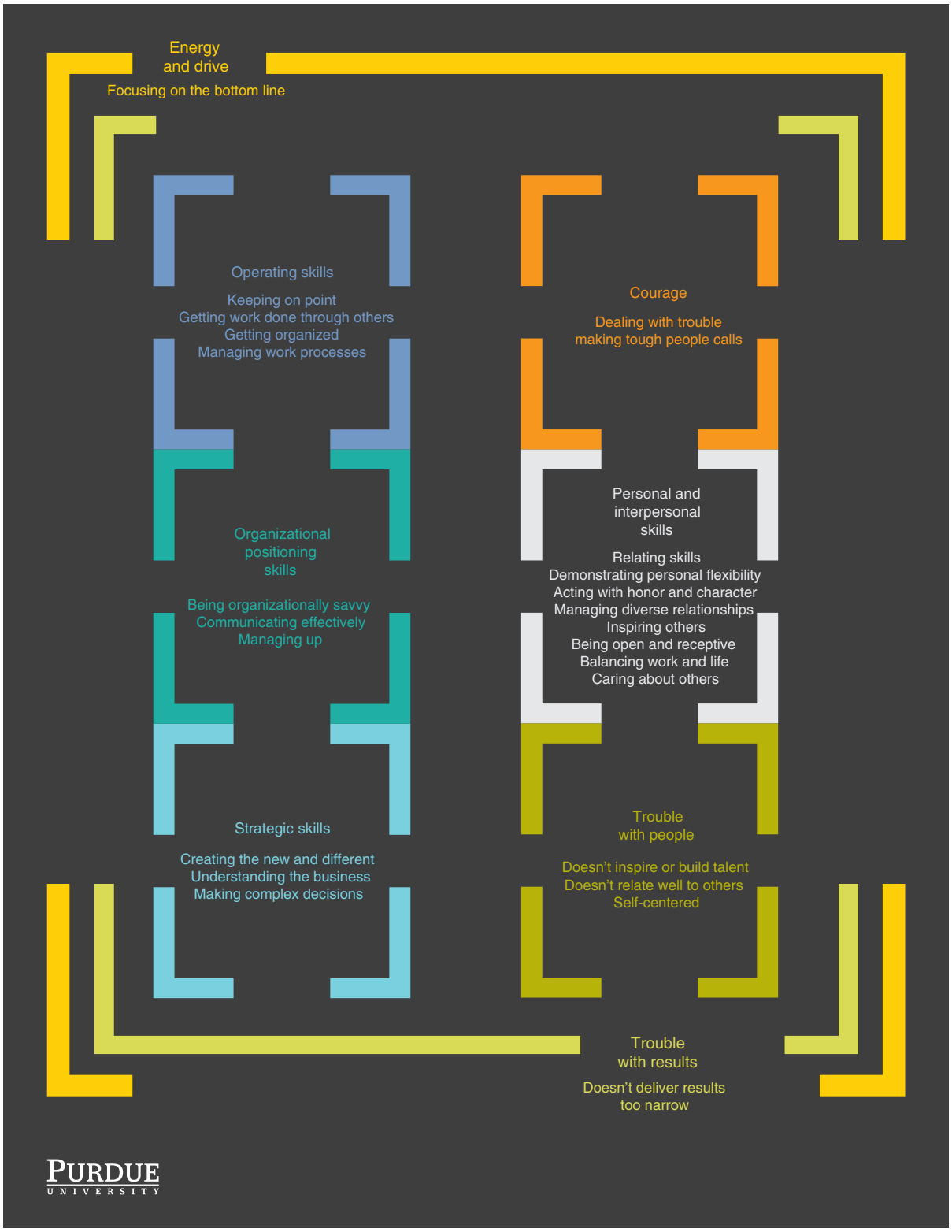

Figure 10 Library structure based on concepts from Lombardo, M., Eichinger, R.W., 1994. FYI: For Your Improvement, A Guide for Development and Coaching, fourth ed. Lominger Ltd Inc.

Entrepreneurship and entrepreneurs

Entrepreneurship is the capacity and capability to identify new business opportunities and to successfully bring that opportunity to market and generate superior (or at least acceptable) financial performance. Entrepreneurs are commonly perceived as risk-takers – they embrace new ideas and are

Table 3 Educational programs in agribusiness management

University	*Country*
Purdue University	USA
Kansas State University	USA
University of Florida	USA
Harvard University	USA
Santa Clara University	USA
Texas A&M University	USA
Wageningen University	The Netherlands
Zamorano	Honduras
INCA	Costa Rica
University of Sao Paulo	Brazil
University of Buenos Aires	Argentina
INSEAD	France and Singapore
MAPP (Denmark Arhus School of Business)	Switzerland
Massey	Australia
University of Pretoria	South Africa
Indian Institute of Management	India
Nanjing Agriculture University	China

willing to encounter financial losses or other exposures to introduce them to the market. In reality entrepreneurs are uniquely skilled at identifying, managing, and mitigating the risks of their new ventures. McGrath and MacMillan (2000) suggest that entrepreneurs have five fundamental characteristics:

1. Passionately seek new opportunities
2. Pursue opportunities with focused discipline
3. Pursue only the very best options – prioritization is critical to success
4. Focus on execution – the entrepreneur doesn't just stop with invention or discovery
5. Engage broad participation in their venture – an inventor may work alone with few collaborators, but a successful entrepreneur is skilled at engaging a large set of participants to bring the new idea to market

McGrath and Macmillan (**Figure 11**) provide more specificity concerning the skills and capabilities critical to successful entrepreneurship.

Innovation and research

Innovation is critical to the long-term success of a firm as well as the economic health of an industry and the overall economy (Gertner, 2008). Brown and Teisberg (2003; p. 1) state that "Innovation is the lifeblood of successful businesses. […] [It] has become every firm's imperative as the pace of change accelerates." Indeed, innovation is a strategy to develop and maintain a sustainable competitive advantage.

Innovation can be a product, a service, a process, a new business model, or a management system that solves a problem and has impact. The food and agribusiness sector is no stranger to innovation. Over the past 150 years, there have been several waves of innovation related to machinery, chemistry, seed, information management, food, restaurants, and services.

In addition, innovation is and will remain essential in the food and agribusiness sector to respond to the critical concerns of society such as new consumer demands, climate change and global warming, food/energy scarcity and security, environmental challenges, and resource use/sustainability. In a recent study by McKinsey on innovation and resource productivity to meet the world's future energy, materials, food, and water needs, four of the top ten opportunities are in the agricultural sector, presenting excellent opportunities for profitability new business ventures: increasing yields on large-scale farms, reducing food waste, increasing yields on smallholder farms, and reducing land degradation.

A key issue in agribusiness R&D and innovation is the length and complexity of the value chain and the challenge is in bringing innovations from the input end of the chain created by the physical and biological sciences of engineering, genetics, nutrition, biotechnology, and nanotechnology to successful market acceptance and adoption at the retail and restaurant (foodservice) consumer end of the value chain. This issue is compounded by the dramatic changes recently in the end uses (bio-fuels, industrial products, etc.) of agricultural raw materials and the development of new value chains in the bio-economy.

The degree of innovativeness – 'new to the world' products compared to incremental 'repositioning' of products – also has a significant impact on structural entry barriers. Disruptive/radical discontinuous innovation by a new entrant can facilitate entry by:

1. Use of new/different resources/inputs, thus challenging the incumbent's control of essential resources;
2. Dramatically lowering the cost of production/distribution; and
3. Introducing superior performing or lower cost products that offset the switching costs of current customers and attract noncustomers.

The long-term implications are for significant challenges to incumbent agricultural production technology firms, as well as product processing firms, as renewable biological-based raw materials become the feedstock not just for food and fiber end-users (the old customers), but for the health/pharmaceutical and industrial products end-users (the new customers) as well.

Managing research and development

Selection of R&D projects: after identifying innovative ideas, a key challenge is to select which ideas will be pursued as part of the R&D portfolio. Most organizations find that they have several good ideas but lack the framework required to select and convert the best ideas into new revenue. With regard to selection criteria, Roucan-Kane (2010) found that food and agribusiness executives prefer (in decreasing order of importance) projects with low risk of technical/regulatory failure, low relative market risk, short-term to market, in-house capability, and high costs already incurred. This work suggests that strategies to manage the risk of technical/regulatory failure and market acceptance merit serious consideration (**Figure 12**).

One way to manage the technical/regulatory and market risk is to select a portfolio of innovation projects with varying degrees of risk as suggested by McGrath and MacMillan (2000). Boehlje *et al.* (2011) illustrate the use of the McGrath

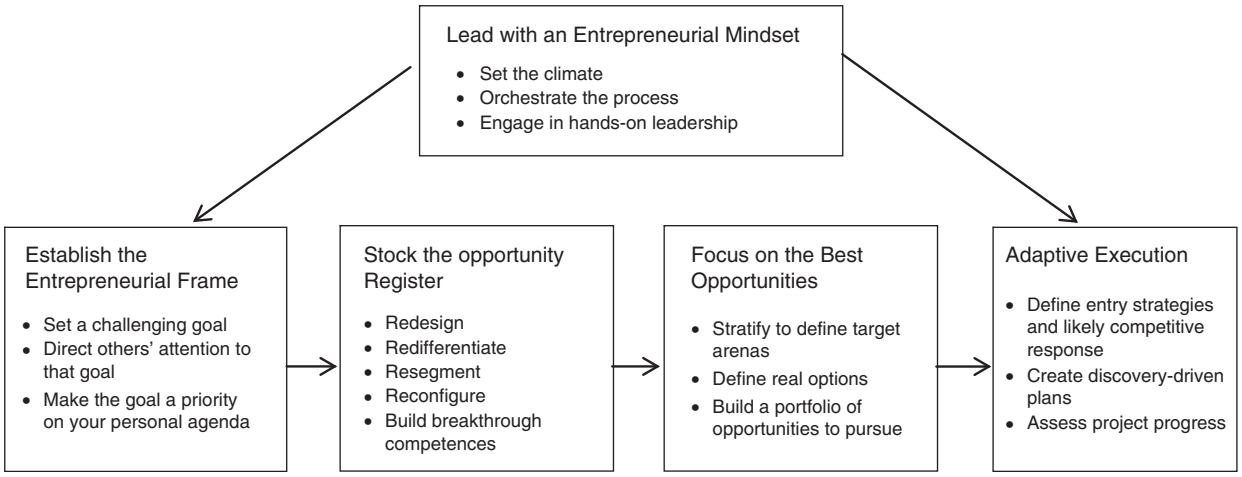

Figure 11 Essentials of entrepreneurial strategy.

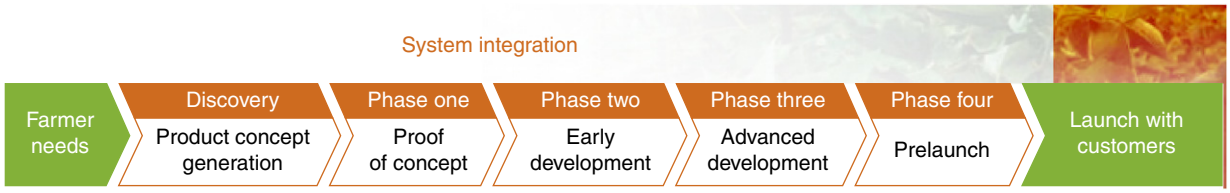

Figure 12 Monsanto's research and development pipeline.

and MacMillan 'portfolio of options' framework to Deere and Company's innovation projects (Figure 13). The framework suggests a diversified portfolio of positioning, stepping stone, and scouting options along with platform and enhancement launches to manage market and technical uncertainties.

Roucan-Kane studied the portfolio of innovation projects for food and agribusiness companies using the same criteria as described earlier. Her survey results indicated that companies tend to diversify their innovation projects in terms of time to market and cost already incurred. They favor projects that are done in-house, and that are not characterized by significant risk of technical/regulatory failure or high relative market risk.

Managing the R&D pipeline: the selection of R&D projects should be regularly reviewed as uncertainty is resolved and new projects enter the pipeline. Cooper's stage-gate process (Cooper, 2001) proposes a structure to continuously analyze the portfolio of innovations and increase the likelihood of success in an uncertain world. His process features five innovation stages: scoping, building a business case, developing, testing and validating, and launching. Each stage (and sometimes within a stage) ends with a gate where the resource allocation and the prioritization of projects is reviewed and changed if needed.

Deere and Company calls its stage gate processes the Enterprise Product Development Process (EPDP) and the Accelerated Innovation Process (AIP). EPDP focuses on incremental innovations, ensuring that these innovations reach the quality standards Deere has set before the product is launched. AIP is targeted toward radical innovations with the use of selection methods such as strategic buckets, structured assessment, and economic models.

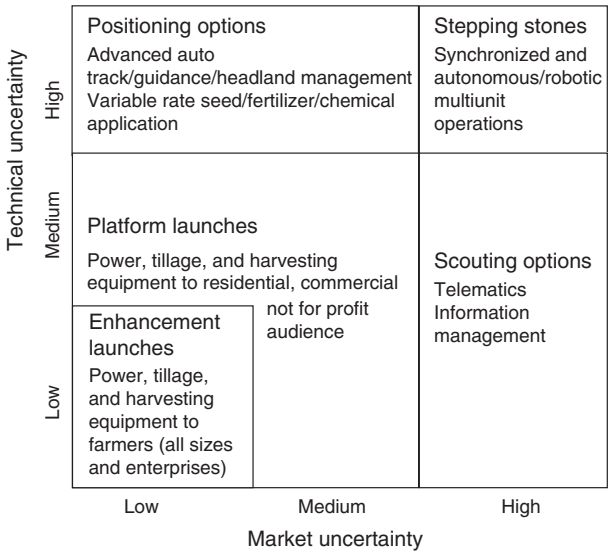

Figure 13 Deere portfolio of innovations. Adapted from Boehlje, M.D., Roucan-Kane, M., Broring, S., 2011. Future agribusiness challenges: Strategic uncertainty, innovation and structural change. International Food and Agribusiness Management Review 14 (5), 53–82.

Conclusions

The purpose of this article is to discuss contemporary topics in food and agribusiness with a focus on definition of agribusiness, description of the global agribusiness environment,

and a discussion on the roles in managing an agribusiness firm. Managers in the agribusiness sector need to be aware of the interrelated subsectors that work together to provide goods and services to global consumers. To be successful in the sector, managers must be able to competently integrate skills and capabilities in the areas of strategy, marketing, finance, operations, human capital, entrepreneurship, and innovation.

See also: Agricultural Cooperatives. Agricultural Finance. Agricultural Labor: Demand for Labor. Agricultural Labor: Supply of Labor. Changing Structure and Organization of US Agriculture. Climate Change, Society, and Agriculture: An Economic and Policy Perspective. Consumer-Oriented New Product Development. Crop Insurance. Farm Management. Food Chain: Farm to Market. Food Marketing. Intellectual Property in Agriculture. International Trade. Markets and Prices

References

Aaker, D.A., 1995. Strategic Market Management. New York, NY: John Wiley and Sons.

Allen, R., 2004. How to interpret new demographic information in the preliminary 2002 census of agriculture release. Paper Presented at the 2004 Agricultural Outlook Forum. Arlington, VA, February 19–20, 2004. Available at: http://ageconsearch.umn.edu/bitstream/33028/1/fo04al02.pdf (accessed 16.04.14).

Apgar, D., 2007. Risk Intelligence. Cambridge, MA: Harvard Business School Press.

Boehlje, M.D., 1999. Structural changes in the agricultural industries: How do we measure, analyze and understand them? American Journal of Agricultural Economics 81 (5), 1028–1041.

Boehlje, M.D., Roucan-Kane, M., Broring, S., 2011. Future agribusiness challenges: Strategic uncertainty, innovation and structural change. International Food and Agribusiness Management Review 14 (5), 53–82.

Brigham, E.F., Ehrhardt, M.C., 2009. Financial Management: Theory and Practice. Mason, OH: South-Western Cengage Learning.

Coase, R.H., 1937. The nature of the firm. Economica 4 (16), 386–405.

Cooper, R.G., 2001. Winning at New Products: Accelerating the Process from Idea to Launch, third ed. Reading, MA: Perseus Books.

Davis, J.H., Goldberg, R., 1957. A Concept of Agribusiness. Cambridge, MA: Division of Research, Graduate School of Business Administration, Harvard University.

Deming, W.E., 1982. Out of the Crisis. Cambridge, MA: The MIT Press.

Garvin, D.A., 1987. Competing on the eight dimensions of quality. Harvard Business Review 65, 101–109.

Gertner, J., 2008. Mad Scientist. Fast Company. February. Available at: http://www.fastcompany.com/641126/mad-scientist (accessed 16.04.14).

Gray, A.W., Boehlje, M.D. 2005. Risk sharing and transactions costs in producer–processor supply chains. Choices, 4th Quarter, pp. 281–286. Available at: http://farmdoc.illinois.edu/policy/choices/20054/theme2/2005-4-13.pdf (accessed 01.09.13).

Harrigan, K.R., 1988. Joint ventures and competitive strategy. Strategic Management Journal 9 (2), 141–158.

Iacobucci, D., 2001. Quantitative marketing research. In: Iacobucci, D. (Ed.), Kellogg On Marketing. New York, NY: Wiley, pp. 195–211.

Kotler, P., 1997. Marketing Management: Analysis, Planning, Implementation, and Control. Upper Saddle River, NJ: Prentice Hall.

Lambin, J., 2000. Market-Driven Management. Houndmills, England: Macmillan Press.

McGrath, R.G., MacMillan, I.C., 2000. The Entrepreneurial Mindset: Strategies for Continuously Creating Opportunity in an Age of Uncertainty. Boston, MA: Harvard Business School Press.

Murcott, A., 1986. You are what you eat – Anthropological factors influencing food choice. In: Ritson, C., Gofton, L., McKenzie, J. (Eds.), The Food Consumer. New York, NY: Wiley.

Perreault, W.D., Cannon, J.P., McCarthy, E.J., 2010. Basic Marketing: A Marketing Strategy Planning Approach, eighteenth ed. New York, NY: McGraw-Hill/Irwin.

Polanyi, M., 1962. Personal Knowledge. Chicago, IL: University of Chicago Press.

Roucan-Kane, M., 2010. How do food and agribusiness companies select their product innovation projects? PhD Thesis, Purdue University, Agricultural Economic Department.

Schumpeter, J.R., 1942. Capitalism, Socialism, and Democracy. New York, NY: Harper and Brothers.

Sonka, S.T., 2011. JBS United and the Future: Too Many Opportunities. West Lafayette, IN: Center for Food and Agricultural Business, Purdue University.

Sonka, S.T., Hudson, M.A., 1989. Why agribusiness anyway? Agribusiness 5, 305–314.

Stern, L., El-Ansary, A., Coughlan, A., 1996. Marketing Channels, fifth ed. Upper Saddle River, NJ: Prentice Hall.

Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. Strategic Management Journal 18, 509–533.

Trejo-Pech, C., Weldon, R.N., Gunderson, M.A., House, L.A., 2009. The accrual anomaly in the food supply chain. Agribusiness: An International Journal 25 (4), 1–13.

Williamson, O.E., 1979. Transaction-cost economics: The governance of contractual relations. Journal of Law and Economics 22 (2), 233–261.

Zoltners, A.A., Sinha, P., Zoltners, G.A., 2001. The Complete Guide to Accelerating Sales Force Performance. New York, NY: Amacom.

Zook, C., 2010. Profit from the Core. Boston, MA: Bain and Company.