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This book is an ideal text for all courses on management in the agribusiness industry.

The work is fully supported by a Companion Website which provides users with additional materials such as multiple choice questions, discussion questions, and PowerPoint slides for each chapter.

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John Foltz is Chair of the Department of Animal Sciences at the Ohio State University, U.S.

Elizabeth A. Yeager is an Associate Professor in the Department of Agricultural Economics at Kansas State University, U.S.

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Sixth Edition

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Agribusiness Management

SIXTH EDITION

Freddie L. Barnard, John Foltz, Elizabeth A. Yeager, and Brady Brewer

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building the industry–institution interface and the use of case studies in the classroom. Foltz cowrites a bimonthly management column for *Feed and Grain* magazine. Professor Foltz received his Bachelor's and Master's degrees from the Ohio State University. Upon graduation, he worked as a district manager for Ralston Purina in Ohio and Pennsylvania marketing livestock feed and animal health products. Subsequently, he received his Ph.D. in agricultural economics from Purdue. John and his wife Barbara have two sons, John and James, who live in the state of Washington with their families.

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DR. BRADY BREWER

Brady Brewer is an Assistant Professor in the Department of Agricultural Economics at Purdue University. Brady has taught classes in management, finance, marketing, economics, and strategy. His research agenda includes the broader topics of agribusiness and profitability, agricultural finance, and production/supply chain issues at the farm level. His Extension program includes educating farmers on credit concerns and lending, working with the agricultural banks across the state, and conducting executive education courses for agribusiness in finance and strategy. Before joining the faculty at Purdue, Brady spent three years in the Department of Agricultural and Applied Economics at the University of Georgia. Brady grew up on a family farm in Oklahoma that raised wheat, soybeans, alfalfa, and cattle. He received a B.S. in agricultural economics and accounting from Oklahoma State University and later earned both his M.S. and Ph.D from Kansas State University in agricultural economics.

Preface

INTRODUCTION

This is an incredibly exciting time to be involved in the food and agribusiness industries. International markets are an inseparable reality for agribusiness managers. Information technology and the Internet make entirely new models for conducting business both possible and practical. Biotechnological developments raise exciting and challenging business and policy issues. Relationships among players in this system have continued to evolve and, as a result, the food production and marketing system is far more complex and interrelated today than it was a mere decade ago. Add to this the challenge of feeding an estimated 9 billion people on Earth by 2050—and agriculture and agribusiness will continue to be the nexus of attention!

This rapidly changing, highly volatile, international, high-technology, consumer-focused world is the one in which today's food and agribusiness managers operate. This edition of *Agribusiness Management* was written to help prepare students and managers for a successful career in this new world of food and fiber production and marketing.

WHAT'S NEW

The basic objective of this text has not changed through six editions: to provide students and managers a fundamental understanding of the key concepts needed to successfully manage businesses, adding value to farm products and/or providing inputs to production agriculture. While there are many concepts in this book that will apply to the farm or production agriculture business, the text is focused on the food and input supply sectors of the food production and marketing system.

This edition of *Agribusiness Management* uses four specific approaches to help readers develop and enhance their capabilities as agribusiness managers. First, this edition of the book offers a contemporary focus that reflects the issues that food and agribusiness managers both face today and likely will face tomorrow. Specifically, food sector firms and larger agribusiness firms receive more attention in this edition, reflecting their increasing importance as employers of food and agribusiness program graduates. Second, the book presents conceptual material in a pragmatic way with illustrations and examples that will help the reader understand how a specific concept works in practice. Third, the

book has a decision-making emphasis, providing contemporary tools that readers will find useful when making decisions in the contemporary business environment. Finally, *Agribusiness Management* offers a pertinent set of discussion questions and case studies that will allow the reader to apply the material covered in real-world situations.

More specifically, the opening section of the text has been updated to help students better understand the current food and agribusiness marketplace, as well as management and basic economic principles as they apply to that environment. The second section includes chapters on forms of business organization and international agribusiness management, which is an area no contemporary book on agribusiness can ignore. In the third section, we start our discussion on the four functional areas of management: marketing, finance, supply chain, and human resources. Ultimately, all business activity revolves around the customer, and the text reflects this customer-oriented philosophy. The marketing management section has been substantially revised to reflect the current thinking in this area. The finance section has also received a complete overhaul, and includes chapters on financial reporting and analysis, with increased emphasis on credit analysis and management. The fifth section, supply chain management, was updated and rewritten to reflect the current thinking in this area. Finally, the human resource section was rewritten and expanded, again to reflect what we now know about managing people.

Preparing for a new food and agribusiness market requires application of concepts and tools to current situations. This edition of *Agribusiness Management* ends every chapter with discussion questions that either are new or have been revised for this text. Also included are cases that cover a variety of situations and types of firm. We feel you will find this mix of cases to be a distinguishing feature of the book.

The bottom-line on this sixth edition of *Agribusiness Management*: this book is contemporary, solid on the fundamentals, practical, and applicable. It provides students and adult learners with an essential understanding of what it takes to be a successful agribusiness manager in today's rapidly evolving, highly unpredictable marketplace.

THE AUDIENCE

Agribusiness Management was written for students. There are tremendous career opportunities in the food and agribusiness industries. In this book, you will be exposed first to the breadth of these opportunities, from research and development manager for a biotech company, to a logistics manager for a major food retail organization. You need to understand the marketplace and some of the unique institutional features of the food production and marketing system before embarking on a career as an agribusiness manager. Preparing for a career in agribusiness management also requires that you understand the fundamentals of management—the basic tasks of planning, organizing, directing, and controlling and the basic functions of marketing, finance, operations and logistics, and human resource management. In this book you will find all of these topics covered in a straightforward way. And, we hope the many food and agribusiness examples and case studies bring these concepts to life for you. This is a book you will continue to use as a reference as your managerial career unfolds.

Agribusiness Management was written for managers and soon-to-be-managers who are already in the workforce. We have had the opportunity over the past 30 years to work with literally thousands of managers through the activities of the Center for Food and Agricultural Business at Purdue University. Most of the case studies and examples in this book come from these industry relationships and interactions. As the business environment changes, and as people assume new responsibilities, we see a need to retool in areas that an individual has not recently been applying in their job. For example, the production manager in a food processing firm who has been asked to serve on a task force focused on helping the firm become more customer oriented may need a "refresher" in marketing management. These individuals (and corporate learning and development directors and training managers) will find this book useful in sharpening their skill set.

Agribusiness Management was written for instructors. Over time, we have found that every instructor has his or her own take on what an agribusiness management course should look like. Some are introductory courses, others have more of a capstone orientation. Some of these courses are part of an entire curriculum in agribusiness management. In other cases, a program may offer only a course or two in the agribusiness area. The organization of this book is structured in a way that instructors will find convenient when developing their course, wherever that course fits in the program's overall curriculum.

An instructor could easily use the material in this edition over a single semester, or over two semesters or a three-quarter course, covering each topic in more detail. Some instructors will find that moving through the book from start to finish sequentially as part of a one-semester course makes the most sense. Others may drop chapters on specialized topics like international business or human resource management, because these topics are covered in other courses. For an advanced course, the book has plenty of rigor. Supplemented with outside case studies, this is an excellent text for a capstone-type course where the material here would be covered more quickly, and more time spent on some of the more advanced ideas. The new and updated cases and the discussion questions will be of value to all instructors as they serve the needs of students hungry for applications and illustrations of the concepts and tools covered in the book.

OUTLINE OF THE BOOK

In Part 1, Scope, functions, and tasks, we focus on the food and agribusiness industries and the role of the agribusiness manager. In addition, a set of economic concepts of fundamental importance to agribusiness managers is covered. Part 1 exposes readers to the tremendous variety of firms that comprise the food production and marketing system. The core focus of this book is the four functional areas of management: marketing, finance, supply chain, and human resources. Readers will better understand the role that managers of food and agribusiness firms play as they execute the four tasks of management: planning, organizing, directing, and controlling.

Part 2, Organization and context, leads readers toward better understanding the context or environment in which agribusiness managers operate by taking them inside the

different forms of business organization, including cooperatives given their prominence in the food and agribusiness markets. This section also provides a glimpse into the issues an agribusiness manager must face when doing business outside of the U.S. The challenges of serving international markets, of sourcing raw materials from international locations, and of competing with international firms have all emerged as key issues in the past decade. Looking to the future, this area promises to be even more important.

We begin our look at the four functional areas of management in Part 3 with marketing management. This section covers the fundamental concepts and tools an agribusiness manager uses in identifying a target market, and taking a product-service-information offering to the market. The marketing mix—product, price, promotion, and place—is covered in some detail. In addition, important tools for marking marketing decisions are discussed. All of this material is presented in the context of the strategic marketing planning framework.

Financial management is the focus of Part 4, starting with basic financial statements, and moving through financial ratios, financing the agribusiness, and on to tools for making operating and capital investment decisions. This section addresses the fundamental elements of finance that any agribusiness manager should understand. A series of integrated examples, and clear explanations of key terms, will help you better understand the language and concepts of finance. More importantly, you will better understand how to use financial information when making managerial decisions.

Part 5 looks at supply chain management. This section takes you into areas such as production planning, total quality management, and logistics management. Production/operations and supply chain management in agribusiness firms have undergone a profound change over the past two decades. Accordingly, these two chapters will provide a fundamental understanding of the key elements in this important area.

Finally, in Part 6, human resource management, we look at key issues involved in managing a firm's people resources. First, we explore issues around organizational structure and leadership. Then, we turn our attention to the personnel functions of hiring, training, evaluation, and compensation of employees. The final section—the issues surrounding the human resource area—is likely the most pressing of all to an agribusiness firm facing a rapidly changing operating environment.

ACKNOWLEDGMENTS

Any large project involves an equally large number of individuals, and this book is no exception. First, we want to acknowledge the work done on previous editions of this textbook by Drs. Steven P. Erickson, David D. Downey, Jay T. Akridge, and Frank J. Dooley. Their work provided the foundation for the sixth edition. Dr. Erickson passed away before the third edition of this book was published. He was a brilliant, award-winning educator, who received numerous teaching awards, including the American Agricultural Economics Association's Distinguished Undergraduate Teaching Award and the Charles B. Murphy Award for Outstanding Undergraduate Teaching (Purdue's highest teaching award). Dr. David D. Downey is Professor Emeritus of Purdue

University. As a professor of agricultural sales and marketing at Purdue, Dr. Downey taught courses in agri-selling and agri-marketing strategy to undergraduate students from several disciplines. He was instrumental in the development of a curriculum in which students could earn a four-year B.S. degree in agri-sales and marketing—the first such program in the U.S. Dave received much recognition for professional excellence, including four major teaching awards from Purdue University and two national awards from the American Agricultural Economics Association. Dr. Jay T. Akridge is currently Provost at Purdue University and is the former Glen W. Sample Dean of Agriculture at Purdue. Prior to being named Dean, Dr. Akridge was the James and Lois Ackerman Professor of Agricultural Economics and served as director of the Purdue Center for Food and Agricultural Business and the M.S.-M.B.A. in food and agribusiness management. He has received several awards for teaching including the Charles B. Murphy Award for Outstanding Undergraduate Teaching—Purdue's highest teaching award—and the USDA Food and Ag Science Excellence in Teaching Award. He was added to the Purdue University Book of Great Teachers in 2003. Dr. Frank J. Dooley is currently Vice Provost for Teaching and Learning and Professor of Agricultural Economics at Purdue University. He has won 19 awards for outstanding teaching and advising, including the Agricultural and Applied Economics Association Outstanding Undergraduate Teacher and the Charles B. Murphy Outstanding Undergraduate Teaching Award from Purdue University. He is also an active presenter in programs at the Center for Food and Agricultural Business.

Second, we need to acknowledge the role of both students and managers we have worked with for the past 35 years. Their input, comments, and suggestions have played an important role in shaping the ideas and presentation of this text. Third, we sincerely appreciate the students enrolled in the undergraduate agribusiness course at Purdue University during previous semesters, who took the time to review and comment on the chapters, discussion questions, and case studies contained in this textbook.

Finally, we sincerely appreciate the sacrifices made by our families; since the time spent revising this textbook was time that would have otherwise been spent at home and with family members. Their sacrifice and understanding enabled the authors to spend the time required for this textbook revision to become a reality.

SUMMARY

This is an exciting time in the food and agribusiness marketplaces. And, it is an exciting time to be preparing for or retooling for a career in these industries. We have tried to capture some of that excitement in *Agribusiness Management*. We hope that you find this book readable and interesting, challenging and pragmatic, and most of all helpful as you better prepare yourself or your students for successful careers in the food production and marketing system.

PART 1

Agribusiness management

Scope, functions, and tasks

PHOTO PART 1 Productive, diverse, efficient: this section explores today's food, production agriculture, and input supply sectors. Photo courtesy of USDA.

CHAPTER 1

The business of agribusiness

OBJECTIVES

- Describe management's role in agribusiness
- Provide an overview of the functional responsibilities of management
- Describe the unique characteristics of the food and agribusiness industries
- Describe the size, scope, and importance of the food production and marketing system
- Understand the farm-food marketing bill and what it means to producers and consumers
- Provide an overview of the food sector, the production agriculture sector, and the input supply sector
- Outline trends in home and away-from-home food consumption, and trends among the types of firms that serve these markets
- Explore the production agriculture sector, and some of the key changes occurring on U.S. farms
- Outline the major inputs used by the production agriculture sector and key trends in input use
- Understand the types of firms involved in producing and distributing inputs to production agriculture

INTRODUCTION

It is exciting and diverse. It is changing quickly. It relies on the weather, uses an incredible array of technology, is tied in every way to our natural resources, and embraces the world. If you eat, you are involved in it as a consumer of its final products. If you farm, you are involved in it as a producer of the raw materials that ultimately make their way to the end consumer. *It* is the extremely efficient, very complex, global, food and fiber production and marketing system.

This system is vast and it is fascinating: the next time you walk through your local grocery store, think about the number and type of diverse activities involved in growing,

harvesting, transporting, processing, and distributing food throughout the 50 states in the United States, and, more broadly, our world. The process by which a 260-pound hog moves from Carroll County, Indiana to a suburban superstore in Los Angeles (now in the form of a hot dog in a pre-packaged children's meal) is very complex, yet it occurs every day in the food production and marketing system.

This food production and marketing system is made up of thousands of businesses, ranging from the small cow-calf producer in western Kentucky, to some of the largest corporations in the world. And, it is ***management*** that drives and directs the firms, farms, and food companies that come together in the food production and marketing system. A retail supermarket, a major corn processor, the local farm supply store, and a family farmer each have a person or a group of people responsible for making sure that things get done. These are the ***managers***. Their titles range from chief executive officer to president to foreman to son or daughter or spouse. However, wherever they are found within an organization, managers are responsible for ensuring successful completion of the functions, tasks, and activities that will determine an organization's success.

This book, *Agribusiness Management*, focuses on the management of food, fiber, and agribusiness firms. We will take a careful look at food and agricultural business management and our definition of food and agricultural businesses is quite broad. So, when we use the term ***agribusiness management*** in the text, remember that we are talking about the management of any firm involved in the food and fiber production and marketing system. Our discussion of agribusiness management in this book provides information, concepts, processes, ideas, and experiences that can contribute to your effectiveness in performing the functions and tasks of agribusiness management.

This chapter will first introduce you to the key functions of agribusiness management. Then, we will explore some of the characteristics that make the food and agribusiness markets unique places to practice the art and science of management. The ever-changing food and agribusiness industries are then discussed. We will look at firms that (1) move final products through the food and fiber system to the ultimate consumer, (2) transform raw agricultural products into the final products desired by consumers, (3) produce raw food and fiber products, and (4) supply inputs to the farm or production sector.

THE KEY FUNCTIONS OF MANAGEMENT IN AGRIBUSINESS

As you can imagine, the responsibilities of managers in agribusiness are highly varied and can range from ordering inputs for the year ahead, to hiring and firing individuals, to making the decision to sell a multi-billion-dollar international subsidiary. A chief executive officer, for instance, is responsible for the overall activities of a large, diversified food or agribusiness firm. In such firms, teams of managers are likely responsible for specialized areas within the firm. In a smaller farm business, one individual may assume roles ranging from chief executive officer, to manager, to laborer, managing multiple projects at different levels simultaneously.

To better understand the form and process by which managers perform the tasks that are required to create and sustain a viable business, the practice of management can be broken down into four key functions:

- Marketing management
- Financial management
- Supply chain management
- Human resource management

Ultimately, no matter how large or small the firm, managers have responsibilities in each of these areas. These four functions of management are explored in some detail in this book. However, it is important to have a basic understanding of each area as we develop our understanding of agribusiness management.

Marketing management

Marketing, in a broad sense, is focused on the process by which products flow through the U.S. food system from producer to final consumer. It involves the physical and economic activities performed in moving products from the initial producer through intermediaries to the final consumer. ***Marketing management*** involves understanding customer needs and effectively positioning and selling products and services in the marketplace. In agribusiness, marketing management is a key function within each of the sectors of agribusiness: the food sector, the production agriculture sector, and the input supply sector. Marketing management represents an integration of several different activities: selling, advertising, web page design, promotions, marketing research, new-product development, customer service, and pricing—all focused on customer needs, wants, and, ultimately, the quest for customer satisfaction.

It is this function of management that is most closely focused on the end-user, or the consumer/customer of the product or service produced. It is often argued that without satisfied customers effectively reached through marketing and sales, no business could successfully operate. Thus, marketing management plays a fundamentally important role in most food and agribusiness firms. Marketing management is focused on careful and planned execution of how, why, where, and when to sell a product or service, who sells it, and to whom it is sold. Decisions here include what products to produce, what services to offer, what information to provide, what price to charge, how to promote the product, and how to distribute the product.

This management function is closely tied to the customer's decision processes, and buyers differ widely in the food production marketing system—from teenagers for a food manufacturing firm, to a soybean processor for a farmer, to a large integrated swine business for an animal health firm. The ways in which agribusiness buyers—all of the buyers just mentioned and many more—make a purchase decision continue to evolve and change.

Financial management

Profit is the driver for agribusinesses as they work to generate the greatest possible returns from their resources. Successful achievement of this objective means making good decisions, and it means carefully managing the financial resources of the firm. ***Financial management*** is involved in these areas and includes generating the data needed to make good decisions, using the tools of finance to make effective decisions, and managing the assets, liabilities, and owner's investment in the firm.

Financial information allows managers to understand the current "health" of the firm as well as to determine what actions the business might take to improve or grow. ***Balance sheets*** and ***income statements*** can provide a wealth of information useful in making decisions. Financial analysis provides agribusiness managers with insights upon which to better base decisions. The tools of finance such as budgeting, ratio analysis, financial forecasting, and breakeven analysis can be used by agribusiness managers to develop long-range plans and make short-run operating decisions.

Another way in which the financial agribusiness scene continues to change is in the sourcing of funds. Agribusiness firms are increasingly accessing larger amounts of funds or money from national and international capital and financial markets. To be competitive in those markets, firms must generate rates of return comparable to other industries. In the past, small agribusiness companies may have been allowed by local lenders to exhibit only modest financial performance. Today, the national and international financial markets expect performance in agriculture comparable to that in other industries if they are going to provide the agribusiness sector the funding needed for expansion, growth, consolidation, technological advancement, and modernization.

The sheer amounts of funds needed to finance future operations of a company will continue to increase dramatically. So will the need for managers who understand the tools and techniques used to source and manage those funds. For most agribusinesses, financial management will be a critical component of agribusiness management.

Supply chain management

New technologies and concepts are rapidly hitting the workplace. This, in turn, changes the way agribusinesses do what they do. The push for quality, the drive for lower costs, changes in the supply chain, and general pressures to be more efficient in meeting consumer demands are swiftly altering the production and distribution activities of agribusiness. ***Supply chain management*** focuses on these areas and provides the tools managers need to meet these operational and logistical challenges. As a result, supply chain management has come to the forefront as a key management function for the agribusiness manager.

Operations management focuses on the direction and the control of the processes used to produce the goods and services that we buy and use each day. It involves several interrelated, interacting systems. Operations management involves the strategic use and movement of resources. For instance, a snack food factory begins its process with corn from a food-grade corn producer and ends with tortilla chips, corn chips, crackers, etc.

Managers must worry about issues of scheduling, controlling, storing, and shipping as the corn moves from the producer's truck to the supermarket.

Logistics management involves the set of activities around storing and transporting goods and services. Shipping and inventory costs are huge costs of doing business for many food and agribusiness firms. The logistics management function is focused on new ways to lower these costs, by finding better ways to ship and store product. Given advances in information technology, the analytical tools of supply chain management, and improved shipping technologies, this has been a dynamic area for food and agribusiness firms. In addition, the growth of global markets depends upon the performance of well-managed supply chains.

Successful agribusinesses are those who consistently produce faster, better, and cheaper. The management of logistics in food and agricultural supply chains will become increasingly focused on building such time-based advantage. Quicker responses to consumer needs, faster delivery times, shorter product development cycles, and more rapid recovery after service problems are all components of time-based advantage in supply chain management. At the same time, there is an incredible push for quality, safety, and integrity in food system production processes. Effective supply chain management will continue to be crucial in the successful execution of any strategic plan for agribusiness firms.

Human resources management

In the end, management is about people. Without the ability to manage the human element—the resources each business has in its employees—businesses do not succeed. When combining efficient management of the marketing/finance/supply chain functions of the business with the thoughtful management of the human side of the business, managers are on the road to successful implementation of their strategy.

Agribusiness managers who can manage people well can significantly impact both productivity and financial success. ***Human resources management*** encompasses managing two areas: the mechanics of the personnel administration, and the finer points of motivating people to offer and contribute their maximum potential. Decisions here include how to organize the firm, where to find people, how to hire them, how to compensate them, and how to evaluate them.

Today's lean agribusiness firms continue to demand more performance from their managers, sales force, and service and support personnel. For instance, in addition to superb selling skills, sales representatives will be expected to have intimate knowledge of technology and a fundamental understanding of the general management problems of their producer customers. Service personnel must be able to maintain increasingly complex equipment. Technical support staff will need to be experts at assimilating and using the massive amount of production data that a large dairy farm or crop farm using site-specific management practices will generate.

These types of demands will require agribusinesses to hire individuals with greater initial skills as well as with the ability to grow into different jobs throughout the course of their careers. Agribusinesses will need to be flexible while providing continuing education and development of key skills. Some examples of such skills are general business,

negotiation, problem-solving, technical, information management, and communication. Recognition of raw ability and the development and fine-tuning of these skills and abilities will be the human resource challenge. Managed well, that challenge will profitably produce for the company. And, this is the role of human resource management in the food and agribusiness firm.

UNIQUE DIMENSIONS OF THE FOOD AND AGRIBUSINESS MARKETS

It may be easy to argue that management theory and principles are the same for any type of business enterprise. The largest businesses in the country such as General Electric and Walmart and the smallest one-person agribusiness are guided by many of the same general principles. And, in many cases, good management is good management, regardless of the type of firm, or the market it is operating in.

Yet key differences between large and small businesses or between agribusinesses and other types of firms arise in the specific business environment facing the organization. Although there are similarities between the markets facing General Electric's wide range of businesses, they also differ substantially. The automotive industry is different from the retail industry. Likewise, the unique characteristics of the food production and marketing system cause management practices to differ for agribusiness firms. Our job is to better understand the similarities and differences in the functions and tasks of a food and agribusiness manager compared to other managers.

As a professional, the manager might be compared to a physician. The knowledge and principles of medicine are the same, but patients differ in such vital details as age, gender, body mass index, and general health. The physician's skill is to apply general medical principles to the specific individual to create the optimal outcome for the patient given the unique set of circumstances at hand. The manager, utilizing specific tools of marketing, financial, supply chain, and human resource management, must attempt to solve the problem at hand and create the best outcome for the firm: long-term profitability.

Food and agribusiness markets differ from other markets in at least eight key ways, influencing the business situation in which food and agribusiness managers must practice. Although one can find examples of other industries where each point is important (for example, seasonality is important to toy companies), combined these factors form the distinguishing features of the food and agribusiness marketplace.

Food as a product

Food is vital to the survival and health of every individual. Food is one of the most fundamental needs of humans, and provides the foundation for economic development—nations first worry about feeding their people before turning their attention to higher-order needs. For these reasons, food is considered a critical component of national security. And, as a result, the food system attracts attention from governments in ways other industries do not.

Biological nature of production agriculture

Both crops and livestock are biological organisms: living things. The biological nature of crops and livestock makes them particularly susceptible to forces beyond human control. The variances and extremes of weather, pests, disease, and weeds exemplify factors that greatly impact production. These factors affecting crop and livestock production require careful management. Yet, in many cases, little can be done to affect them outright. The gestation cycle of a sow and the climate requirements of wine grapes provide examples.

Seasonal nature of business

Partly as a result of the biological nature of food production, firms in the food and agribusiness markets can face highly seasonal business situations. Sometimes this seasonality is supply driven—massive amounts of corn and soybeans are harvested in the fall. Sometimes this seasonality is demand driven—the market for ice cream has a series of seasonal peaks and valleys, as do the markets for turkey and cranberries. Such ebbs and flows in supply and demand create special problems for food and agribusiness managers.

Uncertainty of the weather

Food and agribusiness firms must deal with the vagaries of nature. Drought, flood, insects, and disease are a constant threat for most agribusinesses. All market participants, from the banker to the crop production chemical manufacturer, are concerned with the weather. A late spring can create massive logistical problems for a firm supplying inputs to the crop sector. Bad weather around a key holiday period can ruin a food retailer's well-planned promotional event.

Types of firms

There is tremendous variety across the types of businesses in the food and agribusiness sectors. From farmers to transportation firms, brokers, wholesalers, processors, manufacturers, storage firms, mining firms, financial institutions, retailers, food chains, and restaurants—the list is almost endless. Following a loaf of bread from the time it is seed wheat prepared for shipment to the farmer until its placement on the retail grocer's shelf involves numerous types of business enterprises. The variety in size and type of agribusinesses, ranging from giants like ConAgra to family farms, shapes the food and agribusiness environment.

Variety of market conditions

The wide range of firm types and the risk characteristics of the food and agribusiness markets have led to an equally wide range of market structures. Cotton farmers find themselves in an almost textbook case of the perfectly competitive market where individual sellers have almost no influence over price. At the same time, Coca-Cola and PepsiCo

have a literal duopoly in the soft drink market. Some markets are global, others local. Some markets are characterized by near-equal bargaining power between buyer and seller, whereas others may be dramatically out of balance in one direction or the other.

Rural ties

Many agribusiness firms are located in small towns and rural areas. As such, food and agribusiness are likely the backbone of the rural economy and have a very important role in rural economic development.

Government involvement

Due to almost every other factor raised above, the government has a fundamental role in food and agribusiness. Some government programs influence commodity prices and farm income. Others are intended to protect the health of the consumer through safe food and better nutrition information. Still other policies regulate the use of crop protection chemicals, and affect how livestock producers handle animal waste. Tariffs and quotas impact international trade. School lunch programs and the Supplemental Nutrition Assistance Program (SNAP) help shape food demand. The government, through policies and regulations, has a pervasive impact on the job of the food and agribusiness manager.

Each of these special features of the food production and marketing system affects the environment where an agribusiness manager practices their craft. Agribusiness is unique and, thus, requires unique abilities and skills of those involved with this sector of the U.S. economy.

THE FOOD PRODUCTION AND MARKETING SYSTEM

The highly efficient and effective ***food production and marketing system*** in the U.S. is a result of a favorable climate and geography; abundant and specialized production and logistics capabilities; intensive use of mechanical, chemical, biological, and information technologies; and the creative and productive individuals who lead and manage the firms which make up the food and agribusiness industries. This U.S. food production and marketing system produces enormous supplies of food and fiber products. These products not only feed and clothe U.S. consumers, but are also exported to the international marketplace to fulfill needs of consumers around the world.

The food production and marketing system encompasses all the economic activities that support farm production and the conversion of raw farm products to consumable goods. This broad definition includes a farm machinery manufacturer, a fertilizer mine, a baby food factory, the paper firm that supplies cardboard boxes, rail and trucking firms, wholesalers, distributors, and retailers of food, restaurateurs, and many, many others.

The U.S. food production and marketing system is extremely large, directly employing almost 13 million workers, generating $922 billion worth of value-added products

and services in 2018 (Table 1.1). The output of this system as total value-added production represents 4.5 percent of the Gross Domestic Product (GDP) of the U.S. economy.

Note that the U.S. economic activity also includes the contributions of firms providing inputs to the farm, forestry, and fisheries sectors. In 2013, $251.7 billion of energy, materials, and purchased inputs were used by agriculture and related ventures, representing 1.5 percent of GDP (Table 1.1). In addition, the food and agribusiness sectors are key contributors to the economic activity of transportation, wholesaling, and retailing in the U.S.

TABLE 1.1 Contribution of the food and agricultural industries to the U.S. economy, 2018

	Value added to GDP(billion $)	*% Share of U.S. GDP*	*Number of FTE workers(000)*	*% Share of total U.S. employment*
U.S. GDP	$20,580.2		137,428	
Farms	$129.6	0.63%	698	0.51%
Forestry, fishing, and related activities	$36.9	0.18%	523	0.38%
Food and beverage and tobacco products	$268.9	1.31%	1,814	1.32%
Textile mills and textile product mills	$18.9	0.09%	220	0.18%
Apparel and leather and allied products	$9.2	0.04%	137	0.12%
Food services and drinking places	$458.7	2.23%	9,507	6.92%
Total for food and agricultural industries	$922.2	4.48%	12,899	9.39%
Total inputs for agriculture, forestry, fishing, and hunting	$251.7	1.50%		
Energy inputs	$25.3	0.15%		
Materials inputs	$163.5	0.98%		
Purchased inputs	$62.9	0.38%		

FTE, full-time equivalent

Source: U.S. Department of Commerce 2015

Food and agricultural systems vary widely across the globe. Countries with higher per capita GDP (over $25,000) typically have a lower proportion of their population (under 3 percent) involved in production agriculture (Table 1.2). In contrast, the characteristics of the less developed countries include a lower GDP per capita and a higher proportion of the population involved in production agriculture. In China, 28 percent of the population is involved in farming, whereas in India the figure is 47 percent. The continued economic growth of these countries is fueling a tremendous demand for additional inputs, as well as branded food products. As a result, many U.S. firms are attempting to establish joint ventures with firms in these countries to aid in this development process, and build future markets in the process.

TABLE 1.2 Indicators of U.S. agriculture sector efficiency

Country	*GDP per capita,[a] 2017 U.S. $*	*% Labor force in agriculture[a]*	*% of GDP in agriculture[a]*	*Averagefarm size in acres[b]*	*% Personal consumption expenditures spent on food consumed at home, 2013[c]*
United States	59,800	0.7	0.9	434.0	6.7
Argentina	20,900	5.3	10.8	1,279.5	20.7
Australia	50,400	3.6	3.6	7,501.4	10.0
Brazil	15,600	9.4	6.6	180.3	15.7
Canada	48,400	2.0	1.6	778.0	9.5
China	16,700	27.7	7.9	1.5	26.1
Egypt	12,700	25.8	11.7	2.6	37.4
Germany	50,800	1.4	0.7	111.9	12.0
India	7,200	47.0	15.4	3.4	29.6
Japan	42,900	2.9	1.1	4.8	13.6
Mexico	19,900	13.4	3.6	50.0	25.1
South Korea	39,500	4.8	2.2	4.3	13.4
Spain	38,400	4.2	2.6	59.3	13.8
United Kingdom	44,300	1.3	0.7	140.8	9.3

Source: [a]Central Intelligence Agency 2019; [b]Food and Agriculture Organization 2015; [c]Clauson 2014

Farm size varies dramatically, even among developed countries (Table 1.2). Geography or limited farmland, climate, crop or livestock focus, or simply the area needed to maintain a viable production unit helps explain this variation. This has important implications for the types of agricultural inputs needed in different parts of the globe. A 7,500-acre wheat farmer in Australia has much different expectations and needs from equipment and technology than a Chinese farmer on his or her two-acre plot.

The overall efficiency of the U.S. food and fiber sector is illustrated by the proportion of personal consumption expenditures allocated to food consumed at home. For the average U.S. consumer, less than 7 percent of their total personal consumption expenditures are for food consumed at home (Table 1.2). In Japan this figure is about 14 percent, whereas food accounts for almost one-third of an Indian consumer's personal consumption expenditures. The efficiency of the U.S. food production and marketing system is really quite remarkable. Consider this: with 8.3 percent of the world's agricultural land and 4.4 percent of the world's population, the U.S. food system produces 14 percent of the world's livestock and 14 percent of the world's crops (FAO 2015). In 2010, the U.S. produced 35 percent of the world's soybeans, 39 percent of the corn, 16 percent of the cotton, and 9 percent of the wheat.

A primary requirement for being a successful agribusiness manager is a solid understanding of this food production and marketing system. Regardless of what specific part of the food system you work in, it is important to understand what happens to food and fiber products both before they reach your firm, and after they leave your firm and head to the consumer.

PHOTO 1.1 Income spent on food by a country's people is heavily influenced by the agricultural production technologies in use. Photo courtesy of USDA Natural Resources Conservation Service.

The farm-food marketing bill—a perspective on the system

An important part of understanding agribusiness comes from understanding just how and what consumers spend on food. In 2017, American consumers spent over $1 trillion on food for at home and away-from-home consumption—up 118 percent from the $535 billion spent in 1993 (Figure 1.1). A better understanding of just what that spending is all about comes from looking at the farm-food marketing bill.

The ***farm-food marketing bill*** breaks down the proportions of the consumer's food dollar that go to the farmer for raw products and to the food industry for "marketing" those raw farm products to end consumers (ERS, USDA 2019b). Marketing includes the value added from processing, packaging, transportation, retail trade, food services, energy, financial and insurance, and other categories to make agricultural products ready for the consumer. In 2017, for every dollar spent on food, $0.85 was spent on marketing the product, while $0.15 went to the farmer (Figure 1.2).

From 1993 to 2017, the farm share of the marketing bill rose from $94 to $170 billion, while the marketing share increased from $441 billion to $999 billion (Figure 1.1). This long-term trend reflects continuing increases in farm productivity (which keeps farm prices relatively low), the increase in consumer demand for convenient, highly processed food products, increases in food consumed away from home, and increases in prices for many components of the marketing bill including labor, transportation, and energy. In turn, this fuels the steady widening of the food marketing bill as compared to the farm value of consumer food expenditures.

Figure 1.3 identifies the value added to the consumer food dollar in 2017 by 11 different industry sectors. The farm and agribusiness share only represents 7.8 cents

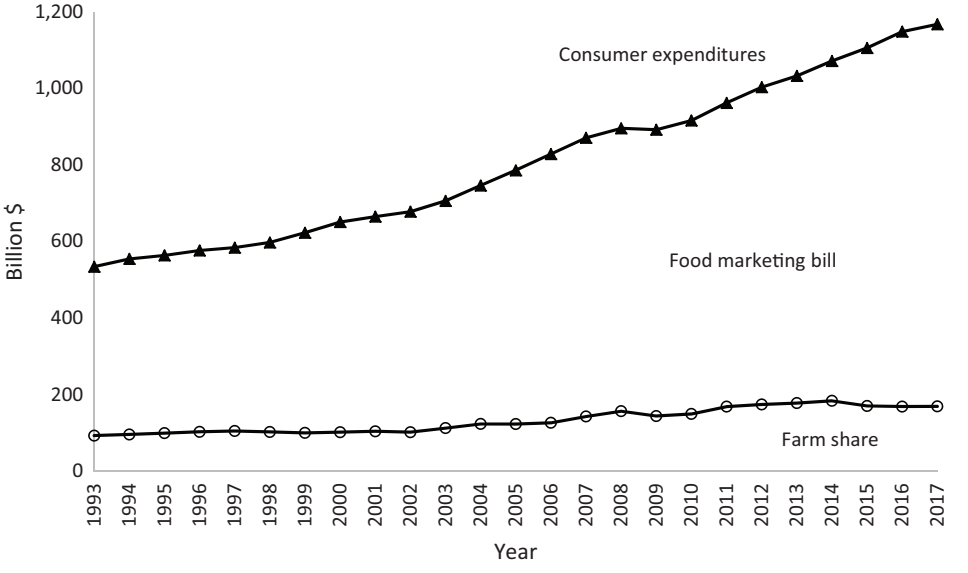

FIGURE 1.1 Farm share and the marketing bill for consumer food expenditures, 1993–2017. Source: ERS, USDA 2019a.

FIGURE 1.2 2017 Farm-food marketing bill. Source: ERS, USDA 2019b. Source: ERS, USDA 2019b.

FIGURE 1.3 Industry sector value-added for the 2017 food marketing bill. Source: ERS, USDA 2019.

of each consumer food dollar, net of farm costs (ERS, USDA 2019b). The wholesale trade, retail trade, and food services sectors contribute over half of the value added to the consumer food dollar, at 9.1, 12.6, and 36.7 cents, respectively. The food processing sector is 15 cents of each food dollar. The 18.8 cents for all other sectors suggests that the impact of the food and agribusiness sector as defined in Table 1.1 is undervalued. Yet without the contribution of transportation, energy, packaging, or advertising, the product would not reach the end consumer.

In the food dollar accounts, the 11 industry sectors that transform agricultural commodities to food products use four main factors of production to add value. The four are salary and benefits, property income, output taxes, and imports. At 50.5 cents per food dollar, salary and benefits comprise almost half of the food dollar (Figure 1.4). The 35.3 cents of property income represents payments for machinery, equipment, structures,

FIGURE 1.4 Factor payments for the 2017 food dollar. Source: ERS, USDA 2019b.

natural resources, product inventory, or other assets that compensate the various owners for services provided (ERS, USDA 2019b). The remainder of the 2017 food dollar is split between the U.S. government for taxes and imports or international assets.

THE THREE PRIMARY SECTORS OF THE FOOD SYSTEM

The U.S. food production and marketing system, for purposes of discussion in this text, is divided into three sectors: the food sector, the production agriculture sector, and the input supply sector (Figure 1.5).

We start with the ***food sector***. This is the sector in which food processing, marketing, and distribution occur (Figure 1.5). Here we have firms such as Kraft, Hormel, Kroger, and McDonald's, as well as thousands of other firms, large and small. This group closely tracks consumer tastes and preferences, adapting to meet changing needs.

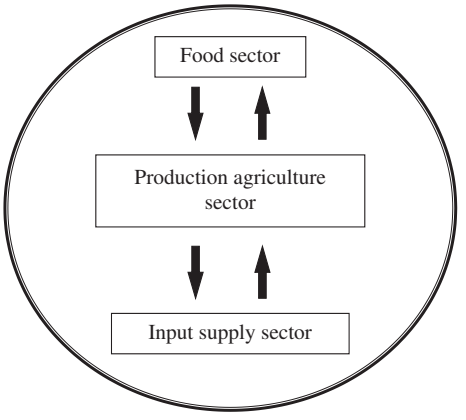

FIGURE 1.5 The food production and marketing system.

Next in line is the ***production agriculture sector***. Purchased inputs, natural resources, and managerial talent are combined to produce crop and livestock products. Agribusinesses in this sector vary in size, number, and focus: from the local grower selling strawberries to neighbors to the 100,000-head cattle feedlot; from the rice farmer in Louisiana to the canola grower in North Dakota; from the pork producer in North Carolina to the mega-dairy in Arizona.

The food production and marketing system ends (or begins) with the many, varied activities that take place in the ***input supply sector***. This sector is responsible for providing the thousands of different inputs—both products and services—to production agriculture. Firms here include DuPont, Syngenta, John Deere, DeLaval, or your local cooperative, as well as hundreds of other firms that manufacture and distribute the inputs that farmers and ranchers need in their businesses. Let's take a closer look at each of these sectors.

THE FOOD SECTOR

At some point, it all comes down to getting raw farm commodities processed, packaged, distributed, and sold to the consumer. A very wide variety of processing and marketing firms are responsible for adding value or utility to commodities as they leave the farm gate. We will start our look at the food sector with food retailers and away-from-home food firms. Then, we will look at wholesaling firms, food manufacturers and processors, and assembly and transportation firms. We will end this section with a focus on the linkages across firms in the food sector, and between the food sector and the other sectors in the food production and marketing system.

Food retailing

The food retailing sector accounts for 12.6 percent of the value added to the consumer food dollar (Figure 1.3). No longer is food moved just through the typical supermarket, for the food retailing sector has fragmented since the late 1980s. Food store formats are classified into three general categories: grocery stores, supercenters, or other food stores.

The grocery category includes traditional supermarkets, as well as convenience stores, superettes and small grocery stores, and specialty food stores (such as meat markets, fish markets, or bakeries). The category of warehouse clubs and supercenters was first dominated by warehouse stores such as BJ's Wholesale Club or Costco. More recently, growth in this sector has been driven primarily by Walmart and Target. Other food stores include food retailed via mass merchandisers, drug stores/combination stores, mail-order, home-delivered food, and farmers' markets. Key attributes for some of the most common store formats are briefly described (Elitzak 2015):

- *Supermarket:* the conventional prototype typically carries about 15,000 items in a 10,000- to 25,000-square-foot store.
- *Superstore:* at least 40,000 square feet in size, which leads to a greater variety (25,000 items) of products, especially non-food items. The strategy is to promote the convenience of one-stop shopping, by providing additional service and selection.

- *Convenience store (without gasoline):* a small grocery store, selling a limited variety of basic foods, snack foods, and nonfood products, typically with extended hours. Grocery products account for 45 percent of sales. Ready-to-eat and fountain beverages represent about 10 percent of sales. Packaged liquor, beer and wine, and tobacco products account for another 35 percent of sales.
- *Warehouse Club Stores:* no-frills, membership-based, wholesale–retail hybrid outlets. These "box stores" serve both small businesses and individual consumers in a large warehouse-style environment. Grocery products (in large and multipack sizes) account for about 30 percent of sales. General merchandise (clothing, electronics, small appliances, and automotive products) accounts for 70 percent of sales. Following a low-price strategy, these stores typically stock fast-moving, non-perishable products, carrying 6,000–12,000 items in stores from 10,000 to 15,000 square feet.
- *Supercenter:* a large combination supermarket and discount general merchandise store, averaging 170,000 square feet of floor space. Grocery products account for up to 40 percent of floor space.

Total food store sales have climbed from approximately $300 billion in 1997 to over $630 billion in 2018 (Figure 1.6). In 1984, grocery stores accounted for 93 percent of food sales, while warehouse club and supercenter sales were inconsequential. Since then sales at warehouse clubs and supercenters have steadily increased, accounting for 26 percent of food sales in 2018. This growth has largely come from an erosion of sales at supermarkets, whose market share of the food dollar for at-home consumption has fallen

PHOTO 1.2 There are a variety of retail store formats competing for the business of U.S. food consumers. Photo courtesy of USDA.

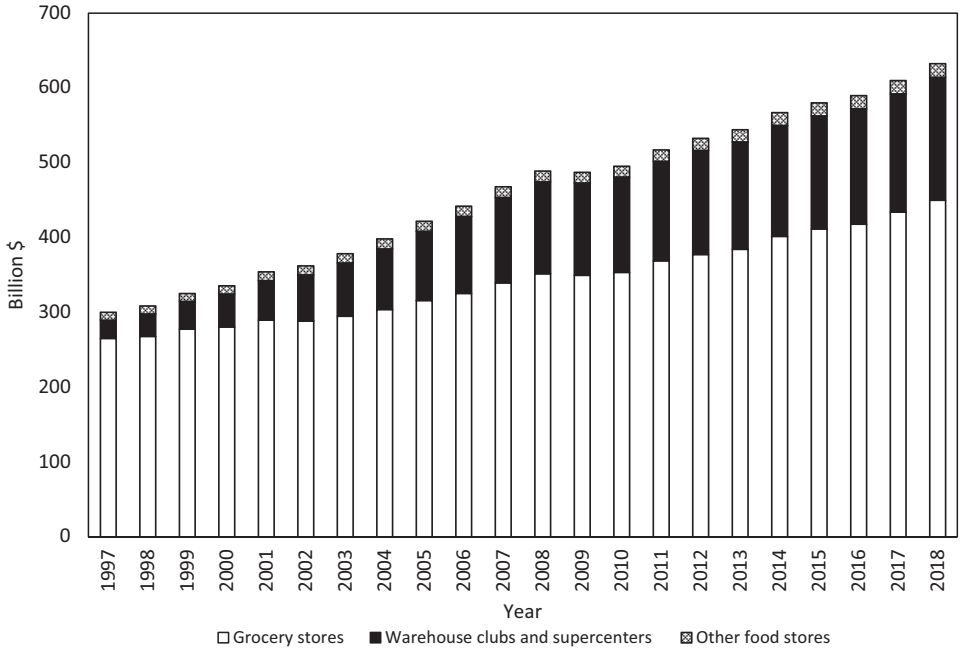

FIGURE 1.6 Food sales by retail sector, 1997–2018. Source: Calculated by USDA, Economic Research Service, from various sources. See the Technical Bulletin by Abigail M. Okrent, Howard Elitzak, Tim Park, and Sarah Rehkamp. Measuring the Value of the U.S. Food System: Revisions to the Food Expenditure Series, August 2018.

to 70 percent. Other food stores have accounted for roughly 1–4 percent of the market over time. They may be poised for growth as the local foods movement gains traction (Martinez 2010).

A growing interest in local foods is the result of an increased interest in environmental and community concerns including supporting local farmers, the local economy, and increasing access to healthful food. Other reasons for buying local food include freshness and taste. Farm operations with direct-to-consumer sales have increased from 116,733 to 144,530 between 2002 and 2012 (Low et al. 2015). Additionally, consumers are being offered more opportunities to purchase directly from producers through farmers' markets, roadside stands, pick-your-own, on-farm stores, and community-supported agriculture arrangements. In 2014, there were 8,268 farmers' markets operating, up 180 percent from 2006 (Low et al. 2015). It is estimated that in 2012, local food sales totaled $6.1 billion.

The 1990s saw widespread consolidation in the grocery industry, as small "mom and pop" chains were acquired or merged by larger grocers, who adapted to compete with the entry into food retailing by Walmart. This has resulted in fewer, but larger food retailing firms. Table 1.3 identifies the ten largest chain stores in terms of total annual sales. Walmart has become the number one food retailer, followed by Kroger and Costco. This consolidation has led to a steady increase in industry concentration. From

TABLE 1.3 Sales of the 10 largest U.S. and Canadian food retailers in 2018–2019

Rank/retailer	*Number of food stores owned*	*U.S. food store sales(billion $)*
1. Wal-Mart Stores	5,764	270.12
2. The Kroger Co.	2,765	117.15
3. Costco Wholesale Corp.	627	72.15
4. Albertson's Cos. Inc.	2,294	60.25
5. Ahold Delhaize	1,959	44.20
6. Publix Super Markets Inc.	1,212	36.38
7. Loblaw Cos. Ltd.	2,422	35.27
8. Target Corp.	1,841	32.43
9. C&S Wholesale Grocers	—	31.60
10. Amazon.com	489	28.10

Source: Supermarket News 2019

1992 to 2013, the market share for the top 4 grocery firms more than doubled, from 17 to 36 percent, while the share for the top 20 firms climbed from 39 to 64 percent (Table 1.4). Concerns over increasing concentration led to a series of five hearings conducted by the Department of Justice and Agriculture in 2010 about antitrust enforcement (U.S. Department of Justice 2011).

Food retailing remains an extremely competitive industry with little margin for error. Warehouses and supercenters compete in part because of their supply chain management expertise. For example, Walmart is a leader in the adoption of information technologies such as radio frequency identification (RFID) or centralized checkout stands. All types of food retailers are increasingly looking to store or private-label offerings. Whereas some argue that fewer and larger retail food outlets will mean a more general selection offered by retailers, others insist that larger retailers can offer a broader assortment of more competitively priced products to customers. The industry is mature, and performance will be driven by disposable income, consumer tastes and preferences, and female participation in the workforce.

Food service

The food services sector comprises the largest share of the 2017 food dollar, at 36.7 percent (Figure 1.3). The food service industry, which employs 11.1 million people, is comprised of three major types of firms: traditional restaurants, fast-food/quick-service restaurants, and institutional food service firms. The nation's restaurants hit $586 billion in sales in 2018, up from $205 billion in 1997 (Figure 1.7).

TABLE 1.4 Concentration k ratios for the top 4, 8, and 20 firms' share of U.S. grocery store sales, 1992–2013

Year	*Top 4 firms*	*Top 8 firms*	*Top 20 firms*
1992	16.8	26.4	39.2
1993	16.8	26.5	39.9
1994	16.7	26.1	41.1
1995	17.1	27.3	40.6
1996	17.5	28.7	42.2
1997	19.0	31.3	45.9
1998	28.0	39.0	50.3
1999	27.6	39.9	54.0
2000	28.8	42.6	54.7
2001	31.9	46.8	58.7
2002	29.8	44.4	56.2
2003	32.9	47.4	58.8
2004	33.8	46.7	58.8
2005	35.5	49.0	61.6
2006	34.7	47.8	59.6
2007	37.5	50.4	63.7
2008	38.1	50.8	65.1
2009	37.9	50.9	64.3
2010	36.7	49.5	62.9
2011	36.2	49.2	62.2
2012	36.1	48.1	61.8
2013	36.4	48.1	63.8

Source: USDA, ERS calculations using data from U.S. Census Bureau, Monthly Retail Trade Survey, company annual reports, and industry sources. Sales based on North American Industry Classification System (NAICS)

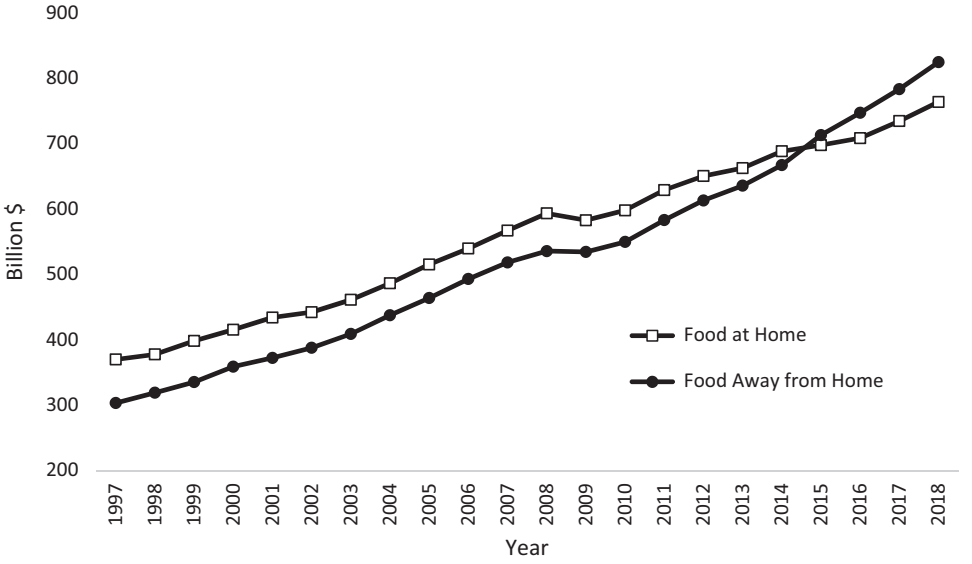

FIGURE 1.7 Sales of food at home and away from home, 1997–2018. Source: Calculated by USDA, Economic Research Service, from various sources. See the Technical Bulletin by Abigail M. Okrent, Howard Elitzak, Tim Park, and Sarah Rehkamp. Measuring the Value of the U.S. Food System: Revisions to the Food Expenditure Series, August 2018.

The food service industry saw steady growth, especially since 1990 as busy people, dual-career families, and a more affluent, mobile society chose the luxury, or some would say faced the necessity, of eating more meals away from home. In 1963, only 28 percent of the food dollar was spent for food away from home (Figure 1.8). Since 2005, the proportion of the food dollar spent eating out and at home has been almost equal. The percentage of the food dollar spent on food away from home exceeded that spent on food at home in 2014.

Traditional restaurants.

Traditional restaurants, also called full-service restaurants, saw sales of roughly $274 billion in 2013 (Clauson 2014). Despite a slowdown in the general economy, affluent baby boomers are the most frequent customers at full-service restaurants. Reflecting a cultural change among Americans, eating out at full-service restaurants plays an important social function for today's customers. Whereas 30 years ago socializing and entertaining were done at one's home, today's consumer meets family, friends, and co-workers at the local restaurant for leisure, conversation, and convenience. There is growing disparity among restaurant types. Substantial growth is expected for casual dining restaurants with per person checks in the range of $15–$20. These full-service restaurants may cater to families or those looking for a more relaxed dining experience. Cuisines at full-service restaurants have shifted

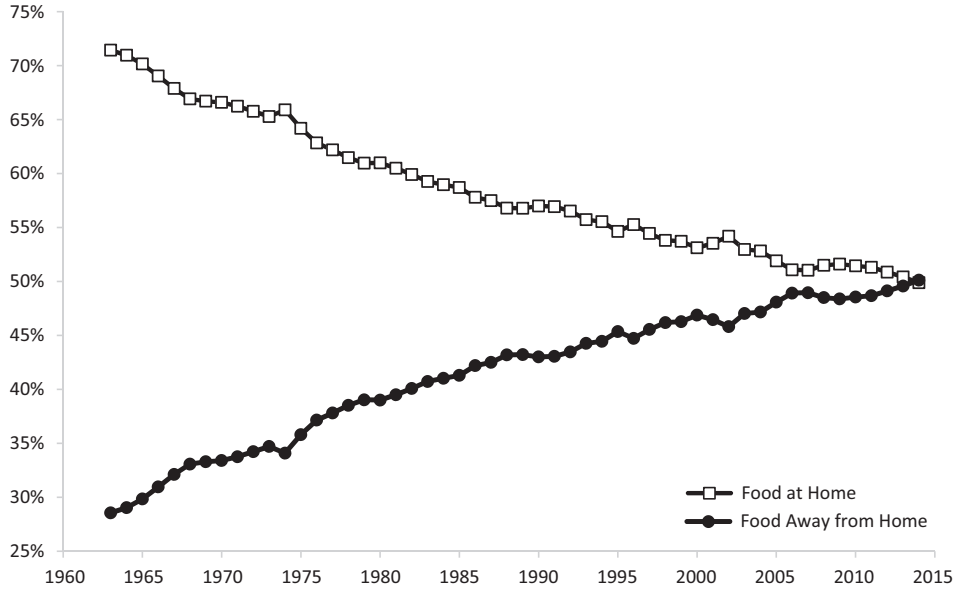

FIGURE 1.8 Percentage of sales of food at home and away from home, 1963–2014. Source: Calculated by USDA, Economic Research Service, using data from the Food Expenditures data series.

toward Italian, Mexican, Japanese, Thai, Caribbean, and Middle Eastern foods, as U.S. tastes broaden.

Fast food/quick service.

The words "fast" and "quick" not only describe the service provided by these restaurants, they also describe the rate at which this industry changes. Since 1990, fast-service food firms such as McDonald's, Subway, and Taco Bell have almost tripled their sales, from $87 to $248 billion. Established as part of American culture, fast-food restaurants have stepped into the next dimension of customer service by experimenting with the offerings and specials on their menus, and faster, better means of providing customers with both fast and nutritious foods. Rising concerns about obesity are leading to new menus. Today's ***fast-food/quick-service restaurants*** often have central wholesale warehouses and buying offices, and many have expanded internationally as U.S. markets have become saturated.

Institutional food service

In 2013, over 41,800 firms were involved in institutional food marketing, with sales of $148 billion. This category includes food offered at hotels, schools and colleges, government offices, corporate eating establishments, airlines, hospitals, etc. Institutional food services account for an important portion of the food people consume daily. Some types of institutional food service firms expanded rapidly during the 1990s (recreation and

entertainment facilities, and retail hosts such as gas stations and bookstores), while sales through other firms in this category were stable or declined (hospitals, vending machines, and the military). Trends and changes in the institutional food service industry will continue to reflect consumer demands for convenience and nutrition. For instance, 30 years ago, it would have been unusual to see ethnic foods, a food now considered common, on the menu of a major university's dorm cafeteria.

Food wholesaling

In 2013, food wholesaling represented an $800-billion business conducted by 34,415 wholesalers employing almost 800,000 employees (County Business Patterns 2015). Although there are several ways to categorize the work done by ***wholesalers***, three basic categories capture most firms in this industry. ***Merchant wholesalers*** represent the largest percentage of food wholesale sales, accounting for approximately 60 percent of the total. Merchant wholesalers primarily buy groceries and grocery products from processors or manufacturers, and then resell those to retailers, institutions, or other businesses. ***Manufacturers' sales branches and offices*** (MSBOs) are wholesale outfits typically run by large grocery manufacturers or processors to market their own products. ***Wholesale agents and brokers*** are wholesale operators who buy and/or sell as representatives of others for a commission. Wholesale brokers and agents typically do not physically handle the products, nor do they actually take title to the goods.

Most wholesale operations focus on sales to retailers, other wholesalers, industrial users, and, in some cases, the final consumer. A wholesaler may buy directly from the producer and sell to another wholesaler or food processor. More typically, however, the wholesaler buys from the food processor or manufacturer and sells to a retailer. The make-up of the wholesale trade sector involves a large group of varied organizations—some quite small and some very large. Chain stores own their warehousing facilities, but typically break this out into a separate operating unit with the objective of generating a profit.

Wholesalers perform a variety of functions for their retail customers. It is important to note that wholesalers are facilitators and that they may take ***market risk*** if they take title to the goods they handle. These firms are responsible for distributing the product in appropriate quantities across a geographic region. Often wholesalers will finance inventory purchases for the retailer. In this case, the retailer does not have to borrow money from the bank, but uses the wholesaler as a source of operating funds. Many wholesalers offer services like automatic ordering, customer traffic surveys, and a suggested shelf-stocking arrangement, among others. The idea is for the wholesaler to forge a profitable working relationship with their retail clients.

Merchant grocery wholesalers are classified into three groups by the types of products they distribute: (1) general line distributors, (2) specialty distributors, and (3) miscellaneous distributors. First, general line distributors operate 9 percent of the total number of food wholesalers, but employ 18 percent of the wholesaler workforce (Wholesale Trade 2015). Also known as broad line or full line distributors, these companies handle a complete line of groceries, health and beauty products, and household products. Supervalu and Sysco are examples of general line distributors. Second,

specialty distributors are typically smaller than general line distributors, and focus on specific items such as packaged frozen food, dairy products, meat or fish products, confectionery, or fresh fruit and vegetables. Specialty wholesalers account for 50 percent of the food wholesaling establishments, employing 46 percent of the workforce. Finally, miscellaneous distributors carry narrow lines of dry groceries (coffee, snack foods, bread, or soft drinks), which are distributed directly to retail food stores. Accounting for 13,763 food wholesalers, miscellaneous food wholesalers employ 36 percent of the wholesale industries' workers.

Food processing and manufacturing

In 2011, U.S. food processors accounted for 14.7 percent of the value of shipments from all U.S. manufacturing plants (Martinez 2014). Meat processing is the largest component of food manufacturing and accounted for 24 percent of food and beverage manufacturing shipments in 2011. The Annual Survey of Manufacturers from the U.S. Census Bureau counted almost 30,000 food processing plants across the nation. An additional $153 billion of processing was performed by 4,347 beverage manufacturers, 92 tobacco manufacturers, 250 fiber, yarn, and thread mills, and 191 tanneries (2012 Economic Census 2015).

The food processing and manufacturing industry turns raw agricultural commodities either into ingredients for further processing or into final consumer products. Meat packers, bakers, flour millers, wet corn mills, breakfast cereal companies, brewers, snack firms, and tanneries are examples of food and fiber processors and manufacturers. These complex firms serve highly varied markets. For example, soybean processors in central Illinois break down soybeans into two major components: soybean oil and soybean meal, each with its own unique market conditions. Literally hundreds of products utilize soybean oil as an ingredient, ranging from margarine to cosmetics. The primary market for soybean meal is as a high-protein livestock feed supplement.

Processors of meat products account for about 18 percent of the total value added by food processors and manufacturers (Figure 1.9). Processors of baked goods, fruits and vegetables, dairy, and grains and oilseeds all account for at least 7 percent of total processing activity. While over 4,500 firms are engaged in food processing activities, most own but a single processing plant. An earlier survey found 66 percent of all plants were small (0–19 employees) and accounted for only 4 percent of the total value of shipments while large plants (100 or more employees) accounted for only 12 percent of plants but 77 percent of shipment value (Martinez 2014).

The sharp increase in concentration among food processing industry firms in the last 30 years has led to a few large companies marketing a wide variety of commodity and branded products. Major commodity processing industries, such as animal feed, grain milling, and meat packing, are dominated by giants such as Smithfield Foods, Cargill, ADM, and ConAgra. Among well-known food processing and manufacturing firms are Nestlé, Kraft, General Mills, Mars, and Coca-Cola.

Our final group of food sector firms includes those that acquire or assemble commodities from agricultural producers, and store and transport these products for food manufacturing and processing firms. Transportation and logistics firms facilitate the

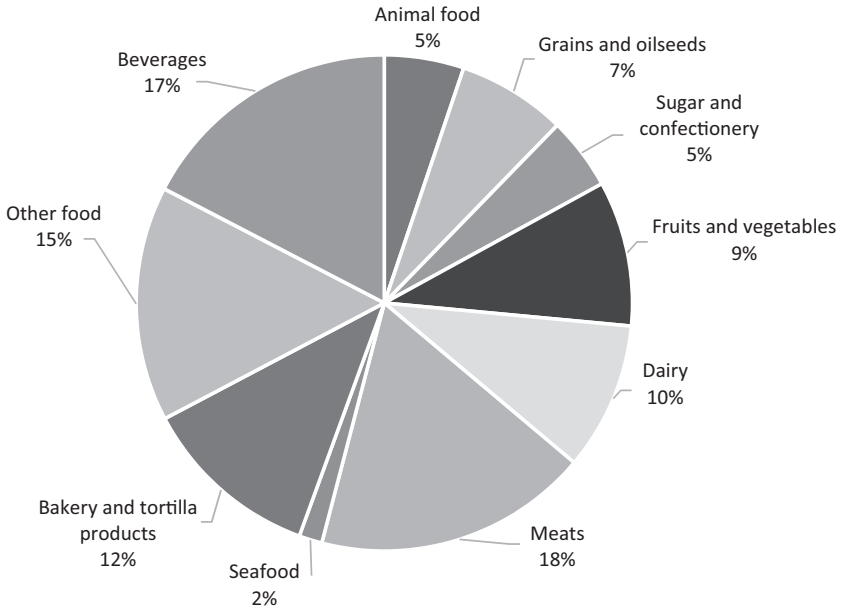

FIGURE 1.9 Composition of total value added by food processors, 2016. Source: Prepared by USDA, Economic Research Service, using data from U.S. Census Bureau, 2016 Annual Survey of Manufacturers.

marketing and processing phases of the food sector. Firms ranging in size from the grain handling giant Cargill, to local cooperatives that handle grain, are involved in the collection, storage, and transportation of agricultural commodities. A similar process then ensues as products are shipped to food retailers.

Transportation output is measured in ton-miles, a metric which tracks the interrelationship between weight and distance. For example, if a 25-ton truckload of wheat moves 200 miles to market, that trip generated 5,000 ton-miles. Agricultural and food products are important users of the U.S. transportation system. Agricultural commodities shipped from growers to processors accounted for 11.8 percent of the ton-miles in 2012 (U.S. Department of Transportation 2015). Shipments from food processors to retailers accounted for another 10.1 percent of the total ton-miles.

One example is the way that grain moves from farm to processor. Grain typically moves from the farm either to local elevators or to sub-terminal elevators located near transportation centers. These firms make money on grain movement, not on speculating that the grain they hold will go up in price. Small local grain elevators may sell to a larger sub-terminal or terminal elevator, or directly to a processor. Terminal elevators assemble grain from smaller country elevators to amass a quantity of grain that will fill ***unit trains*** or barges. Unit trains might move corn to the southeast to feed poultry. Or a group of barges might be transported down the Mississippi River and the delivered grain shipped to the international market.

Managing transportation and storage firms brings a unique set of challenges. A grain buyer for a terminal elevator located close to rail lines and a navigable river must be

knowledgeable of rail rates, the availability of rail cars, and barge rates. Often these rates can change significantly overnight. Risk management is paramount, as commodity prices change quickly. Margins for these firms are typically razor thin, hence, cost management is a priority.

Linkages in the food sector

Many of the organizations involved in the food sector have successfully integrated forward or backward in the food system. Goals for such a strategy include increased operating efficiency and reduced market risk. For example, many firms are involved in both processing and marketing activities and have at least partially integrated back to the production sector by entering partnering or contracting arrangements with producers. Smithfield Foods is one example of a firm with such a position in the market. The link helps reduce market risk by reducing material quality and supply problems.

This arrangement is common in the poultry, fruit, and vegetable production sectors. In the Midwest, for example, the Redenbacher Popcorn Company has producer agreements that guarantee supply before the crop is planted in the spring. Redenbacher contracts with producers by guaranteeing a specific price for popcorn grown on a specific number of acres. The firm provides seed and purchases all popcorn grown on the acreage under contract. Producers deliver production to a local processing facility.

Kroger, one of the top food retailers, owns 37 food processing plants that are used to manufacture store-label products, including dairy, snack foods, and bakery items. Anheuser-Busch owns malting plants and can-manufacturing operations. Firms like ConAgra have a presence at almost every level of the food system. As mentioned earlier, such linkages are common and make the lines between industries very blurry, and the resulting firms quite complex.

THE PRODUCTION AGRICULTURE SECTOR

At the hub of our food production and marketing system is the production agriculture sector. ***Production agriculture*** includes the farms and ranches that produce the crop and livestock products that provide inputs to the food and fiber sector. These farms and ranches are the customers of the firms that make up the input supply sector. As mentioned earlier, relatively few individuals are responsible for a staggering quantity of output in the U.S. production agriculture sector. Today's U.S. farmer produces enough food and fiber in a year to feed and clothe 155 people. More than 40 percent of the corn grown in the world is produced in the U.S.

Every industry in the food system is impacted in some way by production agriculture. And, like the food and input supply sectors, the production agriculture sector has been undergoing profound change in response to a variety of market forces. In this section, we will explore the dynamic production agriculture sector of our food production and marketing system.

Farm demographics

So what is a farm? The United States Department of Agriculture (USDA) defines a ***farm*** as "any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during a given year" (2012 Census of Agriculture 2014). This definition includes many part-time farmers with limited acreage and very modest production. The USDA definition of a farm includes the small hobby farmer that sells 1 horse or 10 lambs per year as well as the commercial operator that farms 8,000 acres or produces 700,000 head of hogs annually. The definition includes those who farm part-time and those who have farmed full-time for generations. The Economic Research Service (ERS) of the USDA classifies farms into four groups: small family farms, midsize family farms, large-scale family farms, and nonfamily farms. ***Small family farms*** include retirement farms, off-farm occupation farms, and farm-occupation farms with both low sales (gross cash farm income less than $150,000) and moderate sales (gross cash farm income between $150,000 and $349,000). ***Midsize family farms*** include operators reporting farming as their primary occupation and gross sales between $350,000 and $999,999. ***Large-scale family farms*** are family farms with gross cash farm income over $1 million and this category is further broken down into large family farms and very large family farms who report gross cash farm income of $5 million or more. ***Nonfamily farms*** are any farm where the primary operator and his or her relatives do not own a majority of the business (2012 Census of Agriculture 2014).

The make-up of the farms varies widely, depending upon the farm typology. Most farms (88.2 percent) are classified as small family farms, yet they produce 19.6 percent of the market value of farm products (Table 1.5). Mid-size family farms make up 5.6 percent of all farms, producing 19.3 percent of farm production; large-scale family farms make up 2.8 percent of all farms while producing 45.3 percent of farm production; while nonfamily farms produce 15.8 percent of all farm products with only 3.3 percent of the farms. At 3,094 acres, large-scale family farms are almost twice the size of midsize family farms.

The past century was a period of huge change for production agriculture in this country. Changes in farm numbers and farm size are reflective of this change. Historically, individual families or extended families have owned and operated the nation's farms. The family provided the land, labor, and other capital necessary to run the business. As market prices fluctuated, farm families adapted by doing without or diversifying in some way. As mechanization or finances allowed, more land was acquired—ideally to send a child to college, or to provide a living for additional family members coming into the business.

As time moved on, farm expansion required that additional inputs such as seed, fertilizer, chemicals, credit, animal health products, or farm machinery be purchased. Technology-fueled expansion made it possible for farmers to operate and productively manage ever larger farm businesses, and farm size grew. However, when fluctuations in price or crop losses caused lean years, farmers still had obligations to pay suppliers. Financing became a necessary and critical component of the family farm business. As we will see later in this book, such debt financing also carries a risk.

Average land values over time reflect the economic health of the farm sector (Table 1.6). Land values grew from $196 to $737 per acre during the 1970s, as America

TABLE 1.5 Farm characteristics, by type of farm, 2012

Type of farm	*Number of farms*	*% of Farms*	*Average acres*	*% Market value of farm products*	*% of Government payments*	*Average age*
Retirement	611,861	29.0%	183	3.2%	12.6%	69.3
Off-farm occupation	811,571	38.5%	160	4.4%	13.2%	52.8
Farming occupation/ low sales	342,440	16.2%	307	4.0%	7.9%	54.6
Farming occupation/ moderate sales	95,344	4.5%	961	8.0%	9.9%	54.5
Small family farms	1,861,216	88.2%	236	19.6%	43.6%	58.6
Mid-size family farms	118,340	5.6%	1,582	19.3%	25.1%	55.2
Large family farms	53,825	2.6%	2,926	26.1%	22.4%	55.4
Very large family farms	5,712	0.3%	4,673	19.2%	2.4%	57.0
Large-scale family farms	59,537	2.8%	3,094	45.3	24.8%	55.6
Non-family farms	70,210	3.3%	1,485	15.8%	6.5%	58.3
Total	2,109,303	100.0%	434	100.0%	100.0%	58.3

Source: 2012 Census of Agriculture, 2014.

planted from fence row to fence row to meet a surge in worldwide demand. In turn, farm expansion financed by debt and secured through inflated land values of the 1970s created severe financial problems for some producers, as well as their suppliers. Some of these farms were not able to survive the farm crisis of the 1980s and farm foreclosures contributed to an overall decline in farm numbers. Thus, the 1980s saw a retreat in farm land values. Farm land values have steadily increased since 1990, as production agriculture has seen a resurgence driven by strong growth in biofuels and export markets.

Total land in farms in the U.S. continues to decline slowly, due in part to conservation programs, as well as continued development of housing tracts, malls, and factories (Table 1.6). In 2017, a total of 900 million acres was farmed, down from its peak of 1.2 billion acres in 1954. The 2 million farms and ranches in the U.S. in 2017 represented a new

TABLE 1.6 Number of farms, land in farms, average size of farm, 1970–2017

Year	*Farms*	*Land in farms(1,000 acres)*	*Average size(acres)*	*Average farm land value ($/acre)*
1970	2,949,140	1,102,371	373.8	$196
1975	2,521,420	1,059,420	420.2	$340
1980	2,439,510	1,038,885	425.9	$737
1985	2,292,530	1,012,073	441.5	$713
1990	2,145,820	986,850	459.9	$683
1995	2,196,400	962,515	438.2	$844
2000	2,166,780	945,080	436.2	$1,090
2005	2,098,690	927,940	442.2	$1,610
2006	2,088,790	925,790	443.2	$1,830
2007	2,204,950	921,460	417.9	$2,010
2008	2,184,500	918,600	420.5	$2,170
2009	2,169,660	917,590	422.9	$2,090
2010	2,149,520	915,660	426.0	$2,150
2011	2,131,240	914,420	429.1	$2,300
2012	2,109,810	914,600	433.5	$2,520
2017	2,042,220	900,218	441.0	$2,976

Source: 2012 Census of Agriculture, 2014; 2017 Census of Agriculture, 2019

low from the 2.1 million farms and ranches that had been relatively stable since 1990. Texas reports the most farms in the U.S. with 248,416; Missouri is in second with 95,320 farms.

Larger and more specialized farming operations have evolved since the 1930s. As a result, a much smaller group of producers accounts for the majority of agricultural production. The 2012 Census of Agriculture showed that about 95 percent of all agricultural production came from 18 percent of U.S. farms, and 81 percent of the total came from only 7 percent of the farms—about 147,000 farmers (Figure 1.10).

Despite all of the changes, today families or family businesses still own nearly 97 percent of the nation's farms (Table 1.5). However, it is important to note that many of these family-run farming operations are very large and sophisticated businesses. At the same time, non-family-owned corporate farms, particularly in the livestock and poultry industries, are increasing in number. In 2012, such operations accounted for 15.8 percent of total farm sales.