THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF SUPPLY CHAIN AND INFORMATION SYSTEMS

UNDERSTANDING THE CHALLENGES OF SUPPLIER DEVELOPMENT IN ORGANIC GRAIN PRODUCTION AND OFFERING MODEL BASED SOLUTONS

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ABSTRACT

Consumer preferences create an ever-changing business world. To compete in the markets and satisfy customers, businesses continually adjust the goods and services provided to their end consumer. In a globally competitive atmosphere, companies face the decision of what to supply and who to source their goods and services from. These procurement decisions can serve to reduce supply chain costs, increase margins, and find new and innovative ways to meet the needs of customers. This report will address a specific problem in food retail concerning rising demand for organic products. Customers have shown a willingness to buy more organic product, however organizations have not been able to procure the necessary grains at the farm level to fill their customer's expectations. The tool was assessed by farm operators and analysts and judged to adequately represent the structure of the key costs and returns. The tool and related analysis can be useful to promote the development of a supplier base that better meets the needs of purchasers of organic grains.

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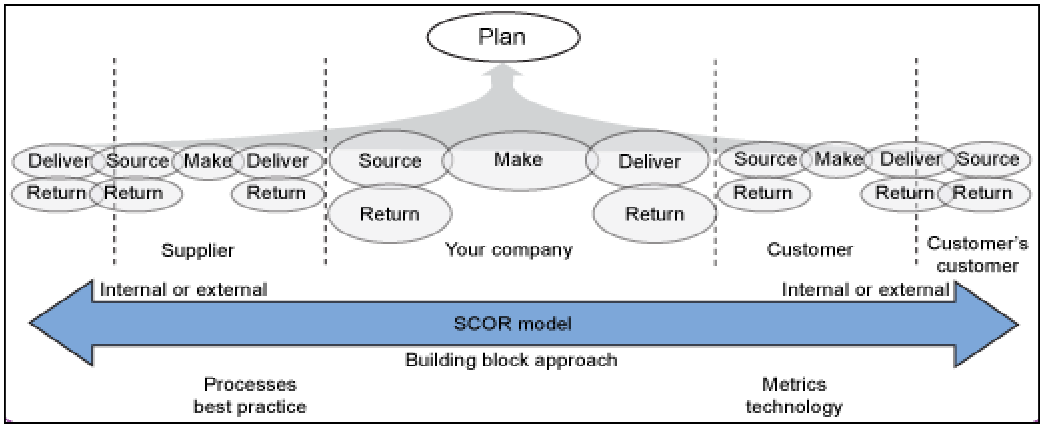
I have been blessed throughout my Academic career at The Pennsylvania State University. My journey from the beginning of the summer session before my Freshman year, to getting accepted into the Schreyer Honors College my junior year, and ultimately submitting this report my senior year has been a fun, exciting, and sometimes grueling process. I would like to thank my parents Gino A. Ruta and Paula Ruta for always being there to support me in my academics and for pushing me to reach my potential. I would also like to thank my friends McKenna Ostryniec and Ryan Kalkbrenner for being there to talk about my thesis, bounce ideas off of, and help me relax when my workload has seemed daunting. Finally, I would like to thank my academic advisor John Spychalski and thesis supervisor Charles Nicholson. Charles has been crucial to my success in college. From the first day of class with Dr. Nicholson, he has sparked my interest in Supply Chain and has been a mentor and a guide for me as I move forward in my career.

Chapter 1

Supply Chain Strategy and Supplier Development

Introduction

The manner in which an organization handles its supply management decisions can play a large role in the success or failure of the firm. The popular SCOR model of supply chain management outlines decision making in the framework of source, make, deliver, and return across different tiers in the supply chain. This discussion will link closest to the "source" decision node at the "supplier" level (see **Figure 1**). Business decisions such as what products or services to provide, what suppliers to utilize, and how to distribute an organization's value proposition to its end customers all fall into this segment and nodes in the supply chain need to be aligned in order to meet the company's desired goals. Specifically this paper will focus on the supply side of the food retail industry. It will discuss strategic sourcing from an overall view, discuss a major concern facing food retail organizations today (lack of organic grain supply), ways of understanding suppliers in this environment, and offer a decision tool that can help companies and suppliers alike in finding partners to meet the needs of their business.



Source: IBM.com

Figure 1. SCOR Model of Supply Chain Management

What Supply Chain Fits Your Business

Sourcing decisions emanate from an organization's choice in designing the supply chain. Every supply chain is different, and often times no two supply chains will be exactly alike. For example, a business must decide whether it wants to be more efficient in designing processes and cutting costs, or more responsive to customer needs. David Simch-Levi in his article *When one Size Does Not Fit All*, elaborates on this trade-off between responsiveness and efficiency and argues that companies must know their customer as well as having a basic idea about the demand uncertainty for their products in order to successfully decide which model of supply chain to adopt. In food retail Walmart has been a benchmark of supply chain efficiency pioneering RFID technology and logistics efficiencies in marketing low cost affordable products to their customers. In contrast, an organization like Wegman's firmly believes in *Food You Feel Good About* and strives to have a responsive product mix that reacts to their customer's desires to eat healthier and live a better lifestyle. It is this type of high-level company philosophy that drives organizations like Wegman's to provide more organic options when their customers have identified their willingness to buy them. Once organizations have ascertained this customer information, and they know what type of supply chain can meet these needs, they have to make decisions related to where to produce, and how many suppliers to utilize.

Supplier Development

The In-house or Outsource Decision

Once a company knows its customer it can begin to mold buyer-supplier relationships to provide value to its customers. The decision of sustaining a continuous supply source for a firm typically relies on two decisions: which products or services should be outsourced, and how many suppliers should the company use to support the company's goals.

Firms must assess their own internal capabilities. The first big question a firm must be able to answer is what products or materials they need to outsource, and which are suitable for in house production. Chopra and Meindel argue that decisions whether to insource or outsource can be whittled down to whether or not the third party provides an increase in supply chain surplus (profits). "A firm should consider outsourcing if the growth in surplus is large with a small increase in risk" (*Sourcing Decisions in a Supply Chain*). While this definition is useful for big picture thinking, one could also benefit by a more specific decision tool. Mark Gottfredson explains that products that are not of high proprietary value to a firm and which are common across many industries signal to a firm that outsourcing is a viable solution. His decision-making matrix below represents possible categories that a firm's products or materials may fall into (*Strategic Sourcing: From the Periphery to the Core*, 2005).

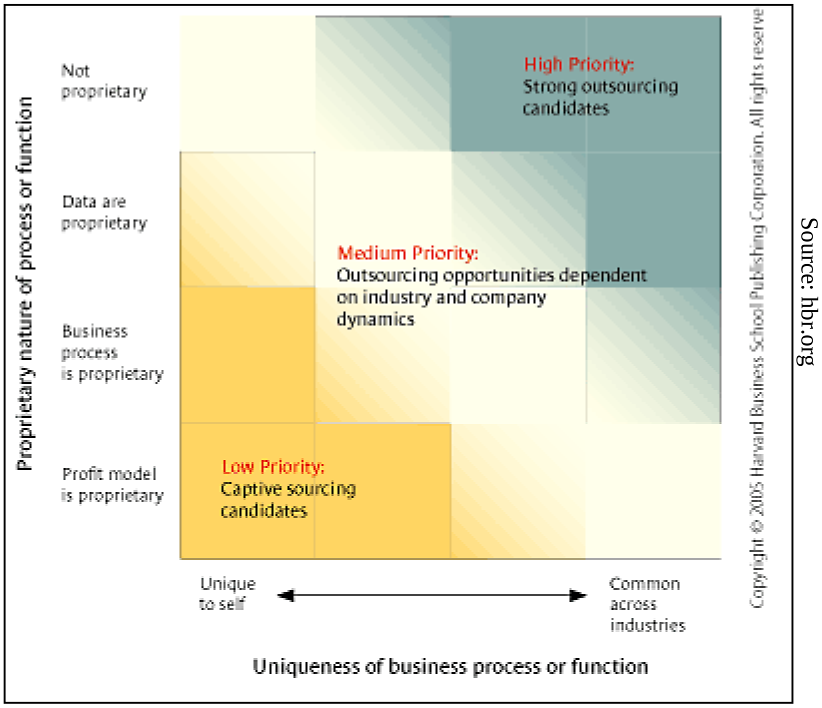


Figure 2. Prioritizing Inhouse and Outsource Decisions

How Many Suppliers?

An organization also needs to make the decision on how many suppliers to utilize. These decisions often revolve around a company's efforts to make a supply network more efficient or resilient. An efficient supply chain attempts to minimize total costs, and may involve rationing suppliers, whereas a more resilient supply chain typically has more suppliers, allowing it to adjust quickly to disruptions in supply or demand. Most often firms will fall in the middle of these two extremes. Ultimately, these decisions revolve around the customer. McKinsey believes supplier relationships depend on the product's supply volatility (in quality or volume) and importance to customer perception. Products with high supply volatility and a strong influence on consumer perception are best sourced primarily through stable— perhaps even exclusive—supplier relationships. Products that are neither volatile nor critical to perception, on the other hand, can be sourced through transactional or even spot-market purchasing (*A Fresh Take on Food Retailing*, 2013). In this framework, a transactional buyer-supplier relationship is very loose and may involve many suppliers whereas more stable relationships require constant contact between a small number of suppliers.

Typically firms choose to rationalize their supply base based on category spend and some level of risk (Monzcka, 2011). However in food retail- specifically in the organic grain market- supply does not meet demand and firms like Walmart and Wegman's are searching for a multitude of large and small suppliers to meet their needs. While this may debunk traditional thinking, firms in this environment are finding that the profit potential for organic grain is high because of high customer perceived value but sources of supply are scarce. As a result retailers need to be more flexible in their sourcing strategies. Harvard business review columnist Mark Gottfredson acknowledges more "forward-thinking companies are making their value chains more elastic and their organizations more flexible. And with the decline of the vertically integrated business model, sourcing is evolving into a strategic process for organizing and fine-tuning the value chain" (*Strategic Sourcing: From the Periphery to the Core*, 2005). It is in this light that food retail companies are adjusting the way they think about supply decisions as a result of the changing environment in consumer mindset towards organic foods.

Moving Forward

These high-level themes are the background for this analysis in this report. Moving forward referencing them will allow the reader to place the model below into the context of a real problem for firms in this industry and more readily understand its implications. From this point, the report will discuss the problem of supply shortages in food retail, offer some insight into how one can begin to evaluate suppliers (farmers) in this environment, and propose a model for farmers to understand the financial impact of making a transition from conventional production to organic production. The next two chapters delve into the problem in more depth. They concern the main problem in retail - lack of organic grain supply, and the underlying problem from the supplier's perspective - the transition from conventional production to organic production.

Chapter 2
Problems in Retail and at the Supplier Level

Rising Demand for Organic Food

The food retail industry is undergoing rapid change as consumers show more demand for organic products. According to the Organic Trade Association (OTA), the market for consumer demand for organic products rose to new heights in 2014, reaching $39.1 Billion in sales. This highlights a continuing trend amongst consumers, as demand for organic products has risen each year over the last 10 years (see figure 3), and has increased almost 800% since 1997(*State of the Industry*, 2015).

Source: https://www.ota.com/resources/market-analysis

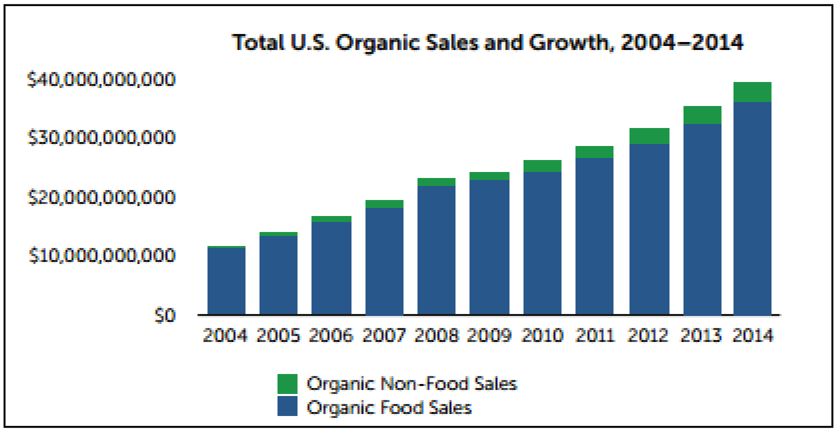


Figure 3. Rising Demand in Organic Food - Organic Trade Association

Driving this trend is the changing trend in how consumers eat. People are now beginning to take a closer look at their diets. Jim Russo of Neilsen notes that for consumers "health and wellness concerns continue to increase in importance. The reasons vary from societal, demographic, technological, governmental and, most importantly, a shift in consumer focus on the role diet plays in health" (*Consumers Want Healthy Food – And Will Pay More for Them,* 2015). Consumers now more than ever are paying attention to the nutrition labels, and monitoring the effect certain foods can have on health concerns like blood pressure or cholesterol. Others are simply cognizant of meeting daily nutritional needs from the food they eat. As a result, manufacturers and food retailers alike are shifting their product mix to those that are better for you and design clever marketing schemes that give the appearance that these foods are better for you on the periphery. Manufacturers who have long been on the outside of the organic market, like Mondelez and Campbell's, are jumping into organics because they understand changing customers. New entrants are making the organic food industry as competitive as it has ever been, and the industry is projected to grow to over $1 trillion globally by 2017.

Two of these relatively new entrants adding competition to leaders like Whole Foods are Costco and Walmart. Costco has worked relentlessly with suppliers in providing more organic options. In an article in the Huffington post, Carly Ledbetter writes that Costco is good at "getting out there and working with suppliers" … " whether it is raising eggs, or ground beef processing, or produce" (*Apparently Costco Sells More Organic Food than Whole Foods,* 2015). Meanwhile Walmart, the every-day-low-price giant, understands where the market is moving amongst American consumers and believes it can become a major player in organic food with its new business partner, Wild Oats, who is one of the preeminent suppliers in organic grains. Walmart believes that through their partnership with this large supplier and its giant distribution network it can even price organic goods at the same level as their other products however, we have also seen that consumers are willing to pay more for organic goods.

Research shows that consumers are willing to pay hirer prices for organic food compared to those that are not. Psychological studies that show a consumer will pay more for a product that carries a USDA certified organic label on it compared to one that does not (ac.els, organic food labeling influences food valuation and choice). Forbes has also reported the same phenomena, citing that 88% of respondents in their polls would pay more for healthy food. This allows retailers to charge higher prices based on perceived customer value, and the premiums extend upstream - farmers can make more money per product by farming using organic methods. For example, there is a large premium on organic corn with prices per bushel around $10 compared to roughly $3.50 for a bushel of conventional corn feed (USDA bi-weekly food stuffs). Similar premiums exist across many organic products and can be found through the USDA's market analysis online page; however, most farmers have not yet made the transition to organic farming and it is one of the main problems that retailers today face concerning organic production.

Problems in Retail

Retailers are struggling to keep pace with this changing environment. A report by the university of Wisconsin acknowledges that "while the [$39.1] billion U.S. organic industry continues to expand at a brisk pace, organic grain production is not keeping up with the growing demand for organic livestock feed and value-added food products" (UW.edu). The University believes that the primary reason farmers do not farm organic is the 3-year transition period. The transition is difficult for farmers and does not happen overnight, making it difficult for businesses to develop sources of supply quickly. The model presented later in this study attempts to break down this 3-year transition process so that farmers can see the transition effect years down the road and businesses can help educate farmers on the transition.

Organic production of grains and animal feed are lagging far behind consumer demand in this growing market (Organic Companies Collaborate Thesis Mini Lit). General Mills one of the largest buyers of grain products believes that its demand for organics is double what it has available in supply today (*Organic Food Companies Collaborate to Increase Grain Supply*, 2015). With the agricultural industry lagging far behind what consumers are demanding of them, organizations are attempting to get to the bottom of how they can get more value out of their suppliers or grow the number of suppliers they currently have. Different from common forms of supplier rationing, companies are simply looking for any source of organic grain and not so much considering rationing until they can ensure a stable supply of product.

Similarly, in conjunction with the Sustainable Food Lab (SFL), large companies like StonyField Farm, Organic Valley, Grain Millers, Clif Bar, and the Organic Trade Association have also collaborated to form the United States Organic Grain Collaboration to become wiser on the challenges in the transition. Elizabeth Reaves of the SFL states, “The focus is to address the systematic issues that are barriers to farmers in organic production” (*Organic Food Companies Collaborate to Increase Grain Supply*, 2015). These problems center primarily around the high costs to transition from conventional to organic methods. Meanwhile organizations like Nature’s Path Food Inc. have even begun to buy their own farms to produce organic products internally, while others like Chipotle have dedicated recruiters in their human resource departments specifically enlisted to search for organic farmers to supplement their supply base (*Hunger for Organic Food Stretches Supply Chain*, 2015). These organizations have made the decision that investing in organic production is a profitable long-term venture, and finding sustainable ways to increase their supply base moving forward will be crucial to their success.

Finding adequate and stable supply is not just limited to North America. A key question engrained in this problem for retail is whether to source locally, or obtain organic grain and feed from offshore farmers. In a focus group of stakeholders conducted by Cornell University in conjunction with Wegman's, farmers and researchers alike acknowledged the low prices of sourcing grains overseas (particularly Asia). While prices overseas are lower, farmers and Wegman's alike had concerns with the quality of the grains. Thus, it is in Wegman's best interest (and other retailers as well) to continue to work with farmers close to home to develop a high quality domestic supply base. This task not only includes developing a system where farmers can understand if their farm can make a healthy transition financially, but also sharing the necessary information on what it takes to become organic certified.

Chapter 3

Barriers to Organic Production

The organic transition period poses a large challenge to farmers. This section of the report will break down why it has been so difficult to find and groom suppliers in organic production at the farm level. Specifically, this section will discuss a comprehensive analysis of reports from Texas, West Virginia, and Pennsylvania as well as information from the USDA's online organic certification requirements to shed light on the difficulties of making the change from conventional to organic production.

Information Gap

One reason farmers are reluctant to switch from conventional production to organic production is simply a lack of understanding of what it means to be USDA organic certified. Confusion about what organic means and ideological resistance to become an organic farmer were common themes amongst farmers in these studies. It appears that there is a stigma associated with organic farming. Conventional farmers perceive organic farmers as dirty, and they think that large amounts of weeds come with organic farming practices (Harvestpublicmedia.org). Other farmers believe that USDA certified organic production is too broadly defined – in Texas one farmer asserts, "I think there is a very fine line between organic and non-organic. I don't think we know where that line really is" when talking about the difference between the different farming methods (York, 2007). Similarly, a farmer in a study in

West Virginia notes “the organic terminology, kind of, turns me off a bit because the that is so loosely used anymore” (Farmer, 2013). While the USDA does not have a singular definition for the term “organic”, it does have strict guidelines that must be followed when labeling goods.

The USDA created the organic standards so that consumers could have a transparent and accurate idea of what it means to be organic. “100 percent organic” labeled items mean all items included are certified organic, all processing aids are organic, and each label must include the certifying agent’s information. “Organic” labeled products include all certified organic ingredients except where specified on the national list, all other ingredients that are non-organic must not exceed 5% of the total ingredients, and they must have the name of the certifying agent on the label. Products that simply carry the “made with” organic label must have 70% of their ingredients as certified organic, all other ingredients must be produced without excluded methods, allowed on the national list, and state the name of the certifying agent. These labeling rules can be found at ams.usda.gov. While these labels make it easy for a consumer to follow, there are far more complexities involved in the process for farmers. The USDA maintains strict rules for the planting, harvesting, processing, and handling of organic product however, farmers are surprisingly unknowledgeable about them. The farmers in the West Virginia study simply “do not understand the process or the requirements” (Farmer, 2013). Below are some of the key requirements the USDA asks of their organically certified farmers.

Major USDA Requirements

Misunderstanding of the USDA’s requirements for organic certification on behalf of farmers is a major cause of the information gap described above. A farmer must certify any production or segment of production that they claim to be "100% Organic", "Organic", or "made with Organic" (ecfr.gov). The USDA breaks down their requirements into major sections like land requirements, seeding requirements, rotation requirements, and pest and weed management requirements. Below is a short look at the key points in each of these categories (For detailed lists of requirements please see the appendix, or refer to ecfr.gov).

Land

Farmland must have distinct boundaries that indicate what land intends to be used for organic production and which land is not. These boundaries must include buffer zones to prevent unintended application or runoff from non-organic substances from adjacent plots of land that are non-organic. The USDA keeps a "National List" of approved substances that can be applied to farmland in production. The list can be found at ams.usda.gov. Using allowed substances a farmer must select and implement tillage and cultivation practices that "maintain or improve the physical, chemical, and biological condition of the soil and minimize soil erosion" and "manage nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials[*]"(ecfr.gov).

[*] Allowed plant and animal materials include animal manure that is (1) incorporated into the soil no less than 90days prior to harvest (2) maintains proper carbon to nitrogen ratios and that is kept at proper temperatures between 131-170 degrees Fahrenheit and (3) any non-composted plant materials that are on the allowed National List (ecfr.gov).

Seeding

Seeds planted on land wishing to become organic certified also follow strict requirements. All must be organic, annual seedlings save for a few exceptions. Nonorganic crop can be used as a close substitute when there is no commercially available organic seed and it has been treated with a substance on the national list, or when a banned substance used is a part of State phytosanitary regulations in the area.

Rotations and Pest/Weed Management

Crop rotations have less strenuous restrictions, and mostly adhere to the land requirements above. Generally speaking a crop rotation must maintain or improve organic matter or soil content, provide for pest management, mange deficient or excess plant nutrients,, and provide for erosion control (ecfr.gov). Pest and weeding requirements restrict farmers from using synthetic materials and pesticides that are not allowed for organic production. Pest problems in organic production may be controlled by including species of insects that are predators to pests or they may install traps or use repellents. Weeds problems may be dealt with through mulching, mowing, fire, livestock grazing, or in rate cases plastic or synthetic mulches as long as they are removed from the field at the end of the growing or harvest seasons (ecfr.gov).

Costs

The transition from conventional production to organic production also bares higher costs. Farmers perceive that weeds will grow more rapidly in organic farming systems compared to conventional ones because the USDA bans herbicides for weed management in organic production. Therefore, farmers believe that the cost of weed management will rise however; the Rodale institute as well as an independent study in Kentucky believes that with tillage weeds can still be kept at bay yields intact, while not changing costs significantly (Moyer). Kaiser from the University of Kentucky study also noted that "mowing, undercutting, or rolling [have] been shown to be an effective replacement for herbicides" (Kaiser).

Labor cost is also a strong consideration. Labor costs can be as much as 25% more under organic production (Kaiser). Additionally the study in West Virginia ranked labor the third most difficult barrier to overcome in the transition process. Labor costs associated with organic farming include higher maintenance on the fields and higher administration costs in organizing paperwork and filing systems. These costs make it hard for small farmers to transition. As the study in West Virginia notes "the certification process is geared toward large-scale farms" (Farmer, 2013). In West Virginia, small farms tend to sell a diversity of products. This means that there are more requirements for certification, and more costs associated with them. These studies seem to draw the conclusion that large farms who sell only few products are the most able to transition to organic production successfully because they can achieve efficiencies in scale.

Indeed, for farmers these challenges present themselves during the entirety of the three-year transition process. The USDA requires farmers not only to follow their strict guidelines for 3 years, but to maintain records for 5 years after their certification (ecfr.gov). During the transition period farmers must battle the higher costs of using organic methods while selling their produce at conventional methods. Only after certification can a farmer begin selling their products with higher organic premiums. This translates into a transition period (selling at conventional prices but farming under organic methods) where a farmer may be making *less money* than farming under conventional methods for the duration of the transition years, before eventually making *more money* selling at premiums once organic certification is granted.

Market Access

Finally, even after a transitioning farmer gets a hold on the requirements proposed by the USDA, they may encounter difficulties finding access to markets. Although a farmer may be able to achieve a price premium by selling organic goods, lack of access to distribution or to processing can act as a deterrent to making a transition. In *Identifying Barriers to Entry into the Organic Market and Possible Strategies to Increase the Likelihood of Success for Potential Organic Producers*, researchers in Texas asked farmers to rank barriers in production and in marketing. The most prevalent marketing barrier for these farmers was “distance to markets”, and the most prevalent production barrier was “organic processing facilities” (York, 2007). Farmers simply do not know where to sell their product or where they can find processing if they make a switch. In a study of New York farms, 44% of farmers stated that they think they would need to travel 50miles to their closest available market. Additionally, a Vermont study states “lack of adequate infrastructure to process the grains into a saleable product” is the primary barrier for Vermont farmers (Darby, 2012). Distance to market and processing are very important variables that will contribute to a farmer’s ability to transition but even if a farmer can find available markets, they must prove their farm is operating in line with organic standards during and beyond the transition period.

Chapter 4

The Farming Process

A retailer's source of organic grain originates upstream at the farm level. As organizations begin to think about how to develop suppliers for organic grain it is imperative for them to have an idea of how business operates on a farm. Similar to any other business, decisions made on a farm revolve around profit maximization. Farmers maintain fixed, variable, and operating costs of production, and they receive revenue on the mix of products planted on the farm. Below is a discussion concerning the variables that contribute to decisions that farmers make. Beginning with a discussion on crops and rotations, and then moving to marketing strategies and the specific costs typically found on the farm, the reader should gain insight into the decisions that farmers must make.

Crops and Rotations

Farmers allocate their mix of crops on the farm between cover crops and cash crops. Cash crops are those crops that farmers sell for revenue, while cover crops' main purpose is to provide protection and/or nourishment to enhance land fertility. Most experienced farmers attempt to keep their soil covered with vegetation, whether cash or cover crops, for most of the year to keep their land healthy and profitable. Rotating crops spurs biodiversity and enriches land with different elements like nitrogen that are vital to maintaining a healthy farm, however because each farm has a different makeup (land features, temperature differences, etc.) rotations across any two farms are likely different.

The National Organic Program (NOP) run by the USDA defines crop rotations as “the practice of alternating the annual crops grown on a specific field in a planned pattern or sequence in successive crop years so that crops of the same species or family are not grown repeatedly without interruption on the same field” (USDA). Rotational crops may include perennial crops, crops in different family groups, row crops, deep-rooted crops and shallow rooted crops, and many more (Moyer). The USDA organic certified requirements stipulate that a farmer must keep record of their rotations and that the rotation must contribute to the health of the soil or offer pest management (205.205). According to the Rodale Institute, an organic certifier will also expect to see “a rotation sequence of three to five crops suitable to your part of the country” in your Organic System Plan (Moyer).

The specific mix of crops that one decides to implement depend on numerous factors as described above, and allowing farmers a wide variety of options for crops has been a key in developing the model in chapter 5. Farmers may base their decisions from advice they have received or simply by what has worked through personal experience. Either way farmers must find ways of providing nitrogen to the crops on their farm. The Rodale Institute advises hairy vetch and rye as two forms of crops included in rotations that are good sources of nitrogen, but in reality there are many possible sources (Moyer). Figure 4 below provides an example of a good possible crop rotation for a farm in the northeast.

- year 1: field corn
- year 2: soybeans or red kidney beans
- year 3: spring small grain (oats or barley), underseeded with medium red clover
- year 4: winter grain (wheat, spelt, triticale, rye, or barley), underseeded with medium red clover
- year 5: field corn or processing vegetables

Figure 4. Example Crop Rotation in the Northeast

Yields

The amount of seed generation, or amount crop harvested, from a plot of land is referred to as crop yield. The more yield a farmer can generate, the more product they can sell. Yields are typically measured in bushels per acre, and this is the metric used in the transition model. Endless variables can effect a farmer's yield. Tilling practices, and nitrogen needs of the soil play major roles in the yields that farmers obtain, and they methods in which they are implemented can differ between conventional and organic production.

Many farmers believe that tilling - the churning, digging, or stirring of land often by machines, negatively affects soil health. However, "Organic farms often have high soil quality despite the use of more intensive tillage than customary at many conventional farms" according to a study of Pennsylvania farms by Brian Caldwell and Charles Mohler (Caldwell, 2014). In addition, the Rodale institute suggests that standard tillage [has] resulted in gains in soil organic matter levels twice those reported for no tillage agriculture" (Moyer). Based on the findings from these two sources the decision to till does not seem to harm soil health, but can actually improve it.

Farmers also tend to be concerned when making the transition because they can no longer use synthetics pesticides (for pests) or herbicides (for weeds) in maintaining their land. As a result, during the transition and learning period for new organic farmers, yields tend to decline. According to the Texas study on transitions, "the adoption of organic methods takes a period of several years to take full effect, which can lead to an increased risk of damage to crops from pests or weeds in the early years of organic production" (York, 2007). The University of Minnesota also conducted research across 66 farms and concluded overall, organic yields are "considerably lower than conventional yields" (*Will Organic Food Fail to Feed the World,* 2012). However, yields after the transition period are recoverable. Sustainable Agriculture Research and Education (*Economics of Organic Production*), estimates that about 90-95% of a farmer's yields can be recovered in the years following the transition.

Transitioning farmers also worry that organic methods can hurt the nitrogen needs of crops. Under the strict organic guidelines synthetic fertilizers are not permitted. This means farmers must find ways of providing nitrogen to their crops without the use of harmful fertilizers. Alfalfa and hairy vetch (containing 3-4% nitrogen) can provide some sources of nitrogen, while natural manures and organic compost can also offer nitrogen to farmers (Moyer).

Marketing and Distribution

Marketing strategies can take many forms for farmers and play a major role in their ability to achieve success. How a farmer chooses to interact with the market can determine the profitability of the crop mix on a farm. The two main strategies that are employed in marketing and distribution at the farm level are direct marketing (Roadside stand and online sales, Farmers Markets, Community Supported Agriculture) and value based chains (Farm direct to Wholesale, Multi-Farm Community Supported Agriculture, Food Hubs). In the food retail space, organizations will primarily interact with farmers willing to engage in some type of value-based chain, and the farmers contacted regarding the formation of the model in chapter 5 all distribute to retailers.

Direct Marketing

Direct marketing typically takes three forms according to Allie Bauman and company in the article *An Evolving Classification Scheme of Local Food Business Models*: Roadside Stands and Online Sales, Community Supported Agriculture (CSA) and Farmers markets. Roadside stands and online sales are possibly the most profitable option for a farmer on a per-unit sold basis because they allow a farmer to achieve high margins. Through this scheme, farmers can set their own price and there is little cost in the form of marketing and set up of the storefront. According to the article, a farmer who is on a well-traveled roadside can even overcome some of the volume concerns associated with direct marketing. Farmers markets meanwhile allow a farmer to reach more local consumers than the typical roadside stand, and farmers can also benefit from shoppers who go to famers markets to buy a myriad of goods because they can get more exposure to consumers who would otherwise not have thought about purchasing their goods. Finally, community supported agriculture is a system in which a farm operation is supported by shareholders within the community who share both the benefits and risks of food production (jazbacfarm.com). CSAs work by having local members of the community enter into agreements to purchase large quantities of a farmer's goods each selling period. Although this marketing strategy is dependent on the size and willingness to cooperate of the local community, some farmers may find that entering into CSAs are a more stable source of income because of the informal contracts that are agreed upon. Issues that tend to arise from direct marketing strategies typically arise because the farmer simply cannot reach the same amount of consumers that they can by entering into a value-based chain.

Value-Based Chains

Direct to Wholesale offers the farmer a chance to achieve more market reach by selling product to wholesalers, specialty retailers, and restaurants. This approach has a high dollar value per unit to farmers, and typically, farmers can have the opportunity to enter long-term contracts with businesses to become a fixed supplier in an organization's supply chain (As mentioned above, Costco has become a leader in procuring organic goods from the farm level). Selling to restaurants is a growing trend as well – as consumers demand healthier, more organic foods restaurants see value in sourcing naturally grown food direct from the farm. A farmer may also enter a muli-farm CSA. When a farmer enters a multi-farm CSA, they still enter into contracts with the local community or with businesses, but they pool resources with other farmers in order to have unified marketing and distribution efforts.

Finally, the USDA defines a food hub as "a centrally located facility with a business management structure facilitating the aggregation, storage, processing, distribution, and/or marketing of locally/regionally produced food products" (*Getting to Scale with Regional Food Hubs*, 2016). Food hubs are similar to multi farm CSAs in the sense that they involve the pooling of resources. The key difference is that they outsource all business functions outside the growing of product to an outside business in charge of marketing and distribution. Food hubs are good for small to mid-size farmers who do not have the financial resources to market and distribute their product on their own . Figure 5 summarizes these various marketing channels.

These marketing channels directly affect how a farmer makes money. As we have seen, some strategies may benefit some farmers more than others, and sometimes (as previously mentioned in Chapter 3) farmers lack either the proper information or means to reach their selling market where they can achieve price premiums.

Source: http://articles.extension.org/pages/70544/an-evolving-classification-scheme-of-local-food-business-models

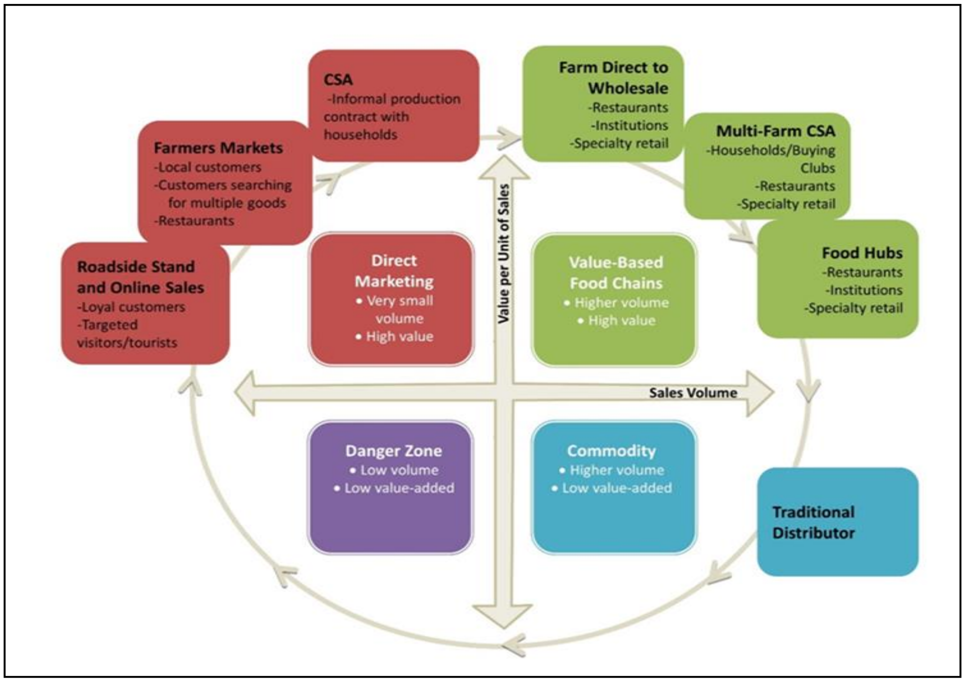


Figure 5. Marketing Strategies for Farmers - Colorado State

Prices

A farmers' primary incentive to make the transition to organic farming from conventional methods is the price premium on their crops. While yields on their farms may go down during the transition period, premiums for their produce can make up for the lost yield. The USDA publishes weekly reports on the prices for organic grains currently in the market. For example, via the USDA's agricultural marketing service, a farmer who produces corn organically can earn up to $9.35 per bushel, whereas they can only up to $4.07 under conventional prices (Bi-weekly foodstuffs, daily grain report march 16th). Similar prices exist in soybean production where a farmer can get up to $22.00 a bushel nationally under organic methods, but only as much as $ 9.40 under conventional methods. Premiums exist in the market for organic goods because consumers are willing to pay more (see chapter 1), but also because farmers must have some incentive to battle the higher costs of producing these products. In terms of feasibility, as mentioned above, these prices must be viewed in relation to the costs associated with organic production and often only large farms are able to make the transition because they can achieve scale that small, more diversified farms cannot.

Chapter 5

Building the Spreadsheet Analysis Tool

The model built for this research aims to provide farmers or farm consultants with a visual aid in seeing the impact of a transition from conventional to organic production. It draws upon the knowledge in the literature review above. The barriers, costs, inputs, prices, and other considerations from the literature review that a farmer might address in making the transition from conventional production to organic production have influenced the model. Each of the studies mentioned above however does not provide a user with a useable tool to describe the characteristics on their farm in aim of showing them if they can achieve a successful transition. It is in this light that I have developed a decision tool in the form of an Excel TM model that allows a farmer to describe their current operations from a pro forma income statement platform. Using the decision tool a farmer can input the cost and price characteristics that describe their farm, look at the financial impact before and after the transition, and use it to make the decision whether or not to take on the risks of transitioning to organic production.

Theory behind the Model

Summary Sheet

The decision tool developed for this report contains nine spreadsheets within an Excel TM workbook. The first spreadsheet is the "summary sheet" which encompasses the decisions made throughout the rest of the model. It incorporates many of the facets of the farming process discussed in the literature review above; it contains a measure of farm size, yield inputs, price, costs, and net income over a transition period for a farm as well as a strictly conventional period for comparison.

The first decision a user of the model will see on the *summary sheet* are input cells asking a farmer to describe his farm size and number of acres used in his operation. A farmer will choose a crop from a predetermined list of popular crops in the Northeast, United States in cells A4:A9. Then they will input how much land they have devoted to each crop in acres in cells B4:G9. This design allows a farmer to have any range of land used, so both large-scale and small-scale farms can participate.

Directly to the right of the “Acres Used” plot is a table titled “Prices and Yields”. Based on the crop mix chosen by a farmer in the “Acres Used” table, sales prices will be chosen from the table of prices for each product. These prices originate from the list “Price and Cost Data”. Organic prices are based on prices from the most recent USDAs bi-weekly foodstuffs report from March 16^{th}. These prices are national averages from around the nation for the crops listed in this study. The conventional prices come from daily reports from the USDA. The next table down on the left of the screen starting in cell A13 titled *Revenues* begins financial calculations on what a farm is selling over a 6-year time horizon. In cells B14:G14 a user may choose the length of their transition. Years marked with an asterisk (*) signal that organic premiums can be obtained, while those without an asterisk signal that conventional prices are used. Six years were chosen for this study so that a farmer or any user of this model could see the financial impact during the 3 years (or more) during the transition, as well as a few years after the transition. This is very important from an intuitive standpoint. A farmer may very well be making *less money* during their transition, but allowing them to see that they can *make more* than they could under conventional methods after the transition period has ended can give them a different perspective on the feasibility of the transition for their farm. Cells B15:G21 represent the revenue for transitional years, with a mix of conventional and organic prices depending on the crop mix a farmer chooses and the length he or she picks for transition length, while cells B23:B30 represent the revenues made under conventional methods. Revenues are calculated by taking acres multiplied by the yield in bushels for each crop multiplied by the selling price. By showing both the transitional and conventional outcomes side by side, a farmer can place in direct comparison the financial impact of making the transition compared to what he or she currently has on their farm.

Directly to the right of the *Revenue* tables are tables titled *Total Cost.* The first table (cells I15:O22) represents costs during a transition period and the second table (cells I23:O31) represent costs for a conventional operation. Total costs depend on the crop mix chosen in the *Acres Used* table in the first portion of the spreadsheet. Once a crop mix has been chosen, the spreadsheet pulls cost information from individual crop spreadsheets for that crop. Each crop (cover or cash) has its own cost spreadsheet with harvest, operating, and overhead costs associated with farming this product. These cost sheets (sheets 4-7 for conventional costs, and 7-9 for organic costs) were developed based off the model that University of California Davis uses in their crop budget reports (www.coststudies.ucdavis.edu, 2016). Costs for organic production in sheets 7-9 for the three crops chosen in the study are higher than the costs to produce conventionally – this accurately supports the research conducted that indicated organic production costing more than conventional. Costs in the two tables are calculated by taking acres used multiplied by the price per acre per crop found in the respective cost sheets. To the right of the primary cost table are two tables that allow a farmer to make a quick change to a top-cost line item, so that they can quickly and easily see how a change in fertilizing cost, land costs, weeding costs, or harvesting costs, can affect their income without having to manually change it in the corresponding spreadsheets. When a farmer makes a change in S17:S20 (for transitional) or S26:S29 (for conventional) they automatically are funneled into the cost table.

Finally, net income is represented in the four rows at the bottom of the summary sheet. The first two rows indicate a transition period and a following two for a conventional period. These cells (A35:G38) simply add up the totals from the *Revenue* and substract *Total Costs* tables above. They also feed into the *Summary Chart* on the next sheet.

Summary Chart

The next spreadsheet titled *Summary Chart* gives the user a visual representation of the earnings they can expect by inputting their farm characteristics into the *Summary Sheet* and the respective cost sheets for their farm. This summary chart is crucial to the effort set forth in this report because of how easy it is to grasp by first time users of the model. It tracks the returns from the transition period, through selling of conventional prices for a specified period of time and then at organic prices after the transition, and also tracks a conventional path that a farmer would choose as the alternative to making the transition. As one would expect, the first years of the transition result in lower earnings for the farmer because they come with higher costs, but as organic prices are ascertained profits begin to rise (as you can see by the blue line moving above the red line in the graph below). It is with every intention that the farmer using this tool to make decisions on their farm see this visual representation because while it may not be easy to understand the complex numbers and formulae in the model, the chart summarizes the financial impact of a farmer's unique transition in a way that is easy to grasp.

Price and Cost Data

The next spreadsheet, *Price&Cost Data* summarizes the total costs per year for each of the crop options on the following spreadsheets(Conventional Corn, Conventional Wheat, Conventional Oat, Conventional Soybean, Organic Corn, Organic Wheat, Organic Oat, Organic Soybean). It also includes the pricing information from the summary sheet, which again is obtained by looking at the bi-weekly foodstuffs report by the USDA for both conventional and organic goods. These prices are listed per bushel, and thus are not representative of the prices per acre without an acres used measurement. This is calculated on the summary sheet. The main purpose of this spreadsheet is to allow the quick and easy pull of pricing information from this spreadsheet to the *Summary Sheet* by creating tables and referencing them. Cell references are used to grab information from the cost sheets (sheets 4- 12). The following spreadsheets focus on how cost structures were derived for each crop system.

Conventional and Organic Cost Spreadsheets

In order to reflect properly the financial health of farms using the decision tool developed in this report, it is crucial to have an accurate description of how a farmer structures their cost. The eight spreadsheets organized on sheets 8-11 each break down costs of Corn, Oat, Soybean, and Wheat. The first four spreadsheets model conventional prices, and the second four sheets model organic prices. These sheets provide line items for harvest, overhead, and operating costs and are meant to be user friendly enough for a farmer to be able to input their own costs that correspond to the line items in the spreadsheet.

Replicating the Model

The transition model developed in this study uses various simple Excel TM functions and tools to create the bottom line net income calculations that represent farmer health. The summary sheet is by far the most complex. The following sheets simply use cell references and allow farmers or users of the model to input their own figures into the cost sheets and prices on their own farm. Below is a list the major functions one should know how to use to create or build upon the decision tool built in this report followed by a brief discussion on the basic formulas used:

- Data Validation
- IF Statements
- VLOOKUP Function
- HLOOKUP Function
- SUM Function
- Cell References (Absolute and Relative References)
- Conditional Formatting

Yearly Calculations

Yearly revenue calculations in the spreadsheet decision tool followed the basic conceptual formula: Revenue = (CropChoice1 * Price of CropChoice1 * YieldCropChoice1 * Acres Used) + (CropChoice2 * PriceCropChoice2 * YieldCropChoice2 * Acres Used) + …

Example Transitional Revenue equation from model:

```
IF((A16=0),0,IF(AND(ISNUMBER(FIND("*",$B$14,1)),$M$10="No"),VLOOKUP(A16,$I$4:$M$9,3,FALSE)*(B4*VLOOKUP(A16,$I$4:$N$9,6,FALSE)),IF(AND(ISNUMBER(FIND("*",$B$14,1)),$M$10="Yes"),VLOOKUP(A16,$I$4:$M$9,5,FALSE)*(B4*VLOOKUP(A16,$I$4:$N$9,6,FALSE)),IF($L$10="No",VLOOKUP(A16,$I$4:$M$9,2,FALSE)*(B4*VLOOKUP(A16,$I$4:$N$9,6,FALSE)),IF($L$10="Yes",VLOOKUP(A16,$I$4:$M$9,4,FALSE)*(B4*VLOOKUP(A16,$I$4:$N$9,6,FALSE)))))))
```

Yearly cost calculations in the spreadsheet tool followed the conceptual formula: Yearly Cost = (TotalCostPerAcreCropChoice1 * Acres Used) +(TotalCostPerAcreCropChoice2 * Acres Used) + …

Example Transitional Cost equation from model:

```
IF((I16=0),0,IF(AND(I16=$Q$16,$S$21="No"),HLOOKUP(I16,'Price&Cost Data'!$K$1:$O$7,2,FALSE)-SUM($R$17:$R$20)+SUM($S$17:$S$20),HLOOKUP(I16,'Price&Cost Data'!$K$1:$O$7,2,FALSE)*B4))
```

Yearly net income calculations in the spreadsheet tool followed the formula: Yearly Net Income = TotalRevenueYearX – TotalCostYearX

Example Net Income Equation:

```
B22-J22
```

Chapter 6

The Model in Practice

It is important that through this report one can understand completely what the model intends to do, and has a working knowledge of how it can be used. To demonstrate the model's usefulness in practice, costs and crop rotations have been picked to closely resemble a small farm (100 acres) in the Northeast United States and have been plugged into the decision tool. This section of the report will construct a model of the financial impact on a small farm because in general, farms tend to be smaller in New York and Pennsylvania where this research is taking place. Below is a brief discussion of the costs and rotations that describe the cost situation on the constructed model farm, followed by the output that the decision tool provides.

Crops, Acres, and Costs

The cash crops chosen for this model farm in the Northeast were soybean and corn. These crops were chosen because they appear to be popular amongst farmers in the region through research and a conversation with Mike Kreher of Kreher Farms – a farm owner in New York. Alfalfa is used as a cover crop in this study because it can provide nutrients to the soil and be sold to provide some revenue during the noncash crop segment of the rotation to offset costs. For the sake of simplicity, a 150 acre farm (small farm) was selected to match what is typical of the region, and 25 acre lots were chosen for each crop over the course of the six year time horizon. Prices for these crops both conventional and organic can be found in the corresponding table to the right marked "Prices and Yields". Note that yields for Alfalfa are typically measured in tons as opposed to bushels. The yields per acre chosen below reflect national averages for these crops, but in practice a farmer may choose a yield that best reflects his farm. Columns 4 and 5 of the "Prices and Yields" table allow a user to quickly make an input change to a price in the model to compare what a slightly higher or lower price would do to their revenue and net income. The gray output cells signal "Yes" when there is a change and "No" when there is not. Below is a picture directly from the model of what these decisions may look like to the user of the model (All values in burnt orange highlighted cells are inputs, and are meant for the user to change manually).

Acres Used

Crops Planted	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Corn	25	25	25	25	25	25
Soybean	25	25	25	25	25	25
Alfalfa	25	25	25	25	25	25
Corn	25	25	25	25	25	25
Alfalfa	25	25	25	25	25	25
Soybean	25	25	25	25	25	25
Total Acreage Used	150	150	150	150	150	150
Farm Size	150					

Prices and Yields

Crops Planted	Conventional	Organic	C.Change	O. Change	Bushels per acre	
Wheat	6.49	16.5	6.49	16.5	56	
Oat	2.5	5.5	2.5	5.5	62	
Soybean	8.75	20.75	8.75	20.75	48	
Barley	3	8.57	3	8.57	40	
Corn	3.75	9.825	3.75	9.825	171	
Alfalfa	210	220	210	220	5.5	(Tons)
Is there an input change?			No	No		

Figure 6. Decision Tool Acres Used, Crops Chosen, and Prices

Costs in the model are set up to resemble an income statement. They include operating, harvest, and overhead costs on the farm. Line items draw information from UC Davis crop cost of production studies, and from conversations with Mike Kreher from Kreher Farms (an organic egg supplier to Wegman's) and Mary-Howell from Lakeview Organic Farms. Users of the model should input their costs into the respective line items for their conventional crops and organic crops so as to reflect the cost per acre on their farm. **Figure 7on the following page** illustrates an example for Corn in Year 1.Years 2 through 6, as well as all of the cost spreadsheets throughout the study for each crop (organic and conventional) follow a similar format. Consistent with the research above, costs for the organic crops were chosen to be higher than conventional systems to give the reader a realistic view of what a transition may look like. All of these costs for years 1 through 6 of each crop are organized into a cost table in the "Cost&Price Data" spreadsheet so that certain Excel TM functions like VLOOKUP and HLOOKUP may be performed to retrieve costs. **Figure 8** shows what this summarized table of costs looks like on the following page (red columns signify conventional costs and green crops indicate organic costs; Alfalfa costs are assumed identical between organic and conventional methods).

COSTS	YEAR 1
Farm In Question	Farm A
Crop in Quesion	Corn
Operating Costs	
Fertilizing Costs	120
Costs to Weed	20
Planting Costs	45
Land Preparation Costs	100
Pickup Truck	50
TOTAL OPERATING COSTS	335
HARVEST COSTS	
Harvest	20
TOTAL HARVEST COST	20
OVERHEAD(CASH AND NON-CASH)	
Rent	100
Liability Insurance	2
Office Expenses	20
Property Taxes	1
Property Insurance	1
Repairs	20
Building	9
Fuel Tanks	2
GPS Technology?	0
Shop Tools	2
Irrigation	2
Equipment	10
TOTAL OVERHEAD	169
TOTAL COSTS	524

Figure 7. Conventional Corn Cost Example

Yearly Costs	Corn	Wheat	Oat	Alfalfa	Soybean	Corn	Wheat	Oat	Soybean	Alfalfa
1	524	292	165	838	684	954	384	259	858	838
2	522	250	165	827	684	981	384	259	847	827
3	524	294	165	837	684	959	389	259	887	837
4	537	275	165	837	684	964	445	259	871	837
5	539	275	165	837	684	959	390	284	857	837
6	525	307	165	837	684	974	391	259	852	837

Figure 8. Summarized View of Costs Years 1 – 6

Revenues

Revenues in the decision tool are calculated on the summary sheet by using the user's input for crop mix, acres used, and transition length. Transition length (explained in Chapter 5) allows a farmer to choose whether organic or conventional prices will be used in revenue calculations. These are the green and red cells below with "Year 1, Year 2…" and so on. Revenues are displayed in the yellow-gold cells below in **Figure 9**. **Figure 9** shows not only the revenues for each crop in each year per acre, but also totals the revenues in each year that will eventually lead to a revenues over costs net income figure for each year. Costs in the decision tool are calculated in a similar manner, drawing costs from the summarized cost table in **Figure 8**, found in the spreadsheet "Price&Cost Data". Transitional costs draw from organic costs per acre, while conventional costs per acre are displayed in the conventional tables shown below in **Figure 10**. The left half of **Figure 10** also displays conventional revenue, which uses solely conventional prices for products.

Revenue per acre (Organic years marked with *)

Transition Length	Year 1	Year 2	Year 3	Year 4*	Year5*	Year 6*
Transitional						
Corn	16031.25	16031.3	16031.3	42001.9	42001.9	42001.9
Soybean	10500	10500	10500	24900	24900	24900
Alfalfa	28875	28875	28875	30250	30250	30250
Corn	16031.25	16031.3	16031.3	42001.9	42001.9	42001.9
Alfalfa	28875	28875	28875	30250	30250	30250
Soybean	10500	10500	10500	24900	24900	24900
Yearly Total	110812.5	110813	110813	194304	194304	194304

Total Costs per acre

Crops Planted	Year 1	Year 2	Year 3	Year 4	Year 5*	Year 6*
Transitional						
Corn	27700	28375	27825	27950	29450	28200
Soybean	21450	21175	22175	21775	21425	21300
Alfalfa	20950	20675	20925	20925	20925	20925
Corn	27700	28375	27825	27950	29450	28200
Alfalfa	20950	20675	20925	20925	20925	20925
Soybean	21450	21175	22175	21775	21425	21300
Yearly Total	140200	140450	141850	141300	143600	140850

Figure 9. Transitional Revenues and Costs

Conventional	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Corn	16031.25	16031.3	16031.3	16031.3	16031.3	16031.3
Soybean	10500	10500	10500	10500	10500	10500
Alfalfa	28875	28875	28875	28875	28875	28875
Corn	16031.25	16031.3	16031.3	16031.3	16031.3	16031.3
Alfalfa	28875	28875	28875	28875	28875	28875
Soybean	10500	10500	10500	10500	10500	10500
Yearly Totals	110812.5	110813	110813	110813	110813	110813

Conventional	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Corn	9200	9225	9225	9225	9225	9300
Soybean	17100	17100	17100	17100	17100	17100
Alfalfa	20950	20675	20925	20925	20925	20925
Corn	9200	9225	9225	9225	9225	9300
Alfalfa	20950	20675	20925	20925	20925	20925
Soybean	17100	17100	17100	17100	17100	17100
Yearly Totals	94500	94000	94500	94500	94500	94650

Figure 10. Conventional Revenues and Costs

Net Income

Net income in the decision tool subtracts total costs per year from revenue per year in order to provide net income calculations for years 1 through 6 on both the transition and conventional production options. Figure 11 below shows a snapshot of the decision tool's net income calculations. As expected, farmers are making a loss during the transition years, and then actually end up making more during the years following the transition at organic prices.

Net Income

Transitional

Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Conventional	-18662.5	-19463	-19613	48253.8	48853.8	48228.8
Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	7187.5	7562.5	7212.5	6562.5	6462.5	7162.5

Figure 11. Decision Tool Net Income

Chapter 7

Results and Discussion

Although the results are not specific to an individual farm and use some roughly representative cost and return values, the decision tool results are illustrative of the financial impacts of a transition to organic grain production and potential barriers. Negative profits in the first three years of the transition (-$18,662.5, -$19,463, -$19,613) may dissuade farmers from engaging in organic production despite higher profits after the transition period ($48,253.8, $48,853.8, $48,228.8). This is one of the principal teaching points that motivated the development of the decision tool. The tool allows farmers to visualize their long-term profitability (or in some cases, lack thereof) via the decision tool and make more data driven and sound decisions for their farms. **Figure 12** shows a summary chart of the net income results from the constructed farm model above (red line = conventional returns; blue line = transitional returns). Although numerous other specific results could be reported, the aggregated annual cash flow values are highlighted here because of their importance in supporting the decision to organic production.

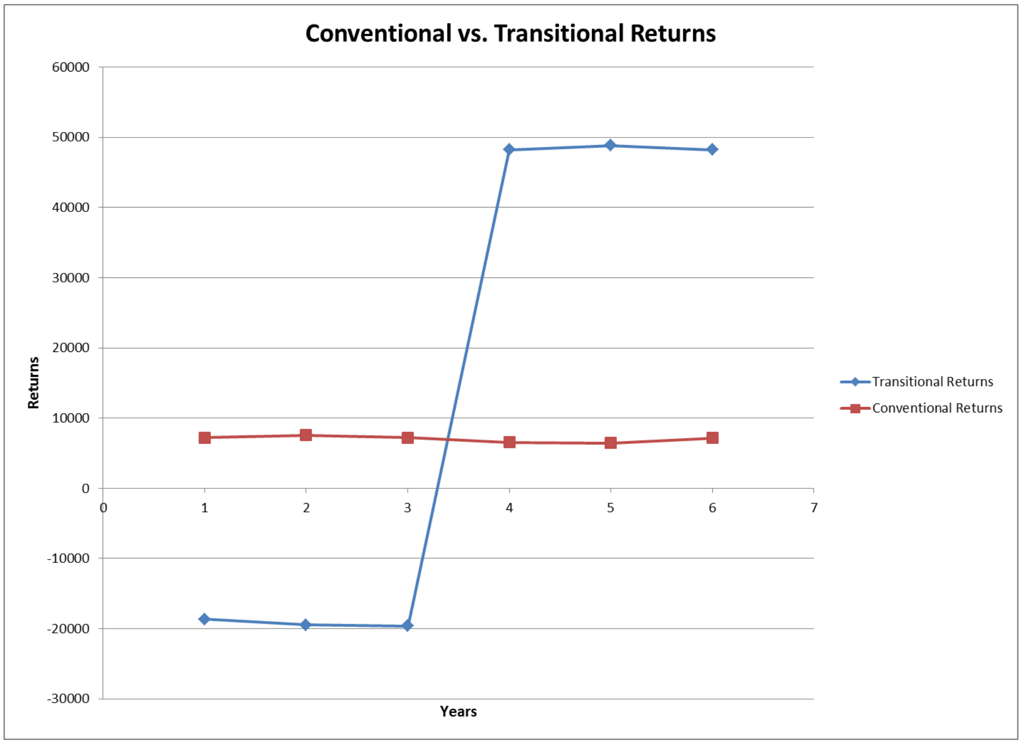


Figure 12. Summary Chart of Net Income

This final model is very similar to those presented to farmers over the phone and via email. These conversations spurred productive discussion concerning the suitability and ease of use of the model and what changes need to or should be made to improve it. The discussion that follows highlights conversations with Mike Kreher of Kreher Farm Fresh Eggs, Mary-Howell of Lakeview Organic Grain, and John Hanchar of Cornell Cooperative Extension.

Mike Kreher, Kreher Farm Fresh Eggs

Mike Kreher is an organic farmer and CEO of Kreher's Farm Fresh Eggs. The business is a large supplier of eggs to retailers but the company also runs an organic and sustainable grain production of feed corn that they use to feed their hens. The company owns over 3,000 acres of land on which it operates and owns its own mill for grain processing (for more information visit KreherEggs.com). The original impetus for the development of the spreadsheet tool came from a conference call with Mike in November 2015, when he indicated the difficulty that potential organic grain producers have in visualizing the financial challenges and opportunities of making the transition. The conversation with Mike pertained to their corn operation, and if the decision tool developed above could be used on his farm and others in the Northeast.

Mike indicated that the decision tool was useful and could help farmers better understand their transition. In fact, Mike acknowledged that the decision tool developed for this research was “very similar to a tool that we have attempted to develop” for various decisions on his farm. Kreher Farm Fresh Eggs develops similar spreadsheet models to determine when to buy and sell machinery and farm tools and acknowledges that the decision tool presented to him could work.

Mike provided helpful insight into crop mix and cost line items that improved the cost estimates and functioning of the tool. An important first step according to mike is the inclusion of soybeans into the crop mix because typically, grain farmers in the northeast typically decide between corn and soybean each rotation period. Knowing this allowed our team to develop a cost structure and research prices to implement into the model in order to make soybean production an option. Mike also ran through the costs on his farm and suggested adding irrigation and drying costs to line items that appear on each cost sheet. This way, if a farmer is also a processor of grain he or she can add those cost characteristics to their model as well. These changes helped to make our model more useful, and an updated version of the model was shared with Mary-Howell of Lakeview Organic Grain for further discussion.

Mary-Howell, Lakeview Organic Grain

Lakeview Organic Farms, run by Klaas and Mary-Howell Martens sells a large variety of organic feed grade grain, seeds and animal health products. Mary-Howell offered a unique yet critical perspective of the model and its functionality. Mary-Howell believed the model functioned properly and could be useful, but the costs presented in the model for each crop did not represent the characteristics of her farm. While she acknowledged that the point of the model developed in this study is to input a farmer's own costs and find their own unique output in the form of net income, she believed that by offering farmers or any other user of the model a version where costs closely mimic reality to some extent can help sell the model. This way a farmer who is not familiar with Excel TM can see its usefulness whereas without these data points they may say (in Mary-Howell's words) "you are just another academic who has never been a farmer".

At the beginning of this project, it was intended that farm level research would be conducted to measure costs on a number of farms to come up with approximate values to act as placeholders in the decision tool that was ultimately created. This is consistent with Mary-Howell's recommendation. However, due to time and other resource constraints of the effort of this project a focus more on developing a fully functional tool that performed its job in measuring prices, revenues, costs, and returns and then having reputable sources critique the model to make it more useful was taken. The next logical step in this effort given more time would be to get ground level data from the farm level to create more accurate placeholder costs in the cost sheets currently in the decision tool.

John Hanchar, Cornell Cooperative Extension

Finally, John Hanchar, a farm financial analyst with Cornell's Cooperative Extension in western New York (where there is more potential for organic grain production) commented on the tool's potential usefulness in giving farmers an understanding of what a transition may look like on their farm. Cornell's Cooperative Extension maintains numerous programs with the goal of supporting more ecologically sound and sustainable farming practices while maintaining profitability. John is a Farm Business Management Associate for the Cornell Cooperative Extension who works with farmers in the northeastern United States to develop sustainable and profitable business practices on their farms, and organic grain development has been a large part of his work recently, noting that his work in the area has been an "extensive effort".

John thought that the decision tool that was developed for this report "captured a couple of the major things we look at in our models, the organization of cost and the multi-period component". John stressed the importance of having the multi-year component of the model because farmers need to see the long-term impact of the transition beyond the first few years of negative returns. In regards to the cost spreadsheets in the model, John thought that their organization was good noting that when they create these types of models for consultation work with farmers they too "tend to keep farm cost line item lists general" so that it can be applied to a broader range of farmers. John said that the biggest challenge that he faces in terms of costs are obtaining this information from farmers – some have their costs readily available, while some do not keep organized accounting records.

The most crucial element in the decision tool developed in this research is its ability to capture a farmer's financial outlook in the present and into the future. John believed that while my model does a reasonably good job at this, one way to possibly make the tool better would be to “introduce a time value of money analysis” in the form of a Net Present Value or Internal Rate of Return, calculation. This is an element to the model that could be implemented in the future to further develop the financial outlook that the model provides. The discussion based on of the reviews of the spreadsheet tool by farm managers and farm financial analysts suggests that the tool will be useful for its stated purpose, and that with additional data inputs from specific farms, this can be more comprehensively evaluated.

Chapter 8

Conclusions

The research conducted in this report and the model that was built originated from a business need of food retailers to develop ways of finding new suppliers to facilitate organic grain sourcing. A large number of studies have discussed (largely in qualitative terms) the sources of the limited development of an organic supplier base. Few studies analyzed specific costs of organic production, and discussed the problems and barriers concerning organic production without offering farmers a tool to support financial analysis of the three-year transition process. This suggested that a spreadsheet tool could be usefully developed to enable farmers to envision the financial dimensions of the transition to organic production on their farms. The process of information gathering, model building, and discussions with potential users of the decision tool has led to a final model that in principal could be used by a wide range of farmers. The decision tool, however, has implications outside of the farm level as well.

How the Model Can Be Used

Although this model has direct meaning to farmers, organizations and consultants working in extension organizations or in supplier-development efforts for buyers can benefit as well. By empowering food retailers with a tool like this they can more readily identify new suppliers, and hold discussions with current suppliers. Using the model can facilitate discussions with farms currently producing conventional crops and make a case for making the transition to organic grain. Similarly, consultants working in extension can use the model in their discussions with famers as a teaching tool. Farmers may find that the tool has given them a different perspective on how they view production related financing on their farm. They may find that they can make more money than conventional production after the transition and with the information provided by the tool, assess and potentially more easily obtain a loan to help finance the negative returns during the transition years.

Implications for Supply Chain Managers

At the beginning of this research, this report examined the SCOR model of supply chain management and took a deep dive into best practice sourcing strategies for firms. It then went on to describe how sourcing organic grain may not follow conventional business thinking because of how few sources of supply there are. This report hopefully has provided some additional insights into how deeply one should look into the problems concerning organic grain production and realize that it is a problem that originates at the farm level and the producer's challenge of overcoming the hurdle of transition to certified organic production. In the big picture view, firms should realize that because there are few forms of supply for organic food that the common practice of rationalizing (consolidating) the supply base is unlikely to work in this case. Buyers in this industry segment might try to find many small organic suppliers to fill their needs, or attempt to create a strategy to develop more sources of organic supply by choosing to fund efforts to help farmers overcome the main challenges that the literature review and the model above have made evident.

Have We Solved the Organic Grain Problem?

Demand for organic goods has been steadily rising over the last twenty years and it is currently outstripping supply. This report and the model that has been developed for it go a long way in describing why there is a shortage, identifying some of the major barriers at the farm level in the supply chain for these products. It also offers a decision tool that can help develop suppliers in this category, or simply help a farmer understand if they can make the transition on their own farm for their own personal financial goals. These two points alone however are not enough to conclude that a solution to the overarching problem has been achieved, but it does offer businesses and farmers a way to understand the issue at hand a way of thinking through the decision tool that can help place an analytical mindset behind the farming process.

Appendix A

Prominent Data Sources for the Organic Transition Tool

The decision tool created in this study was the result of identifying a major barrier to farmers in their transition: an inability to properly envision their costs and see what their income would look like over a transitional time horizon. The tool was developed by consulting with thesis supervisor Chuck Nicholson to develop the basic structure in its cost and revenue calculations, and also drew upon data from the USDA and UC Davis's crop studies to develop realistic cost line items and pricing information for the various crops chosen in the study.

USDA Crop Pricing Information

The pricing information in this study came from the USDA's market analysis of different crops, organic and non-organic to obtain prices. The prices used in the model are the most up to date prices listed on the USDA's bi-weekly foodstuffs report for organic grains. These reports can be found at https://www.ams.usda.gov/market-news/livestock-poultry-grain. An example of the bi-weekly food stuff report from March 30th is below:

National Organic Grain and Feedstuffs - Bi-Weekly

*****Change on Feed Corn FOB and Delivered Prices*****

Greeley, CO | Wed, Mar 30, 2016 | USDA Livestock, Poultry & Grain Market News

Bi-Weekly Weighted Average Report for the Week Period: 03/18/2016 to 03/26/2016

Compared to the prior trading period, organic grains traded light on light demand. Forward contracts for 2016 organic crops are still being negotiated with growers showing little interest in contracting at current bid offers. Feed mills are exiting the market due to storage constraints that will last until new crop. Imports and a strong U. S. Dollar continue to impact trade activity on domestic organic corn, soybeans, and wheat adding a strong possibility for carryover into new crop. Trade on food grade corn inactive. Feed grade corn traded mostly 7.90 to 8.80 per bushel FOB on limited trades. Trade on food grade soybeans inactive with several contract offers established. Feed grade soybean trades limited with slightly higher undertones on light demand. Soybean meal traded steady to slightly lower on light demand with trades limited. Trade activity on roasted soybeans, soybean oil, oats and barley too limited to trend but steady to slightly lower undertones were noted. Trade activity on HRS, SRW, and HRW too limited to trend, but steady slightly higher undertones were noted on light demand.

Prices negotiated spot market, FOB the farm and reported with a weighted average. Prices quoted $/bushel, except soybean meal ($/ton and FOB the mill). Hay reported FOB the stack or barn unless otherwise noted. Soybean oil, sunflowers, spelt, cents/lb.

		Price	This Week	2 Weeks Ago	Year Ago
Organic Corn	Food Yellow				
	Feed Yellow	6.60 - 11.50	8.06	8.38	12.58
Organic Soybeans	Food Grade				28.77
	Feed Grade	18.60 - 22.00	19.51	19.22	24.11
	Meal	900.00 - 1035.00	1020.82	1031.44	1095.56
	Roasted				
	Oil				
Organic Oats	Feed Grade				6.43
Organic Barley	Feed Grade				9.06
Organic Wheat	Food Grade HRS				
	Feed Grade HRS				
	Food Grade SRW				
	Feed Grade SRW				
	Food Grade HRW				
	Feed Grade HRW				12.37

UC Davis Crop Studies

To develop the cost line items used in the decision tool, research into crop budget reports at University of California Davis were very influential in capturing most of the major categories. These studies can be found at coststudies.ucdavis.edu. Below is an example of what a budget for Feed Corn may look like from a UC Davis report:

UC COOPERATIVE EXTENSION
TABLE 1. COSTS PER ACRE TO PRODUCE FIELD CORN
SACRAMENTO VALLEY AND NORTHERN SAN JOAQUIN VALLEY-2015

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
Pre-plant:								
Chisel 18" Depth 25% of Ac	0.04	1	2	1	0	0	3	
Stubble Disc & Roll 25% of Ac	0.04	1	2	1	0	0	3	
Finish Disc & Roll	0.11	2	5	3	0	0	10	
Tri-plane 75% of Ac	0.11	2	5	2	0	0	10	
Laser Level 25% of Ac	0.00	0	0	0	0	40	40	
List-Shape Beds	0.15	3	4	2	0	0	10	
Weeds-Fallow Beds Roundup PowerMax	0.05	1	0	0	9	0	10	
Open-Fallow Beds	0.15	3	4	2	0	0	9	
Open Ditch	0.05	1	2	1	0	0	4	
Pre-irrigate 20% of Ac	0.00	3	0	0	5	0	9	
Close Ditch	0.08	2	1	1	0	0	4	
TOTAL PRE-PLANT COSTS	0.79	20	26	13	14	40	112	
Cultural :								
Plant Corn-Starter Fertilizer	0.25	5	7	3	152	0	167	
Break Crust 10% of Ac	0.03	1	1	0	0	0	1	
Open Ditch 2X	0.10	2	5	2	0	0	8	
Irrigate 6X	0.00	103	0	0	163	0	265	
Close Ditch 2X	0.17	3	3	1	0	0	7	
Insects-Cutworms 20% of Ac	0.03	1	0	0	2	0	3	
Cultivate-Sidedress Fertilizer	0.10	2	3	1	145	5	156	
Weeds-Post Plant Roundup PowerMax	0.13	3	4	2	9	0	16	
Weeds-Post Plant-Broadleaf 25% of Ac	0.03	1	1	0	7	0	9	
Insects-Mites 60% of Ac	0.00	0	0	0	17	9	26	
Service Truck	0.17	3	2	2	0	0	7	
Pickup Trucks	0.42	17	6	2	0	0	24	
TOTAL CULTURAL COSTS	1.42	140	30	14	494	14	692	
Harvest :								
Harvest-Combine Corn	0.25	5	18	13	0	0	35	
Bank Out Grain	0.23	5	6	4	0	0	15	
Land Rent (18% of Return/Ac)	0.00	0	0	0	230	0	230	
TOTAL HARVEST COSTS	0.48	10	24	17	230	0	281	
Post-Harvest:								
Chop Stubble 50% of Ac	0.06	1	1	1	0	0	3	
Disc Stubble 50% of Ac	0.08	2	4	2	0	0	7	
TOTAL POST-HARVEST COSTS	0.14	3	5	3	0	0	10	
Interest on Operating Capital at 5.75%							22	
TOTAL OPERATING COSTS/ACRE	3	173	84	46	738	54	1,117	

Source: http://coststudyfiles.ucdavis.edu/uploads/cs_public/03/dc/03dc4496-32af-47c6-b479-38e1d27c134e/15cornsacramentovalleyfinaldraftjuly20.pdf

Appendix B

List of Main Equations Used in Decision Tool

Yearly Revenue Calculations from Summary Sheet

Transitional:

=IF((A16=0),0,IF(AND(ISNUMBER(FIND("*",$B$14,1)),$M$10="No"),VLOOKUP(A16,$I$4:$M$9,3,FALSE)*(B4*VLOOKUP(A16,$I$4:$N$9,6,FALSE)),IF(AND(ISNUMBER(FIND("*",$B$14,1)),$M$10="Yes"),VLOOKUP(A16,$I$4:$M$9,5,FALSE)*(B4*VLOOKUP(A16,$I$4:$N$9,6,FALSE)),IF($L$10="No",VLOOKUP(A16,$I$4:$M$9,2,FALSE)*(B4*VLOOKUP(A16,$I$4:$N$9,6,FALSE)),IF($L$10="Yes",VLOOKUP(A16,$I$4:$M$9,4,FALSE)*(B4*VLOOKUP(A16,$I$4:$N$9,6,FALSE)))))))

Conventional:

=IF((A16=0),0,IF($L$10="No",VLOOKUP(A25,$I$4:$M$9,4,FALSE)*B4,VLOOKUP(A25,$I$4:$K$9,2,FALSE)*B4)*VLOOKUP(A25,$I$4:$N$9,6,FALSE))

Yearly Cost Calculations from Summary Sheet

Transitional:

=IF((I16=0),0,IF(AND(I16=$Q$16,$S$21="No"),HLOOKUP(I16,'Price&Cost Data'!$K$1:$O$7,2,FALSE)-SUM($R$17:$R$20)+SUM($S$17:$S$20),HLOOKUP(I16,'Price&Cost Data'!$K$1:$O$7,2,FALSE)*B4))

Conventional:

=IF((A16=0),0,IF(AND(I25=$Q$16,$S$21="No"),HLOOKUP(I25,'Price&Cost Data'!$F$1:$J$7,2,FALSE)-SUM($R$17:$R$20)+SUM($S$17:$S$20),HLOOKUP(I25,'Price&Cost Data'!$F$1:$J$7,2,FALSE)))*B4

Yearly Net Income

Total Yearly Revenue – Total Yearly Cost

Screen Shots of Formulae from Model

Prices and Yields

Crops Planted	Conventional	Organic	C.Change	O. Change	Bushels per acre	
Wheat	6.49	11	6.49	11	56	
Oat	=VLOOKUP(I5,'Price&(	=VLOOKUP(I5,'Price&(	2.5	5.5	62	
Soybean	=VLOOKUP(I6,'Price&(	22	8.75	22	48	
Barley	=VLOOKUP(I7,'Price&(	=VLOOKUP(I7,'Price&(	3	8.57	40	
Corn	=VLOOKUP(I8,'Price&(	9.35	3.75	9.35	171	
Alfalfa	210	220	210	220	5.5	(Tons)
Is there an input change?			=IF(AND(J4=L4,J5=L5,J	=IF(AND(K4=M4,K5=M		

Total Costs per acre

Crops Planted	Year 1	Year 2	Year 3	Year 4	Year 5*	Year 6*
Transitional						
=A4	=IF((I16=0),0,IF(AND(	=IF((I16=0),0,IF(AND(	=IF((I16=0),0,IF(AND(	=IF((I16=0),0,IF(AND(	=IF((I16=0),0,IF((A16=	=IF((I16=0),0,IF(AND(
=A5	=IF((I17=0),0,IF(AND(	=IF((I17=0),0,IF(AND(	=IF((I17=0),0,IF(AND(	=IF((I17=0),0,IF(AND(	=IF((I17=0),0,IF((A17=	=IF((I17=0),0,IF(AND(
=A6	=IF((I18=0),0,IF(AND(	=IF((I18=0),0,IF(AND(	=IF((I18=0),0,IF(AND(	=IF((I18=0),0,IF(AND(	=IF((I18=0),0,IF((A18=	=IF((I18=0),0,IF(AND(
=A7	=IF((I19=0),0,IF(AND(	=IF((I19=0),0,IF(AND(	=IF((I19=0),0,IF(AND(	=IF((I19=0),0,IF(AND(	=IF((I19=0),0,IF((A19=	=IF((I19=0),0,IF(AND(
=A8	=IF((I20=0),0,IF(AND(	=IF((I20=0),0,IF(AND(	=IF((I20=0),0,IF(AND(	=IF((I20=0),0,IF(AND(	=IF((I20=0),0,IF((A20=	=IF((I20=0),0,IF(AND(
=A9	=IF((I21=0),0,IF(AND(	=IF((I21=0),0,IF(AND(	=IF((I21=0),0,IF(AND(	=IF((I21=0),0,IF(AND(	=IF((I21=0),0,IF((A21=	=IF((I21=0),0,IF(AND(
Yearly Total	=SUM(J16:J21)	=SUM(K16:K21)	=SUM(L16:L21)	=SUM(M16:M21)	=SUM(N16:N21)	=SUM(O16:O21)
Conventional						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
=A4	=IF((A16=0),0,IF(AND(	=IF((A16=0),0,IF(AND(	=IF((A16=0),0,IF(AND(	=IF((A16=0),0,IF(AND(	=IF((A16=0),0,IF(AND(	=IF((A16=0),0,IF(AND(
=A5	=IF((A17=0),0,IF(AND(	=IF((A17=0),0,IF(AND(	=IF((A17=0),0,IF(AND(	=IF((A17=0),0,IF(AND(	=IF((A17=0),0,IF(AND(	=IF((A17=0),0,IF(AND(
=A6	=IF((A18=0),0,IF(AND(	=IF((A18=0),0,IF(AND(	=IF((A18=0),0,IF(AND(	=IF((A18=0),0,IF(AND(	=IF((A18=0),0,IF(AND(	=IF((A18=0),0,IF(AND(
=A7	=IF((A19=0),0,IF(AND(	=IF((A19=0),0,IF(AND(	=IF((A19=0),0,IF(AND(	=IF((A19=0),0,IF(AND(	=IF((A19=0),0,IF(AND(	=IF((A19=0),0,IF(AND(
=A8	=IF((A20=0),0,IF(AND(	=IF((A20=0),0,IF(AND(	=IF((A20=0),0,IF(AND(	=IF((A20=0),0,IF(AND(	=IF((A20=0),0,IF(AND(	=IF((A20=0),0,IF(AND(
=A9	=IF((A21=0),0,IF(AND(	=IF((A21=0),0,IF(AND(	=IF((A21=0),0,IF(AND(	=IF((A21=0),0,IF(AND(	=IF((A21=0),0,IF(AND(	=IF((A21=0),0,IF(AND(
Yearly Totals	=SUM(J25:J30)	=SUM(K25:K30)	=SUM(L25:L30)	=SUM(M25:M30)	=SUM(N25:N30)	=SUM(O25:O30)

Oat	Current Cost
Fertilizer	500
Land Preparation Costs	500
Harvest	500
Weeding	500

Corn	Current Cost
Fertilizer	500
Land Preparation Costs	500
Harvest	500
Weeding	500

Acres Used						
Crops Planted	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Corn	25	25	25	25	25	25
Soybean	25	25	25	25	25	25
Alfalfa	25	25	25	25	25	25
Corn	25	25	25	25	25	25
	25	25	25	25	25	25
	25	25	25	25	25	25
Total Acreage	=SUM(B4:B9)	=SUM(C4:C9)	=SUM(D4:D9)	=SUM(E4:E9)	=SUM(F4:F9)	=SUM(G4:G9)
Farm Size	=MAX(SUM(B4:B9),SUM					
Revenue per acre (Organic years						
Transition Length	Year 1	Year 2	Year 3	Year 4*	Year5*	Year 6*
Transitional						
=A4	=IF((A16=0),0,IF(AND(I	=IF((A16=0),0,IF(AND(I	=IF((A16=0),0,IF(AND(I	=IF((A16=0),0,IF(AND(IS	=IF((A16=0),0,IF(AND(IS	=IF((A16=0),0,IF(AND(IS
=A5	=IF((A17=0),0,IF(AND(I	=IF((A17=0),0,IF(AND(I	=IF((A17=0),0,IF(AND(I	=IF((A17=0),0,IF(AND(IS	=IF((A17=0),0,IF(AND(IS	=IF((A17=0),0,IF(AND(IS
=A6	=IF((A18=0),0,IF(AND(I	=IF((A18=0),0,IF(AND(I	=IF((A18=0),0,IF(AND(I	=IF((A18=0),0,IF(AND(IS	=IF((A18=0),0,IF(AND(IS	=IF((A18=0),0,IF(AND(IS
=A7	=IF((A19=0),0,IF(AND(I	=IF((A19=0),0,IF(AND(I	=IF((A19=0),0,IF(AND(I	=IF((A19=0),0,IF(AND(IS	=IF((A19=0),0,IF(AND(IS	=IF((A19=0),0,IF(AND(IS
=A8	=IF((A20=0),0,IF(AND(I	=IF((A20=0),0,IF(AND(I	=IF((A20=0),0,IF(AND(I	=IF((A20=0),0,IF(AND(IS	=IF((A20=0),0,IF(AND(IS	=IF((A20=0),0,IF(AND(IS
=A9	=IF((A21=0),0,IF(AND(I	=IF((A21=0),0,IF(AND(I	=IF((A21=0),0,IF(AND(I	=IF((A21=0),0,IF(AND(IS	=IF((A21=0),0,IF(AND(IS	=IF((A21=0),0,IF(AND(IS
Yearly Total	=SUM(B16:B21)	=SUM(C16:C21)	=SUM(D16:D21)	=SUM(E16:E21)	=SUM(F16:F21)	=SUM(G16:G21)
Conventional						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
=A4	=IF((A16=0),0,IF($L$10=	=IF((A16=0),0,IF($L$10=	=IF((A16=0),0,IF($L$10=	=IF((A16=0),0,IF($L$10=	=IF((A16=0),0,IF($L$10=	=IF((A16=0),0,IF($L$10=
=A5	=IF((A17=0),0,IF($L$10=	=IF((A17=0),0,IF($L$10=	=IF((A17=0),0,IF($L$10=	=IF((A17=0),0,IF($L$10=	=IF((A17=0),0,IF($L$10=	=IF((A17=0),0,IF($L$10=
=A6	=IF((A18=0),0,IF($L$10=	=IF((A18=0),0,IF($L$10=	=IF((A18=0),0,IF($L$10=	=IF((A18=0),0,IF($L$10=	=IF((A18=0),0,IF($L$10=	=IF((A18=0),0,IF($L$10=
=A7	=IF((A19=0),0,IF($L$10=	=IF((A19=0),0,IF($L$10=	=IF((A19=0),0,IF($L$10=	=IF((A19=0),0,IF($L$10=	=IF((A19=0),0,IF($L$10=	=IF((A19=0),0,IF($L$10=
=A8	=IF((A20=0),0,IF($L$10=	=IF((A20=0),0,IF($L$10=	=IF((A20=0),0,IF($L$10=	=IF((A20=0),0,IF($L$10=	=IF((A20=0),0,IF($L$10=	=IF((A20=0),0,IF($L$10=
=A9	=IF((A21=0),0,IF($L$10=	=IF((A21=0),0,IF($L$10=	=IF((A21=0),0,IF($L$10=	=IF((A21=0),0,IF($L$10=	=IF((A21=0),0,IF($L$10=	=IF((A21=0),0,IF($L$10=
Yearly Totals	=SUM(B25:B30)	=SUM(C25:C30)	=SUM(D25:D30)	=SUM(E25:E30)	=SUM(F25:F30)	=SUM(G25:G30)
Net Income						
Transitional						
Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Conventional	=B22-J22	=C22-K22	=D22-L22	=E22-M22	=F22-N22	=G22-O22
Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	=B31-J31	=C31-K31	=D31-L31	=E31-M31	=F31-N31	=G31-O31

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B.S. ECONOMICS

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AUGUST 2008 – JUNE 2012, Paul Vi Catholic High School *Fairfax, VA*

ADVANCED DIPLOMA

WORK EXPERIENCE

OPERATIONS LEADERSHIP INTERN, Amazon.com, Inc. *Hazleton, PA*

6/18/2015 TO 7/24/2015

Managed 50 to 118 workers daily within the outbound side of the AVP1 cross-dock fulfillment center

Learned how to manage key metrics in the fulfillment process such as utilization rates, throughput rates, and DPMOs in order to meet daily production forecasts

Engaged with Amazon associates within each functional role in order to build a cohesive and productive team

Created and implemented multiple continuous improvement projects aimed at making processes more efficient and cost effective

SUMMER SHADOW PROGRAM, Dick's Sporting Goods *Coraopolis, PA*

6/24/2014 TO 6/25/2014

Selected as one of 11 students to attend an immersive experience with Dick's Sporting Goods in preparation for the Merchandise Training Program Internship

Learned vital roles of buyers, planners, and merchandise allocators within Merchandising for Dicks Sporting Goods

Worked alongside a mentor who taught the key competencies of his job in a hands-on fashion

LEADERSHIP EXPERIENCE

PRESIDENT, Smeal's Sports Business Club *University Park, PA*

6/1/2014 TO PRESENT

Analyzed and solved problems associated with a new organization: discovered core business, established appropriate mission and vision, and implemented strategic marketing.

Tripled average meeting attendance, raised over 40,000 dollars for charitable foundations, and tripled our club budget while managing 23 leaders

SUMMER LEADERSHIP CONFERENCE , The Pennsylvania State University *University Park, PA*

8/5/2014 TO 8/7/2014

Engaged in team building activities and interactive learning seminars on conflict management, running effective meetings, branding, and mission and vision statement development as one of 10 selected students