ASSESSING SMALL FARM VIABILITY AND NET FARM INCOME: A MICHIGAN CASE STUDY

By

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Community Sustainability–Master of Science

2016

ABSTRACT

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Small farms are prominently featured in increasingly popular food marketing channels, such as farmers markets and food hubs. U.S. Department of Agriculture (USDA) data, however, suggest that most small farms are not financially viable without additional off-farm income. Few studies have examined finances at time periods finer than an annual scale for these types of farms. To gain a more detailed understanding of financial viability, this study analyzed net farm income and interview data conducted at the end of the growing season to gather information on farmer demographics, farm incomes and business strategies.

Net farm incomes in the study ranged from $-2,172 to $69,255. Those with more experience, and who were better at tracking their labor and finances, were more likely to achieve higher net farm income. Farmer interviews revealed value themes that play an important role when considering economic viability of small farms. Analysis of the strategies reported by more successful farmers suggests that the use of high value crops, niche marketing channels, and a focus on reducing input costs may be effective ways to improve small farm viability. As one component of strengthening regional food systems, efforts to increase the financial viability of small farms may benefit from implementing policies that reduce barriers to these strategies.

ACKNOWLEDGEMENTS

The completion of this thesis and my degree program would not have been possible without the support and guidance of numerous individuals. I would like to extend my gratitude to my advisor, Phil Howard, for his support throughout my studies and for pushing me in my research, writing and critical thinking skills. In addition, I would like to thank the other two members of my committee, Mike Hamm and Bridget Behe, for their support, critical thought and energy. I am especially grateful to Mike Hamm for funding this research and my graduate school education through his position as the C.S. Mott Chair of Sustainable Agriculture. In addition, staff at the Center for Regional Food Systems has been invaluable, notably Adam Montri and Colleen Matts for their mentorship over the years as friends and as food systems practitioner role models. Endless thanks go to Laurie Thorp for countless life lessons and guidance over the years and offering me the opportunity to be a teaching assistant and guest lecturer as a Masters student. The support and friendship of my colleagues in Detroit and CSUS has kept this chapter of my life in perspective. In particular staff members at Keep Growing Detroit and gardeners across the city of Detroit for all the life lessons. Farmer Scott Chaskey in Sag Harbor, NY for his mentorship and written word, and my neighbor and friend Jon Miller for his love of wildness and endless acts of kindness.

Thank you to my parents, whose second shifts and sacrifices allowed me to pursue college, always with love and home cooked meals. The older I get the more I am made aware and grateful for their sacrifices. My brothers, Justin and Brandon, were my first

explorers and teachers of community and food and I am grateful for their support. To my farming relatives: the late Uncle Fred and Aunt Florence, as a small boy I learned about Caesar Chavez's struggle for migrant farmworkers on your cucumber farm; Karen and John LaRosa, for listening to my critiques and interest in animal ethics from your hog and turkey barns; the Imhoffs, for teaching me about farm work through milking cows and bailing hay after my homework in the evenings; and to my grandparents, for always sharing their stories and our family's agricultural history with me. Thanks to Tim for our adventures in the Hudson Valley and our endless nights of running the numbers to see if we could make any money while farming. To Ceara, your daily patience, work ethic and loving support have kept me grounded and focused. Thank you for being there for me and for your willingness to review countless drafts. And last, this work would be for naught without the commitment and patience of every participating farmer in this study.

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CHAPTER 1. INTRODUCTION: CONTEXTUALIZING SMALL FARM VIABILITY

Over the past two decades, developments in the mainstream food system have been accompanied by growth in local food systems, or a relocalization of the food system. Despite this popularity and corresponding boost in sales of locally grown food, evidence suggests that the economics behind the movement still don't favor the majority of farmers. Diversified systems of marketing, such as farmers markets and food hubs, have grown in practice and strive to support small- to mid-sized farmers. Even with the growth in these marketing channels, little is known about specific strategies that contribute to the viability of small commercial farmers. The thesis presented here explores potential strategies for developing viable small farm businesses through an assessment of small farm practitioners.

It is well documented that the process of consolidation in U.S. agriculture has reduced market opportunities for small farms (Hendrickson and Heffernan, 2002). Several notable experts in the field of sustainable agriculture have called for a more diverse agricultural landscape, with a segmented continuum of production at all scales (Lyson, Stevenson, & Welsh, 2009; Stevenson & Pirog, 2008; Tagtow and Roberts, 2011). Diversity in the scale of production is regarded as a critical building block of a resilient food system and is supported nationwide by significant demand for locally produced foods (Clancy and Ruhf, 2010; Hamm, 2008). More than four of five respondents to a 2006 national survey said they either occasionally or always purchased fresh produce directly from growers (Bond et al., 2009). Other recent national surveys also reflect consumer interest – an estimated half of respondents said they purchased food directly

from farmers either by visiting farmers' markets, joining a Community Supported Agriculture (CSA) program, or buying direct from the farmer (Zepeda and Li, 2006).

The growth of local and regional food systems suggest that small farms are a vital building block, yet little is known about the specific characteristics that make up these farms and how they are faring financially. Using a hypothesis generating technique (Yin, 2010), I studied eleven small farms in order to identify strategies that contribute to the success of small farm businesses. The research questions I used to guide this study included:

1) Are the selected small farms financially viable?
2) What net incomes did farms generate for the 2015 growing season?
3) What strategies best contribute to small farm viability?

Despite historical trends of consolidation, the past two decades have seen a slight growth in the total number of small farms nationwide. By USDA definition, a small farm is a farm with sales between $10,000 and $350,000 per year, whereas a medium size farm has sales ranging from $350,000 to $999,999 (Hoppe and MacDonald, 2013). Small farms dominate local food sales marketed exclusively through direct to consumer market channels, while medium and large farms dominate food sales marketed exclusively through intermediated channels (Low and Vogel, 2011). Locally grown food still only accounts for a small segment of U.S. agriculture.

The small farms category provided by the USDA includes farms that differ in terms of their level of commitment to farming as well as their capacity to earn income (USDA,

2014). Seventy-two percent of these farms are comprised of a farmer (farm operator) who is either retired or resides on the farm because of the lifestyle it provides (USDA, 2014). The remaining farms are in the small farms category and the operators consider their major occupation to be farming. The USDA-ERS farm typology classifications focus on the "family farm," or any farm where the majority of the business is owned by the farmer and individuals related to the farmer. The USDA defines a farm as any place that produces and sells—or normally would produce and sell—at least $1,000 in agricultural products during a given year. Gross cash farm income (GCFI) is used to measure a farm's revenue that includes sales of crops and livestock, government payments, and other farm-related income, including contractual business work or farm production contracts. The ERS farm typologies, developed in 1998 (Hoppe and MacDonald, 2013), group similar farms together in seven homogenous groups, defined by the farm's GCFI, the primary occupation of the operator, and whether the farm is a family farm (see Table 1 below).

Farms in the low-sales category are particularly vulnerable, having exhibited high turnover rates. A better understanding of which farm and operator characteristics influence profitability would be useful to operators of small farms who wish to make changes in their operations in order to increase profits. Such information could also support policymakers who seek to design policies aimed at increasing the incomes of small farmers.

USDA farm typologies are beneficial when assessing national agricultural statistics gathered through census surveys, but can miss the nuances of the more diverse

producers who operate small farms. Broad descriptions of farms based on U.S. averages can mask variations among different sizes and types of farms. Small family farms dominate the farm count, but midsize and large-scale family farms account for the bulk of farm production. There are important differences between farms when considering size; however, USDA statistics are based on a very broad farm definition that can obscure the performance of small commercial farms.

Table 1. USDA-ERS Farm Typologies: Classifying farms by operator's primary occupation and farm size

Farm Type	Operator's primary occupation[1]	Typology
	Farm size measured by gross farm sales	*Farm size measured by GCFI*[3]
Small family farms[2]	Varies	Less than $350,000
Retirement farms	Retired	Less than $350,000
Off-farm occupation farms	Nonfarm	Less than $350,000
Farm-occupation farms:		
Low-sales	Farming	Less than $150,000
Moderate-sales	Farming	$150,000-$349,999
Midsize family farms	Not a criterion	$350,000-$999,999
Large-scale family farms	Not a criterion	$1,000,000 or more
Large farms	Not a criterion	$1,000,000 or more
Very large farms	Not a criterion	$5,000,000 or more
Nonfamily farms	Not a criterion	Not a criterion

[1] Occupation at which the operator spends 50 percent or more of his or her work time

[2] Gross cash farm income (GCFI) is the sum of the farm's crop and livestock sales. Government payments, and other farm-related income

[3] Family farms include any farm where the majority of the business is owned by the operator and relatives of the operator. Nonfamily farms do not meet that requirement.

According to current USDA definitions small farms constitute nearly 90 percent of all U.S. farms, own 52 percent of farmland, and produce a 26 percent share of farm output (Hoppe, 2014). Many obtain only a fraction of their income from farming. According to

recent USDA-ERS reports (Brown and Weber, 2013), 43 percent of vegetable farm operators nationwide work an off-farm job in the non-farm economy. In addition, many invest off-farm income into their farm operations. Except for households operating retirement farms, most of their off-farm income is from wage-and-salary jobs or self-employment.

According to the U.S. Census, small farms are considered one and the same regardless of output or geographic location. For instance, the 2012 Census reported that 75 percent of the two million farms in the U.S. post less than $50,000 a year in sales. Furthermore, the bulk of agricultural output comes from farms with sales of $1 million or more.

The goal of the Census is to include every farm that meets the USDA's defined criteria, regardless of where it is located, what it produces, or its size, and all registered farms automatically receive notification of the survey. State-level departments of agriculture and other farm organizations actively engage in outreach to new farmers, with the goal of encouraging all eligible organizations to fill out the survey. It can be difficult to ascertain how many new farms actually take the steps necessary to be included in the census. While big picture statistics are great for general comparisons, they often lack a practitioner-oriented lens that contributes to developing effective strategies for farmers.

CHAPTER 2. FACTORS INFLUENCING THE FINANCIAL VIABILITY OF FARMS

Measuring farm viability is difficult because economic vitality needs to take into account current viability, as well as the generation of sufficient income for retirement savings, future college tuition, buying land, paying health insurance premiums, etc., which vary from farm to farm (Galt et al. 2012). There is rarely a shared concept of viability for a number of reasons: some farmers allocate salaries for farm partners and exclude this salary from their measured profit; not all farmers amortize their accounting; and many reinvest all operating surplus into the farm to make it more productive or to prevent reporting a profit for tax purposes (Levins, 1996). Because of these differences this study uses the most general farm reporting categories of gross income and gross expenses to capture net farm incomes (see Appendix II) and hourly wages over the course of the study period. According to Becker (2009) at the University of Minnesota's Center for Farm Financial Management, key indicators of farm profitability include the following measurements: net farm income, rate of return on farm assets, operating profit margin, and earnings before interest, taxes, depreciation and amortization.

Understanding how small farms can become economically viable operations requires a broad understanding of the influences and pressures farms face. The following review of literature provides an overview of factors that influence the financial viability of farms, including: 1) farm and farmer characteristics; 2) farmer values; and 3) direct to consumer marketing.

Farm and farmer characteristics

Many of the decisions that affect profitability are influenced by farm and farm operator characteristics including farm size, employment status (availability of labor), and proximity to metropolitan areas (Govindasamy, Hossain, and Adelaja, 1999).

The inclusion of farmer characteristics, such as education, provides insights into the influence of training, experience, and demographics on farm viability. Huffman (1977) found that these factors affect the production function of farms. Highly educated farmers are part of a growing demographic of young beginning farmers – farmers by choice, not by heritage – who have committed themselves to small-scale agriculture. With strong educational backgrounds and urban or suburban upbringings, these young people have chosen their vocation over many other options available to them. According to human capital theory, education is hypothesized to have a positive effect on financial performance. Lins et al (1987) showed that higher levels of farmer education correlate with the farm's success and a farmer's ability to receive the same or better wages from farming as from other jobs.

With significant demographic changes occurring in the agricultural sector, recent research has focused on addressing the needs of beginning farmers (Dimitri, 2005). Understanding the predictors of financial performance and financial stress can help structure and target programs to better address the needs of beginning farmers. Studies on beginning farmers have considered various aspects of financial performance, including profitability (return on assets), marginal income and solvency criteria, and net farm income per dollar assets (Adhikari, Mishra, and Chintawar, 2009; Ahearn and

Newton, 2009; D'Antoni, Hendrickson 2005, Mishra, and Chintawar, 2009; Mishra, Wilson, and Williams, 2007 and 2009; Newton and Ahearn, 2007).

Ford and Shonkwiler (1994) and Hoffman (1996) looked at the relationship between farm size and profit. Hoffman (1996) indicated that well managed farms, based on farm records, are better able to compete in per-unit profitability with farms many times larger. Another focus across the literature is on-farm enterprise budgets. Conner et al. (2010) used enterprise budgets to study the benefits of low-cost season extension structures - hoophouses. Their results suggest a broad range of outcomes across farms in labor allocation and returns as well as gross and net revenues.

Farmer values

Farmer motivations and values remain critical to why farmers choose to farm. Ruth Gasson's classic study in 1973 identified four broad "value orientations" that were important for farmers (p. 528). These were "instrumental" (make money, expanding the business), "social" (maintaining a tradition), "expressive" (creativity), and "intrinsic" (enjoyment of work tasks, lifestyle preference). Following this work, more recent research (Willock et al. 1999; Mayberry, Crase, and Gullifer, 2005) suggests that there are distinct behavioral categories of farmers with some driven more by economic motives and others driven more by social, lifestyle, or family objectives, with varying degrees of interaction between them.

A recent publication by Rogus and Dimitri (2015) substantiated previously believed motivations of urban (small) farmers, indicating that many urban farmers see

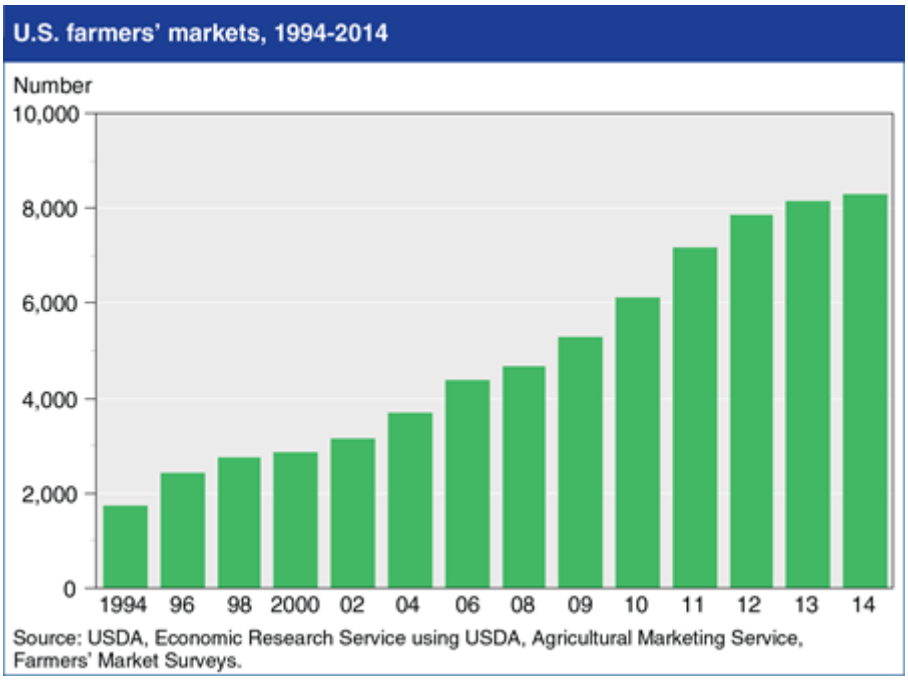
themselves less as profit-driven businesses and more as social enterprises addressing concerns like food insecurity, education, and community-building. Two-thirds of the 370 urban farms surveyed identified those three concerns as their primary focus, while about a quarter said they were driven by market concerns.

Direct-to-consumer marketing

Consumers who are willing to pay higher prices for locally produced food place higher importance on product quality, nutritional value, and support for local farmers (Martinez, 2010). Direct-to-consumer sales have year over year accounted for a larger portion of sales for small farms than for medium and large farms. According to the 2012 Census of Agriculture, most farms that sell directly to consumers are small farms with less than $50,000 in annual farm sales (Martinez, 2010).

Producers and consumers often base their definitions on marketing arrangements such as direct to consumer sales at farmers' markets. Such sales are critical to the survival of small-farming operations, as they comprise the main form of marketing for small farmers. This form of marketing has seen a significant growth in the U.S. as evidenced by farmers' markets tripling in number from 1996 to 2015 to over 8,000 markets (Figure 1) (USDA AMS, 2015). Despite this growth, the relevance of markets for farm income has come into question, as an estimated 80 percent of producers receive $5,000 or less per season at farmers' markets (Ragland and Tropp, 2009). Nevertheless, direct markets represent an important source of income for many small farmers who find them to be easy points of entry (Low and Vogel, 2011).

Figure 1. U.S. Farmers' Markets, 1994-2014



Hardesty and Leff (2010) conducted an important and in-depth analysis of farmers selling through wholesale outlets and farmers' markets. They found wholesale marketing to be more profitable than farmers' markets when using full-cost accounting, attributing results to the low labor-to-revenue ratio found in wholesale marketing. Their study estimated that 33 percent of produce did not meet wholesale standards and therefore the remaining was sold at market or discarded. They also found profits decreased by 53 percent with only 20 percent reduction in produce sold when using only farmers markets. It should be noted that their study was conducted with farmers farming 20 acres or more in California, where markets are often year-round.

LeRoux et al. (2010) examined marketing outlet profitability among four farmers in New York, producing on seven acres or more. Marketing outlets consisted of farm

stands (staffed and un-staffed), wholesale, Community Supported Agriculture (CSA), and farmers' markets. LeRoux et al. results conflict with those of Hardesty and Leff (2010) in that wholesale outlets were less profitable than farmers' markets and CSA's. The researchers also found that factors such as attitudes toward risk, lifestyle preference, and labor availability significantly impacted market selection.

Donnell et al. (2011), through the analysis of five crops typically sold at farmers' markets, confirmed that production and marketing risk are significant factors for director marketers. They used sales of 50 percent, 75 percent, and 100 percent of production to assess potential revenues. Their results showed that break-even prices were very sensitive to the amount sold. Guntera et al. (2012) assessed the feasibility of three different scenarios based on levels of investment in production, storage, and distribution in Northern Colorado. The first scenario studied the exclusive use of wholesale markets and was found to be unsustainable based upon the first three years of production. The authors concluded that risk for each option varied due to differing levels of commitment to capital and labor.

Harwood et al. (1999) discuss the various sources of risk in agriculture and state, "Understanding risk is a starting point to help producers make good management choices in a situation where adversity and loss are possibilities" (p.2). Therefore, when choosing the level of involvement in wholesale and direct markets, small-scale producers need to understand the risk involved, or the tradeoff of higher pricing. Small-scale producers are often unfamiliar or uncertain about expanding their markets to include wholesale outlets. For example, Curtis et al. (2012) found that only 19 percent of

the farmers surveyed at farmers' markets in Utah, Nevada, and Idaho also used wholesale markets.

Recent developments in food hubs and infrastructure improvements for direct to consumer marketing channels point to the potential for small farms to aggregate produce in order to generate enough volume for distributors and institutions that demand high volumes of local food (i.e. grocers, restaurants, and schools) (Hardy et al., 2016). However, generating returns through direct marketing provides mixed evidence and depends on a host of spatial, market, and demographic factors, as well as preferences that may not be financially based (Hardesty and Leff, 2010; LeRoux et al., 2010; Monson, Mainville, and Kuminol, 2008). As of 2015 there have been few studies on the impact of local food production on small farm viability. This study seeks to analyze this phenomenon by using a mixed methods approach to better understand farmer viability through the use of quantitative farmer-reported data collection and qualitative interviews.

CHAPTER 3. METHODOLOGY

This study utilized a mixed methods approach of quantitative and qualitative data collection to explore strategies that improve small farm viability. Quantitative data sets were collected to assess farm viability through the use of on-farm data logs. Qualitative research methods were used to "approach fieldwork without being constrained by predetermined categories of analysis" (Patton, 2005, p. 22). Methods focused on a grounded theory approach to explore hypotheses that were developed through farmer interviews (Yin, 2015). Interview data supported the interpretation of quantitative data beyond financials and helped capture themes shared among the informants. This qualitative method uses two basic principles: 1) questioning rather than measuring, and 2) generating hypotheses using theoretical coding.

Data collection and analysis consisted of monthly financial data tracking with the participation of nine small farms located in five counties across Michigan (Figure 2) from March 2015 through October 2015. Once selected, farmers were contacted to schedule an initial meeting or phone call to go over the details of participating in the research. Farmers were provided the necessary data logs and supplemental tracking tools to create records of monthly financials. They read and signed consent forms granting permission to report data from their reported budgets and financial data logs. I provided assistance with data collection in the form of quarterly checkups throughout the research period. Technical assistance with data collection was also provided through phone calls, emails and at least one site visit over the course of the research period.

Eleven farmers participated in a semi-structured interview (Rubin and Rubin, 2005) providing a summary of farm demographics and description of farm businesses and farming experiences, as presented in Appendix I. This research was approved by the Michigan State University Institutional Review Board for Human Subjects (IRB#x15-081e) and was classified as "exempt."

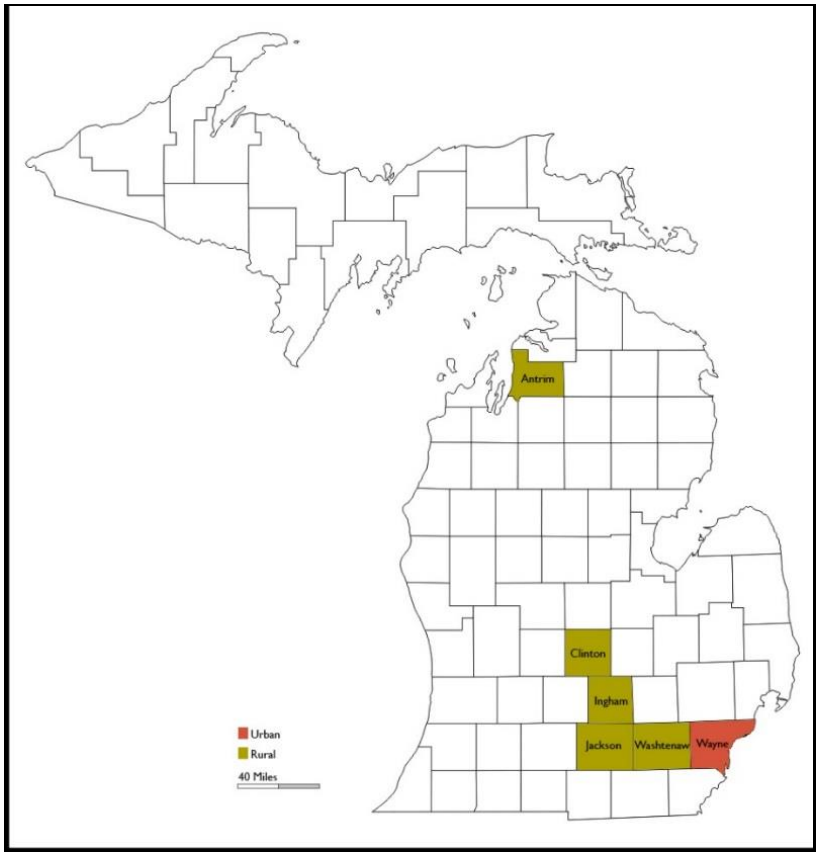
Sampling strategy

A combined convenience and snowball sampling strategy was used to identify eleven growers, five urban and six rural, as interview participants to provide information-rich cases (Yin, 2015). Farms that were selected for this study consisted of licensed for-profit farms that were registered with the Farm Service Agency (FSA). Nationally, many urban farms are non-profit organizations, which were intentionally left out of the sample population. Codes were assigned to each farmer, with F1 through F6 representing rural farms from across five Michigan counties (see Figure 2). Farmers F7 through F11 represented urban farms from Detroit, Michigan. Nine additional farmers were recruited to increase the sample size but decided they could not make the commitment, lacked the financial record keeping, or quit the study after one month.

Obtaining detailed financial information is difficult and requires trust and cooperation of research participants. With this in mind, data sets and personal financials were collected and stored with confidentiality assured to the participant. Interviews were conducted in person and audio recorded. Growers made suggestions as to which financial data could be collected during initial outreach efforts and select growers made suggestions on how to analyze the financial data. The data were captured through a data

log (see Appendix II) that growers used to record or transcribe existing financial record keeping.

Figure 2. County locations of participating farms



Data analysis - Quantitative

Growers identified farm earnings based on net incomes to be the most appropriate measure for assessing their farms' financial health, not including factors such as machinery use and land costs, depreciation, and opportunity costs. Net farm income is defined as total annual sales minus total costs. After initial outreach efforts with growers, it became clear that the majority of producers were still learning the financial management steps needed to ensure their farms' success. With this in mind, data

collection was tailored to meet growers at their level of proficiency. According to Becker (2009), net farm income provides an examination of the return to labor, management, and equity that a grower has invested in their farm business. It is the reward for investing unpaid family labor, management and money in the business instead of elsewhere and was therefore used to assess farm viability. The completed net income data logs were analyzed using STATA statistical software. The sample size was not large enough to analyze for statistical significance or standard deviations, therefore descriptive statistics were used. Additionally, average (mean), median, and ranges were reported as a means to simplify the discussion and help maintain grower confidentiality.

Data analysis - Qualitative

According to Rubin and Rubin (2005), analysis of qualitative data is best served in two distinct phases. These phases were used to inform the qualitative data. All interviews were recorded and transcribed by the author. After transcription, open coding was performed to identify possible themes. The initial set of codes were then compared and subsumed into four themes, which were defined and delimited in a codebook (see Appendix IV). The codebook was created to conduct content analysis of the interview transcripts. Validation and reliability was cross-referenced with a practitioner to maintain consistent and accurate analysis.

Limitations and assumptions

Growers only collected data for eight months of a 12-month calendar year due to time constraints. Although growers were asked to include expenses and sales for the beginning of the calendar year, they were not able to report earnings for the end of the season. This could impact the net income analysis in this study provided the popular use

of hoophouses among farmers and income generation on the shoulders of the season. Farming is a highly volatile business, and farms of a smaller scale are more vulnerable when it comes to generating a dependable income. The farm financial records that were captured only provide a snapshot of financial health. A more detailed cash flow analysis would have provided a stronger picture of farm finances, if all participating farms were able to provide such data.

The objective was not to uncover a single truth, but to "discover variation, portray shades of meaning and examine complexity" rather than to look only at raw financial reporting or solely the frequency of codes (Rubin and Rubin, 2005, p.202). This approach uses research participants as a source of knowledge to generate meaningful hypotheses from their experiences and generate hypotheses (strategies) from their answers (Yin, 2015).

Second, while some individual or preconceived biases are impossible to avoid, I exercised self-reflection during all stages of the data collection and analysis. There was no specific model or hypothesis that consciously guided my research and therefore the data were allowed to tell a story rather than fit a pre-conceived model. Grounded theory research is exploratory in nature and does not focus on one idea being more appealing than another.

CHAPTER 4. RESULTS and DISCUSSION

Farm and farmer characteristics

Demographic characteristics for the farmers in this study indicated that they were young ($\overline{X}$=36.5) and highly educated, with an average educational attainment of 15.5 years and only one grower with less than an associate degree. Many farmers gained farming experience through a training program (e.g. Michigan State University's Student Organic Farm, or a qualified apprenticeship at a non-profit) or apprenticed on a for-profit farm before starting their own. Farmers represented a wide range of farming experience, having five to twenty years of farming experience, with an average of ten years. Only two farmers were raised on a farm, but noted that production practices on their family's farm were for commodity agriculture and therefore the learning curve for current production practices in specialty crops was steep. The remaining nine farms had five or more years of experience in farming, including hoophouse and greenhouse production practices (see Table 2-2 below). Compared to the national average age of 58 years old, growers in this study were younger, with an average age of 36. Urban growers cultivated crops on a relatively small amount of land, .73 acres on average, as compared to rural producers at 11 acres.

Table 2. Mean farmer attributes, farm business descriptors, and self-reported behavioral factors of 11 farmers.

	Age (yrs)	Education level (yrs)[2]	Farm experience (yrs)	Hoophouse experience (yrs)	Specialty crop area farmed (acres)	Uses Operating Loan	Importance of being profitable (scale 1-10, 1 being the lowest)[3]
Urban[1] (avg) n=5	36	15	8	5	.73	0 / 5	8
Rural (avg) n=6	33	16	10	9	11	4 / 6	10
All n=11	35	15.5	10	7	6	4 / 11	9

[1] Urban is defined as a farming producing within a city limit
[2] Twelve years is high school graduate or equivalent
[3] Self-assessment of importance of being profitable

Farmer attributes

Farmer attributes used in the analysis are presented in Table 2 and include a wide variation in farmer attributes such as acreage in production, the use of an operating loan and experience farming. Farmers that exhibited behaviors of sound farm and financial management paid themselves regularly and had the highest net incomes for each geographic type (urban and rural). These farmers reported record-keeping skill as an eight out of ten on a Likert scale (with 10 being highest skilled), and stressed the importance of profitability to their business and family in interviews. Additionally, farmers who relied on farm income for a larger portion of their household budget had higher net farm incomes. For instance, the farm reporting the highest net income at $69,255 estimated that 90 percent of their household income for 2015 came from the farm. Farmers who self-reported a lower rating for record-keeping skill reported the most difficulty turning in records and had lower net incomes. These farms on average

reported five out of ten on the Likert scale and commonly referenced "not having enough time" to complete detailed records.

Farms with better kept records also had more farm experience and college education compared to lower earning farms. Overall, all farmers in this study were highly educated with all but two growers having less than an associate's degree. Comparing this study to national farmer demographics is difficult but this group of farmers is highly educated even in comparison with the overall U.S. population. The highest earning farmers had bachelors or masters degrees, possibly providing them with skills to navigate complex accounting and farm management decisions. There is no direct Census data on new and beginning farmer educational levels, but nationally the 1.5 percent increase in young farmers (under the age of 35) are thought to be highly educated (Mitchell, 2015).

Reported net farm income and viability

Eight out of nine participating farms reported positive net incomes indicating that their farm was viable, while one farm operated at a loss. Net farm income ranged from $-2,172 to $69,255 with an average of $19,577 and a median of $8,964 across the nine reporting farms. Two farms reported sales above $34,000 skewing the average upwards. Given the study length of eight months and the fact that data collection ended before all farms received payable invoices for produce sales in October and November, it is likely that the one farm operating at a loss would have been closer to breaking even. Three farms reported the ability to manage their forecasted earnings to pay themselves a biweekly salary during the 2015 growing season. The remaining farmers reported living

off farm operating cash flow, taking the leftover balance at the end of the growing season as payment.

The economic outcomes presented in Table 3 point to key differences between urban and rural producers. With the ability to grow greater amounts of food on larger acreage, rural producers averaged net incomes at $35,189 compared to $7,088 for urban farmers. Higher earning farms mentioned reducing their reliance on purchased inputs by substituting labor and management and continuously striving toward a more efficient farm business. These growers focused on relationship building through direct marketing to create niche marketing arrangements. These growers have also figured out select crops, such as salad greens or heirloom tomatoes that are competitive in the sea of conventional agricultural supply chains that make up their market competition. Despite smaller scales of production, urban producers were slightly more efficient on an income per acre basis, reporting a median of $8,964, while rural farmers reported $7,199 (see Table 3 below). The highest urban farm's net income made roughly 80 percent of the household's income from five main crops. Successful producers tended to focus on crops that met a market demand while also earning them money.

Table 3. Summary of economic outcomes of eleven small farm case studies

Farmer ID code	Urban or Rural	Farming is Sole household income	Estimated % of household income from farm	2015 Net income	Net income per acre
F1	Rural	No	25%	$1,425	$150
F2	Rural	Yes	90%	$69,255	$4,617
F3	Rural	No	20%	34,234	$4,617
F4	Rural	No	35%	$35,840	$11,946
F5	Rural	Yes	100%	n/a	n/a
F6	Rural	Yes	100%	n/a	n/a
F7	Urban	Yes	100%	$-2,172	$-1,086
F8	Urban	Yes	95%	$19,671	$19,671
F9	Urban	No	10%	$2,035	$8,140
F10	Urban	Yes	15%	$8,964	$8,964
F11	Urban	No	15%	$6,944	$6,944
URBAN (avg)		60%	47%	$7,088	$4,214
Urban (median)			15%	$6,944	$4,490
RURAL (avg)		50%	62%	$35,189	$5,333
Rural (median)			63%	$35,037	$7,199
ALL (avg)		55%	55%	$19,577	$4,773
ALL (median)			35%	$8,964	$4,617

Values as a crucial component of perception of success

Success in the context of a small farm business is defined in multiple ways. In interviews farmers continually referenced the importance of the farm business to the quality of life of their family and community as important components that farms used to measure their success. One explanation for suboptimal financial behavior of farmers is that while business related motivations such as maximizing profit are important factors to farmers, it may not be their sole motivation for farming (Howley, Dillon, & Hennessy 2014). As reported in this study, small farms may earn little, if any, net income, which begs the

question of values that motivate farmers to remain in this occupation.

Qualitative data themes

Small farms in this study had mission-related values with a strong social component. Analysis of interview data showed that the primary reasons farmers gave for producing food included four main themes: community, self-sufficiency, social justice, and food system change. These themes are similar to those found in several other studies (Rogus and Dimitri, 2015; Gasson, 1973; and Galt, 2013) and suggest an important alternate set of values that sustain and motivate farmers beyond economic viability.

Community

No other value was more important to farmers than their relationship to their community. It was the only theme that appeared among all interviewees. Farmers defined their community as their personal connection to their neighbors and customers, along with a strong sense of place. This sense of place enriched their everyday lives, and a common phrase among farmers was "making a healthy contribution towards my community." Farmers using the Community Supported Agriculture model often expressed a strong sense of gratitude and commitment to their CSA members. One informant explained:

> I didn't anticipate having such a strong connection to our CSA and the strong sense of community that is created through it. It has provided a deep sense of purpose for our family and the mission of this farm.

Five farms used the CSA concept to provide a financial backbone to their farming operation, with one farmer stating:

> I started out with a romantic vision of farming and realized that in order for my family to make a living we needed to scale up beyond 5 acres. For us, CSA was the way to do that; we intentionally priced our CSA higher than anyone else in the

> area in order to farm with our values in mind. It has worked so far and it means that I don't have to harvest anything I have not already sold.

Three farmers expressed concern with current methods of commercial food production and distribution, and the consequences on small farms and the local community. For these producers, their involvement in a CSA provided an opportunity to increase awareness of local food production among consumers and seek opportunities to collaborate with more conventional farmers on alternative methods of food production. Increased interaction among producers and non-farm consumers in a CSA might translate into local support for agricultural protections or related community development. Community building enterprises such as CSAs can contribute to building a coalition of support for agriculture that otherwise might not exist due to the absence of familiarity and empathy among farmers and non-farmers.

Self-sufficiency

Self-sufficiency was another important value for farmers in this study. It was often referenced in concert with having "personal security." Growers practiced self-sufficiency through growing, making, or selling their own product. Three farmers expressed self-sufficiency as a solution to larger systemic forces that they distrusted. Farmers who had previously worked off farm referenced the importance for self-sufficiency more than farmers who were born into farming. One farmer expressed this well, stating:

> It was important for us to create a lifestyle that was self-sufficient as much as possible. Regardless of how much money we make, this is better than working at Staples or any other job you don't have self-autonomy over.

Social justice

Social justice-related topics such as public health, food access, and reduction of health disparities were key concepts expressed by farmers. Social justice-related activities were

an important difference between urban and rural farms. Interview data showed that all five urban farmers' compared to one rural farmer expressed strong values of social justice. Farmer 8 put it in perspective, expressing:

> I try to employ kids from the neighborhood and you wouldn't believe the conversations we've had around racism, class disparities, etc. – these are 12 to 16 year olds who have never left the city and are curious about the world. They see my farm as a safe place to not only to engage in these conversations but also take some food home to their families.

Five farmers moved from off farm jobs or aspirations towards full time food production as a means to make a direct impact on social injustices. Farmer 7 summarized this well, stating:

> I saw growing food as the greatest way to address health disparities and as an effective way for people to address their own health outcomes without a top-down controlling approach.

Food system change

Strongly coupled with lifestyle choice, system-change was an overarching theme that emerged from growers seeing their day-to-day work as part of something larger. Farmer 7 expressed:

> I wanted to work for myself, work outdoors, and have my actions contribute towards a local agricultural movement.

Food system change provided a platform for supporting multiple agendas including local and state food policies. In general, farmers were active members in their local food political circles. Three farmers had been critical to starting new farmers' markets and three participating farms joined forces to start a multi-farmer CSA. Farmers expressed these efforts as part of a larger movement to "change the system of how food is produced."

Strategies of financially viable small farms

Managing a viable farm requires the successful management of many small enterprises. Successful farms found ways to minimize their startup costs, while quickly learning good business management techniques, maximizing direct marketing arrangements, diligent record keeping, managing labor and people, knowledge of season extension, and creative marketing practices. The following section will look into these particular strategies further.

Maximizing direct marketing arrangements

Marketing is a vital part of any farming business that transforms production into financial success. Therefore, selecting the appropriate marketing channel is critical, as it will have a tremendous impact on a farm's finances. Due to their size of production, there tends to be a limited number of marketing outlets available for small farmers. For instance, the smaller acreage growers in this study rarely utilized wholesale outlets or other intermediate outlets due to the product volume and price point received. As a result, growers on smaller acreage typically developed niche marketing arrangements with their customers. These arrangements included CSAs and direct relationships with chefs at restaurants. Typical crops sold through these outlets included high-dollar per pound crops such as salad or microgreens, and/or unique varietals with short plant-to-harvest times. These more specialized niche-marketing arrangements capitalized on consumer commitment and guaranteed a higher price premium for growers.

A common marketing strategy that seven out of eleven of the farms used to develop early cash flow was the Community Supported Agriculture (CSA) model. CSAs were seen as a solution that brought together community members, farmers and agricultural land in a relationship of mutual support. CSAs were a common way growers assured their

incomes and maintained a consumer base eager to support their efforts. Overall, the CSA marketing arrangement accounted for 37 percent of grower income. Interestingly, the top income earner chose to forgo the expense of attending a weekly farmers market and received 84 percent of their earnings through CSA alone.

Farmers made use of their own unique farm characteristics when choosing the type of CSA to operate. These included the more traditional approach of an on-farm CSA pickup, while the smallest farmers utilized the strategy of a multi-farmer CSA, aggregating produce at a single pickup location. This strategy provided a way for small farmers to capture the benefits of a CSA. In interviews, multi-farmer CSA farms indicated the importance of the CSA customer relationship to their operation as well as a stronger price point for their produce. Farms with the highest net incomes had 100 or more CSA shares ranging from 16 to 50 weeks. Successful CSA farms cited the CSA model as an important strategy to build strong relationships with their community and customer base as well as a means to generate dependable income.

High CSA earning farms were assured relatively steady high gross sales because members pay for their share of the harvest at the beginning of the year. Other marketing strategies are subject to the marketplace and weather, while a CSA provided a guaranteed income. This is especially notable when assessing month-by-month incomes. The highest grossing farm had a significant capital inflow in the early and late parts of the season, reporting gross earnings of $56,400 and net earnings of $32,713 for March[1] and an inflow of $41,570 in August with a net income of $25,843. Farm 2 also

[5] This accounted for the preceding months of January and February.

had the largest CSA membership and was only one of two farms that did not sell at a farmers market. With such significant cash flow, Farm 2 was able to reduce their labor inputs of staffing a farmers market and spent time building their relationship with their CSA customer.

In interviews, farmers suggested future directions for advancing direct-market opportunities, notably in urban or peri-urban regions where higher-end restaurants are demanding local product. In these regions, farmers utilized the CSA concept as a selling point to restaurants whereby they receive a retail price in agreement with a chef who guarantees product purchases. This benefits growers in two major ways: a cost reduction in staffing a market and generating increased revenues from the potential for year-round production.

Record-keeping

As previously mentioned, farms earning a higher income also kept better records. In interviews these farmers either referenced their computer spreadsheets or were able to offer up information based on systematized organization of their records. As expected, successful farmers stated that sometimes they make judgment calls on a "hunch" but generally focus on maintaining simple records that require minimal time. One farmer of larger acreage stated:

> For example, many of our crops are planted in beds which have three rows planted on 3-foot beds at 100 feet long and have 1 feet (tractor tire width) between beds; each of these beds is therefore 300 square feet. We also use a simple spreadsheet in a notebook in the washing station that is filled in each harvest day showing the: product, quantity packed for market [bunches, heads, pounds, etc.], and the quantity that returns from the market. From those numbers, a total quantity sold of each product can be determined at the end of the year, and therefore its total approximate value.

This farmer went on to explain that these records would help them compare crops based on the square footage grown and the actual dollar value that each crop produced for the entire year. With this information in hand they could make crop decisions, assess crop yields and soil fertility over time, and weigh these decisions against other input costs like labor.

Labor

Although more than half the farmers hired hourly labor, farmers and their families provided much of the labor and management used in farm production. Two farms reported hiring seasonal farmworkers, and two had interns or apprentices as the main source of labor. Four farms also had mutually beneficial arrangements where they would help one another without monetary exchange. For instance, three urban farms participated in a multi-farmer CSA program that demanded occasional labor for large harvests. In these scenarios, growers would rely on exchanging labor with one another instead of hiring short-term hourly labor.

The shortage of skilled labor is forcing farmers to explore creative ways to secure sufficient workers, and the issue is magnified given their resource constraints. Some farmers used methods beyond compensation to enhance employee satisfaction and productivity, including respect, recognition and growth opportunities (Farmer 4 interview). This required strong communication skills and the ability to build relationships with employees to understand their motivations for growth beyond a paycheck. These characteristics were most common for farms employing an

apprenticeship program, and could be one way that small farms could reduce the costs associated with labor. Nationally this has been a common (and controversial) trend whereby farms host an educational internship or apprenticeship program and avoid paying minimum or competitive wage(s). Only two farms in this study had such programs.

As farm size increased, the ability for farm families to meet the labor requirements of the farm business was limited, and they supplemented family labor with hired or contract farm labor. Farmers generally paid hired workers directly, and considered them to be a farm employee. In contrast, one grower paid a labor contractor for the performance of specific tasks, such as fruit or vegetable picking, who in turn hired laborers. As emphasized by the farmer, this was in an area where seasonal farm labor is a more common practice. When this type of labor arrangement occurred, contract laborers were considered employees of the contractor, not the farm business.

The two largest acreage farms (>20acres) in the study used hired or contract labor to meet labor demands during peak harvest windows. These farms also relied more on labor saving practices through the use of specialized farm equipment. In interviews, farmers mentioned the frustrations with finding reliable labor, and often mentioned seeking opportunities for increased mechanization.

Farm equipment

Tools and equipment varied depending on the scale of production and which farming system(s) growers were implementing, as farming systems transition from a hand-labor

scale to a tractor scale. Equipment for small-scale intensive crop production tends to be simple and less specialized than equipment for larger-scale production. There was a significant range of farm equipment based on farm size and geographic location. Urban farms had a greater reliance on hand-scale equipment like stirrup hoes, wheel hoes, and walk behind rototillers (rented or borrowed). Harvesting was done completely by hand, and on the same day that produce was sold (except for one urban farm with a cooler, see next section). Coincidentally, at the season's end three urban farms indicated their plans to apply for grant funding to purchase a walk-behind tractor in an effort to reduce reliance on unreliable volunteer or hired hourly labor. All but one rural farm had a tractor and three used a cultivating tractor in addition to hand weeding crops. Rural farms mentioned the desire for a larger tractor and minimal three-point hitch attachments such as a brush mower, disc plow, tine weeder, or rototiller.

Higher grossing farms expressed possessing knowledge around investing in equipment that would make their farms operate more efficiently. Farmers 2 and 3 indicated this required the knowledge to secure debt and manage their production forecasts in order to pay down their equipment debt. Generating a profit after the initial investment of purchasing the equipment also depends on the associated costs of maintaining, storing, and repairing the equipment (Grubinger, 1999). Studies have shown that investing in hand-labor savings, even after costs such as labor for the driver, fuel, maintenance, and equipment depreciation are factored in can save growers from added expenses. A 2005 study published by the Center for Integrated Agriculture found market vegetable farms using sustainable farming practices invest between $2,011 and $26,784 per acre in equipment (Hendrickson, 2005).

Cold storage refrigeration

Walk-in coolers have been around for decades, but their cost and complexity put them out of reach of many small farmers. Growers with higher incomes utilized cold storage refrigeration in the form of a walk-in cooler. The common practice among all growers was the use of a CoolBot device, which enables a window air conditioner to cool down to thirty-five degrees Fahrenheit without freezing up. With larger volumes of produce, rural producers stressed the importance of having a walk-in cooler. Five rural producers have them, while only 1 urban grower has made this investment. This practice allowed farmers to harvest produce 2-3 days before market and store it on site, pre-packed and ready for market. In interviews one farmer referenced its usefulness:

> We've worked it pretty hard, packed it full on hot summer days, and it has performed well. It's a really good solution for the scale we're at, allowing us to pick crops like zucchini when they are ready, even if market is 3 or even 4 days away.

Historically, small farmers have not had access to compressor-based cold storage refrigeration because it was too expensive. The CoolBot is a cheaper alternative, costing around $315 for the device and $350 for a compatible air conditioning unit, after construction costs for a walk in cooler (Store It Cold, 2016).

Season extension

A common growing technique used across all scales was season extension structures. Seven out of eleven farmers in this study utilized a season extension structure, with the most common structure being a hoophouse. Season extending technologies used by farmers in this study included mulches, row covers, low and high tunnels, and greenhouses. Hoophouses were the most popular method of extending the season, with growers citing low upfront costs and subsidy benefits of the NRCS EQIP cost share

program, along with the flexibility to produce diverse crops for extended periods. Growers mentioned using these structures to produce higher earning crops like heirloom tomatoes, spinach, salad and microgreens in the early and late parts of the season. High earning crops helped with much needed springtime cash flow, and two farms were able to start attending local markets and initiate their CSA season earlier as a result. Season extending strategies can be ideal for local producers who seek to supply fresh, high quality produce on a consistent basis. The cost and returns of a high tunnel structure are often determined by several factors including size, type of crop grown, and variable costs including plants, fertilizer, and irrigation (Reynolds-Alle et al. 2013). Enterprise budgets could contribute to further analysis of production strategies using hoophouses as a means to increase farm viability. Farmers in this study did not use enterprise budgets, but past research has indicated their use as an effective way to improve grower earnings. Conner et al. (2010), for example, found that novice hoophouse growers using enterprise budgets over a three-year period transitioned away from planting decisions focused on single crop profitability toward a CSA model, basing production decisions on the basket they believe customers desire.

Linking values and viability

As expressed through grower interviews, the link between food production and community-values is a critical part of their farm business. For every participating farm, food is a vehicle used to improve the quality of life for family, community and consumer. Many of the current food movement's core ideals are embodied by small farms, which often share goals of improving food access, raising awareness about farming, teaching children and adults about the source of food, or making neighborhoods better (Pirog et

al., 2014). These social goals have recently been promoted by federal policy initiatives. For example, the U.S. Department of Agriculture's Know Your Farmer, Know Your Food initiative is intended to strengthen and support local and regional food systems (USDA, 2016). The Healthy Food Financing Initiative provides tax incentives to grocery stores and healthy food retailers to improve food access in underserved communities (U.S. HHS, 2016). Finally, the Farm to School Act of 2015 has a goal of improving the diet of children by facilitating the use of local food in school lunch programs (Low et al., 2015). Small farms operate on a local scale, aiming to achieve similar goals to those embedded in the aforementioned federal policies.

Despite the optimism expressed by farms in this thesis in meeting social goals, small farms face real problems, many of which have long been a part of agriculture in the U.S. Assessing agriculture census data, it is clear that two of the most pressing challenges are farm survivability and farmer livelihood. In the rural agricultural sector, issues of farm survivability have historically been addressed through an extensive network of federal farm policy that has evolved over time to meet the needs of a changing agricultural sector (Dimitri, Effland, and Conklin, 2005). The following section focuses on recommendations and supports for small and medium farm operations.

CHAPTER 5. CONCLUSION

Findings from this study indicate that similar to small farms nationwide, small farms in Michigan struggle to earn a full-time living from the farm. Based on net incomes, the findings indicate that farms can be viable through selling to highly select direct markets, reducing input costs, and lowering production risks through season extension. Dominant interview themes expressed by growers provide a look into the complex balance that small farmers are trying to maintain.

For reasons stated in previous chapters, small farms should be a major focus of the USDA, state departments of agriculture, and land-grant universities. Census data reveals that farms with sales of less than $350,000 in gross sales comprise nearly 90 percent of all farms in the United States. Nationally these farms, on average, earn a negative return on equity and are therefore not profitable. It is these farms that are most in need of public support to create opportunities for their viability.

Despite lower levels of food production compared to commercial operations, small farms serve as diversified producers of localized food, qualities that consumers continue to demand. In doing so small farms serve as building blocks for vibrant local and regional economies and act as agents of social and community well-being. As evidenced in this thesis, producing food in larger quantities can be difficult for small farms struggling to achieve financial viability. Building local and regional food systems while maintaining farm viability is an important and difficult challenge that food system practitioners, policymakers, and farmers should continue working to address.

As farmers across the country continue to age, small farms provide an important entry point for new and beginning farmers to take advantage of the popular direct-to-consumer food channels. However, retailer requirements, the cost of marketing, accessing capital and land can make it difficult for small producers to consider new markets or achieve economic viability. Federal policies have historically benefited large producers and rarely sought to support the interests of smaller producers. Programs like the USDA's Know Your Farmer, Know Your Food initiative have begun to recognize the importance of small-scale farmers. As a result, federal programs that fund initiatives for small farms and local food systems have increased. The following section focuses on recommendations for farmers and practitioners made available through federal policy as well as in the private sector.

Recommendations for farmers and practitioners

The major policy tool for U.S. agriculture, the federal farm bill, and other food and agricultural policies have historically been at odds with small and mid-sized farms and the development of local and regional food systems. The USDA, in its efforts to address the changing demographics and scale of farming, have offered new programs for specific, targeted farmers, as well growth around local and regional food systems. The past two farm bills have seen increasing support for small-scale diversified farms that can directly support their financial health and well being. This section provides current and new program areas that small farmers can use to enhance their viability.

Accessing capital and managing financial risks

Commercial lending institutions (and to a large extent, USDA programs) are geared towards large-scale loans rather than meeting the needs of small-scale farming. For

example, two growers in this study mentioned reaching out to an agricultural loan officer at a local bank who told them (separately) they did not make agricultural loans of less than $250,000. The business-lending officer was not comfortable with the risks inherent in farming and therefore a smaller loan would have cost significantly more in interest. Unlike smaller producers, larger farmers are more likely to possess collateral, and the required detailed financial and performance records lending institutions require to evaluate credit risk. Additionally, the process and cost of obtaining a loan are relatively higher for small farmers, which present an application hurdle. Another hurdle is the limited capacity for financial institutions to evaluate the repayment capacity of these small, diversified, farms.

Many commercial banks participate in USDA Farm Service Agency (FSA) guaranteed loan programs, providing additional opportunities for making and servicing agricultural loans. FSA recently began offering a microloan program—direct farm operating loans with shortened applications and reduced paperwork designed to meet the needs of smaller growers. The purpose of the microloan program is to meet the smaller credit needs of small, young, beginning, socially disadvantaged, and veteran farmers through a simplified loan application process.[2] Microloan repayment schedules and loan terms are similar to those of direct operating loans, but are smaller with loans being made up to $50,000. This program is well suited for farmers serving local and regional markets. According to the microloan application, they may be used to cover farm purchases, such

[2]USDA Microloan link: http://www.fsa.usda.gov/programs-and-services/farm-loan-programs/index

as seeds, animals, small equipment, or other investments that farmers require for their operations.

Like many small businesses, farms have more success at starting small and then scaling up, and therefore do not necessarily need huge loans in order to be successful. Microloan programs provide active farmers with the ability to plan their farm growth over time through small loans with reasonable interest rates. These programs can contribute to viability by helping with land rents, down payments, equipment, and infrastructure purchases.

The Beginning Farmer and Rancher Individual Development Account (IDA) program matches dollars that farmers put into accounts to be used for investment in farms. This program serves a similar purpose to the Microloan program, but allows farmers investment capital that they don't have to pay back. The program is designed to help farmers of limited means finance their farm business through business and financial education and matched savings accounts. In a matched savings account program, for every contribution the farmer makes, the federal government (through a local partner) matches that amount, effectively doubling (or tripling) its value. IDA programs could constitute a productive way for local food system organizations or individual philanthropists to assure their investments are utilized productively; since they require both investment by the farmers themselves and often include financial and business management training.

The Microloan and IDA programs can support farm viability by making capital available and improving financial literacy, both commonly cited as areas needing improvement among farmers in this study. Although financing options are limited, it is important for local producers to understand the options available and their requirements to be able to select the best fit for their farm and their financial capabilities.

In addition to public programs, innovative funders have established public private partnerships to provide funding for small farmers that may find difficulty meeting government criteria. Programs like the Michigan Good Food Fund[3], seek to aide in building solid infrastructure for local food and support small farm development by creating new markets for healthy food. The fund supports farmers and food enterprises often overlooked by commercial banks. In addition to lending they provide business assistance and financial education for loan recipients.

Managing production risk

Farming, like any business enterprise, involves taking risks to obtain a higher income than might be obtained otherwise. Some farmers appear to virtually disregard risk. But for most, the amount of risk that can be accepted is limited. Thus, risk management is not a matter of minimizing risk, but of determining how much risk to take, given the farmer's alternatives and preference tradeoffs between risk and expected return. Even with the smaller-size operations presented in this thesis, growers were regularly weighing risk – what crops to grow, pest conditions, buying a hoophouse, etc. The goal

[3] Michigan Good Food Fund link: http://migoodfoodfund.org

of risk management is to obtain the best available combination of expected income and income certainty, given each farms resources and risk preferences.

Production risk involves all activities that affect the quantity and quality of production, including the effects of weather, pests, and diseases. These risks have been discussed for years (Schickele, 1949; Hansen et al., 1999; Collier et al., 2008) and continue to be a staple of weekly reports through extension bulletins. Risk management strategies to deal with such risks range from diversifying crops to adopting new technologies. More recently, there has been an increase in the use of strategies to reduce production risks that are more appropriate for smaller-scale producers. These strategies involve season extension technology for crop production and the use of crop insurance.

As previously mentioned, season extension is a popular strategy amongst growers in this thesis. Season extension strategies are ideal for local producers who are seeking to supply fresh, high quality produce on a consistent basis and spread food production over a year. Currently the use of season extension through high tunnels is a popular strategy as it has seen government cost-share supports through the NRCS-EQIP program. It is also supported by research that indicates it being a flexible tool in producing a diverse set of crops for extended periods of time (Blomgren and Frisch, 2007; Conner et al 2010; and Lamont and Orzolek, 2003). As growers continue to scale their operations or look for ways to manage risk, hoophouses can continue to be a cost-effective way to secure crop production.

Acquiring crop insurance is another method of mitigating production risks. Historically, crop insurance was viewed as a practice amongst commodity producers but has since expanded to provide federally subsidized insurance for specialty crops. Growers at a smaller scale with lower production volumes and a diverse production mix creates a hurdle for small-sized operations to effectively use specialty crop insurance. Obtaining whole farm diversified risk management insurance offered by the USDA Risk Management Agency may help growers as they scale up and seek to cover income losses from weather or disease. Whole Farm Revenue Protection[4] (WFRP) is a crop-neutral revenue insurance policy designed to protect revenue on a farmer's whole farm, not just one crop. Under this new policy, diversified farms that might not have access to crop or revenue insurance for each crop they grow can insure all the crops they grow and livestock they raise with one whole farm insurance policy. This innovative policy recognizes and rewards the inherent risk management benefits of on-farm diversification. For small farms, policies such as the WFRP can be crucial in deciding to scale-up production capacity as it provides an assurance for production risk.

Marketing

As all interviewed growers indicated, direct marketing, in the form of CSA or farmers markets, is their primary means of farm income. Thirty years ago the CSA marketing concept was only used among a few farms but now consists of over 12,000 farms nationally (Community Supported Agriculture, 2012). Through niche marketing successful growers in this study have been able to realize economic returns in the face of increasing control of the overall market by providing products that larger farms cannot

[4] Whole Farm Revenue Protection fact sheet: www.rma.usda.gov/policies/2015/wfrpfactsheet.pdf

or do not provide. Much of this marketing is conducted in the public sphere and therefore it is crucial for local governments and foundations to continue supporting infrastructure improvements to farmers markets. Practitioners and governments should work with food policy councils to learn best practices before developing ordinances or laws that may impact farm viability.

Small farms may have difficulty in competing in wholesale marketing programs and may want to work with food hubs to transition to wholesale or intermediated marketing. The number and type of food hubs have been growing across the states over the past five years, providing important infrastructure to link buyers and sellers (Hardy et al., 2015; Fischer et al., 2013).

Farmers and consumers both benefit from improved access to fresh, healthy, local food in communities, but building more connections between farmers and consumers involve many key stakeholders. These important connections, like farmers markets and food hubs, help grow economic opportunities for small farmers while also increasing consumer access to fresh and healthy food. An important federal funding program that supports these efforts is the Farmers Market and Local Food Promotion Program[5] (FMLFPP) which funds direct-to-consumer marketing strategies as well as local and regional food business enterprises that act as intermediaries between producers and consumers by aggregating, storing, processing, and/or distributing locally or regionally processed food products. Farmers can seek out opportunities to work with local

[5] Farmers Market Local Food Promotion Program link: https://www.ams.usda.gov/services/grants/fmpp

organizations that pursue these funds and encourage these organizations to support initiatives that can booster small farm survivability.

New policies

According to the 2012 Census, there are more than twice as many farmers who are 75 or older as 34 and younger. The rapidly aging farmer population has significant implications for the future of the nation's farm economy and food system. Many reasons have been cited for the decline of beginning farmers, most notably high start-up costs and capitalization needed to enter agriculture and difficulty of securing land to purchase or to rent.

The USDA should develop a detailed summary of all the programs available for new farms, e.g., the number and amount of FSA loans, and the type of grants available for new and beginning farmers. The Beginning Farmer Rancher Development Program [6](BFRDP) is an important first step but would benefit from an extensive outline of current efforts and funding levels and where grants have been awarded. Appointing a USDA new farmer agent at the county, or at a minimum, state-level would aid in navigating initiatives. Such agents could work with food policy councils, county agricultural commissioners, and university faculty and extension agents in order to serve the wide range of agricultural demographic interests.

[6] Beginning Farmer Rancher Development Program link: https://nifa.usda.gov/program/beginning-farmer-and-rancher-development-program-bfrdp

Recommendations for future research

Future research should focus on an improved data collection process and aim for a sample size that is statistically significant. With improved records and an increased sample size, a multi-year longitudinal study of farmer incomes could provide greater detail towards farmer decision-making and viability. Improved records would also support research on specific crop varietals of higher earning farms, while also supporting small growers looking to build niche markets. Any future research looking at farm viability should include a cash flow analysis, in order to gain a more detailed understanding of farm debts and income generation potential.

Research integrating small farm viability and crop production practices would support farmers looking to scale up and generate greater revenues while also supporting efforts to produce the amount of food necessary to continue building regional food systems.

APPENDICIES

APPENDIX I: Interview Template

Pre-interview:

1. Phone call, directions to farm, introductions, understand timeline for interview
2. Go over IRB informed consent (remind them of what they signed)
3. Ask permission to begin

Interview guide

This guide indicates the key areas for semi-structured interview with farmers at their home, fields, or where distance is prohibitive via Camtasia (video screen recording).

Farmer Information:

Michigan County/City: _____

Age:_____

Farm Experience (Yrs): _____

Greenhouse Experience (Yrs)_____

Hoophouse/Season Extension Experience (Yrs): _____

Total Acres/Sq. Ft of Greenhouse:_____

Total Acres/Sq. Ft of Hoophouse:_____

Total Acres in Production:_____

Acreage in Fruit/Vegetables:_____

Education Level (circle): Middle School GED Bachelors Masters PhD

Record Keeping Skill (circle one):

1 2 3 4 5 6 7 8 9 10

No skill Average Expert

 # Of farmers' markets grower is selling at this year (per week):

For each market you sell at, how long (months/years) have you sold there?

Please circle which marketing outlets your farm sells through:

CSA Farmers Market Farm Stand: On site / Off-site

Wholesale (type): Restaurant Food Hub/Exchange Grocery Institution

Other:

What percentage of sales are sold through each market?
CSA Farmers Market Farm Stand: On site / Off-site

Wholesale (type): Restaurant Food Hub/Exchange Grocery Institution
Other:

<u>Open Ended Interview Questions:</u>

Did you grow up farming?

Why did you choose to farm?

Did you start your farm as a business opportunity to generate income? (circle)
Yes, please explain No, please explain

Based on your amount of time farming have your intentions to farm changed?

Are you concerned with your farm being profitable? Please explain

How important is it that your farm be profitable?
1 2 3 4 5 6 7 8 9 10
Not important Somewhat Very important

What are the biggest factors in your farm being profitable?

What are the biggest factors in your farm being successful?

What does it mean to you to be successful?

In 2014, approximately how much of your household budget did your farm business pay for? (circle)
0% 1-19% 20-39% 40-59% 60-79% 80-99% 100%

Did you start your farm with a small business loan?
If yes, please explain If no, please explain

Do you currently use an operating loan to manage your business?

What would it take for you to expand production?
Financing:
Equipment:
Labor:
Information:
Markets:

How can you save for retirement?
Farm Subsidies:

1) In 2014, did your farm receive any farm incentives/subsidies? If, yes please explain

2) Have you participated in Government/Foundation programs? (NRCS, Beginning farmer, etc.) If yes, what years and programs?

3) Have you built/received a hoophouse in the past 5 years? If yes, when and how large?

4) If received, which program did you work with? Please explain relationship.

5) Have you been enrolled in a farm business training or workshop in the past 5 years?
   If yes, which one(s), when, and did it improve your business? How?

6) Did you receive business incentives through your involvement in this program?
   If yes, please explain

APPENDIX II: Sample data log

Table 4. Sample data log

NAME: John Doe FARM: Date:

	FARM INCOME		**FARM EXPENSES**							
MONTH	**Gross Income from Produce Sales** (CSA, Farmers Market, Wholesale)	**Gross Farm Income** Produce +Non-produce, merch.	Fixed Input Costs for Season: (Seed, Soil, Fertilizer, One time input purchases)	Total Farm Labor Hours (Non-Market)	Market Labor Hours (Market+ Deliveries)	Total Farm Miles	Prop. Taxes or Rent	**Total Expense**		NET FARM INCOME (Total Gross Farm Income - Total Gross Farm Expenses)
MARCH	FM:100 W:300 CSA:	400	600	60	12	0	n/a	600		-200
APRIL	FM:200 W:300 CSA:500	1000	400	60	12	0	n/a	400		600
MAY	FM: W: CSA:									
JUNE	FM: W: CSA:									
JULY	FM: W: CSA:									
AUGUST	FM: W: CSA:									
SEPTEMBER	FM: W: CSA:									
OCTOBER	FM: W: CSA:									

APPENDIX III: Economic outcomes of eleven small farms

Table 5. Economic outcomes of eleven small farms

Farmer Identification code	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	ALL Average	ALL Median
Urban or Rural	Rural	Rural	Rural	Rural	Rural	Rural	Urban	Urban	Urban	Urban	Urban	n=11	
Farming is Sole Household Income	No	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	No		
Farmer Est. % of Household Income from Farm	25%	90%	20%	35%	100%	100%	100%	95%	10%	15%	15%	55%	
2015 Gross Income	$16,318	$188,258	$118,491	$66,958	n/a	415,000	$26,851	$59,900	$16,652	$11,124	$9,579	122,194	$43,376
2015 Net Income	$1,425	$69,255	$34,234	$35,840	n/a	n/a	-$2,172	$19,671	$2,035	$8,964	$6,944	$19,577	$8,964
Net Income Per Acre	$150	$4,617	$4,617	$11,946	n/a	n/a	-$1,086	$19,671	$8,140	$8,964	$6,944	$4,773	$4,617
Avg. Net Cash Income of Operation by County	$13,605	$8,715	$8,715	$64,575	$31,248	$373	$6,996	$6,996	$6,996	$6,996	$6,996	$14,746	

APPENDIX IV: Dominant interview themes

Table 6. Dominant interview themes

Dominant themes	Self-sufficiency	Community	Social justice	Food system change
Definitions (subsumed)	use of the phrase 'self-sufficiency'	use of the word 'community'	public health	being part of a movement
	use of the phrase 'sustainable living"	community supported agriculture	food access	affect change
	personal or family security	Sense of place for others	racial injustice	lifestyle
	stewardship	greater good	health disparities	faith
	livelihood	employing people	being fair	good food
	flexibility	fun		educating
	simplicity in our family's life	passion		
Example quote	"It was important for us to create a lifestyle that was self-sustaining as much as possible. Regardless of how much money we make, this is better than working at Staple's or any other job you don't have self-autonomy over."	"I didn't anticipate having such a strong connection to our CSA and the strong sense of community that is created through it. It has provided a strong sense of purpose for our family and the mission of this farm."	"I saw growing food as the greatest way to address health disparities and as an effective way for people to address their own health outcomes without a top-down controlling approach."	"I wanted to work for myself, work outdoors, and have my actions contribute towards a local agricultural movement"

REFERENCES

REFERENCES

Adhikari, A, Mishra, A.K., and Chintawar, S. (2009). Adoption of technology and its impact on profitability of young and beginning farmers: A quantile regression approach. *The Southern Agricultural Economics Association Annual Meeting, Georgia, USA*.

Agricultural Marketing Service. (2015, August). *Farmers Market and Direct-to-Consumer Marketing*. Web. 26 May. 2016. Retrieved from: http://1.usa.gov/1ZdmEC9

Ahearn, Mary Clare, and Doris J. Newton. (2009). Beginning farmers and ranchers. *Economic Information Bulletin* 53.

Becker, K., Kauppila, D., Rogers, G., Parsons, R., Nordquist, D., & Craven, R. (2009). Farm Finance Scorecard. Center for Farm Financial Management*, University of Minnesota, St. Paul, Minnesota*.

Bond, J. K., Thilmany, D., & Bond, C. (2009). What influences consumer choice of fresh produce purchase location?. *Journal of Agricultural and Applied Economics*, *41*(01), 61-74.

Brown, A. (2002). Farmers' market research 1940–2000: An inventory and review. *American Journal of Alternative Agriculture*, *17*(04), 167-176.

Brown, Jason P. and Jeremy G. Weber. The Off-Farm Occupations of U.S. Farm Operators and Their Spouses, EIB-117, U.S. Department of Agriculture, Economic Research Service, September 2013.

Clancy, Kate, and K. Ruhf. (2010). Is local enough? Some arguments for regional food systems. *Choices* 25(1): 123-135.

Collier, R., Fellows, J. R., Adams, S. R., Semenov, M., & Thomas, B. (2008). Vulnerability of horticultural crop production to extreme weather events. *Aspects of Applied Biology*, *88*, 3-14.

Community Supported Agriculture. (2012). Retrieved July 12, 2016, from https://www.nal.usda.gov/afsic/community-supported-agriculture

Conner, D., Waldman, K., Montri, A., Hamm, M., & Biernbaum, J. (2010). Hoophouse contributions to economic viability: Nine Michigan case studies. *HortTechnology*, *20*(5), 877-884.

Curtis, K. R., Yeager, I., Black, B., & Drost, D. (2012). Potential Benefits of Extended Season Sales through Direct Markets. *Journal of Food Distribution Research*, *43*(1).

D'Antoni, J., Mishra, A. & Chintawar, S.. (2009). Predicting financial stress in young and beginning farmers in the United States. Selected paper, Southern Agricultural Economics Association Annual Meeting*, Atlanta, GA*.

Detre, J. D., Mark, T. B., Mishra, A. K., & Adhikari, A. (2011). Linkage between direct marketing and farm income: a double-hurdleapproach. *Agribusiness*, *27*(1), 19-33.

Dimitri, C., Effland, A. B., & Conklin, N. C. (2005). *The 20th century transformation of US agriculture and farm policy* (Vol. 3). Washington, DC: US Department of Agriculture, Economic Research Service.

Dimitri, C., Oberholtzer, L., & Pressman, A. (2016). Urban agriculture: connecting producers with consumers. *British Food Journal*, *118*(3), 603-617.

Donnell, J., Biermacher, J. T., & Upson, S. (2011, January). Economic potential of using high tunnel hoop houses to produce fruits and vegetables. In *Selected Paper, Southern Agricultural Economic Association Annual Meeting, Corpus Christi, TX*.

Fischer, M., Hamm, M., Pirog, R., Fisk, J., Farbman, J., & Kiraly, S. (2013). Findings of the 2013 national food hub survey. *Michigan State University Center for Regional Food Systems & The Wallace Center at Winrock International*. Retrieved from: http://foodsystems.msu.edu/activities/food-hub-survey

Ford, S. A., & Shonkwiler, J. S. (1994). The effect of managerial ability on farm financial success. *Agricultural and Resource Economics Review*, *23*(2), 150-157.

Fox, G., Bergen, P. A., Dickson, E., & Hallam, A. (1993). Why are some farms more successful than others? A review. *Size, structure, and the changing face of American agriculture*, pp. 232-250.

Gale, Fred. "Direct Farm Marketing as a Rural Development Tool," *Rural Development Perspectives*, U.S. Department of Agriculture, Economic Research Service, 12(2), pp. 19-25, 1997.

Galt, R., O'Sullivan, L., Beckett, J., & Hiner, C. (2012). Community supported agriculture is thriving in the Central Valley. *California Agriculture*, *66*(1), 8-14.

Govindasamy, R., Hossain, F., & Adelaja, A. (1999). Income of farmers who use direct marketing. *Agricultural and Resource Economics Review*, *28*, 76-83.

Grubinger, V. P. (1999). *Sustainable vegetable production from start-up to market*. Natural Resource, Agriculture, and Engineering Service, Cooperative Extension.

Guntera, A., Thilmany, D., & Sullinsc, M. (2012). What is the new version of scale efficient: a values-based supply chain approach. *Journal of Food Distribution Research*, *43*(1).

Hansen, J. W., Jones, J. W., Kiker, C. F., & Hodges, A. W. (1999). El Niño-Southern Oscillation Impacts on Winter Vegetable Production in Florida*. *Journal of Climate*, *12*(1), 92-102.

Hardy, J., Hamm, M., Pirog, R., Fisk, J., Farbman, J., & Fischer, M. (2016). *Findings of the 2015 National Food Hub Survey*. East Lansing, MI: Michigan State University Center for Regional Food Systems & The Wallace Center at Winrock International. Retrieved from: http://foodsystems.msu.edu/resources/2015-food-hub-survey

Hardesty, S., Feenstra, G., Visher, D., Lerman, T., Thilmany-McFadden, D., Bauman, A., & Rainbolt, G. N. (2014). Values-based supply chains: Supporting regional food and farms. *Economic Development Quarterly*, 0891242413507103.

Hardesty, S. D., & Leff, P. (2010). Determining marketing costs and returns in alternative marketing channels. *Renewable agriculture and food systems*, *25*(1), 24.

Heifner, R., Coble, K., Perry, J., & Somwaru, A. (1999). *Managing risk in farming: concepts, research, and analysis*. J. L. Harwood (Ed.). US Department of Agriculture, Economic Research Service.

Healthy Food Financing Initiative. (2016, April 27). Retrieved June 25, 2016, from http://www.acf.hhs.gov/ocs/programs/community-economic-development/healthy-food-financing

Hendrickson, J. A. (2005). *Grower to grower: Creating a livelihood on a fresh market vegetable farm*. Center for Integrated Agricultural Systems.

Hendrickson, M. K., & Heffernan, W. D. (2002). Opening spaces through relocalization: Locating potential resistance in the weaknesses of the global food system. *Sociologia ruralis*, *42*(4), 347-369.

Hoffman, R. (1996). Size and profitability: It's better to be good than big, but you can't beat good and big. *Farm Journal (Mid-March)*, 2-3.

Hoppe, Robert A. Structure and Finances of U.S. Farms: Family Farm Report, 2014 Edition, EIB-132, U.S. Department of Agriculture, Economic Research Service, December 2014.

Hoppe, R. A., & MacDonald, J. M. (2013). Updating the ERS farm typology. *USDA-ERS Economic Information Bulletin*, (110).

Howley, P., Dillon, E., & Hennessy, T. (2014). It's not all about the money: understanding farmers' labor allocation choices. *Agriculture and human values*, *31*(2), 261-271.

Huffman, W. E. (1974). Decision making: The role of education. *American Journal of Agricultural Economics*, *56*(1), 85-97.

LeRoux, M. N., Schmit, T. M., Roth, M., & Streeter, D. H. (2010). Evaluating marketing channel options for small-scale fruit and vegetable producers. *Renewable agriculture and food systems*, *25*(01), 16-23.

Levins, R. A. (1996). Monitoring sustainable agriculture with conventional financial data: first in a series of publications based on the work of the biological, social and financial monitoring team.

Lins, D., P. Ellinger, and D. Lattz. (1987). "Measurement of Financial Stress in Agriculture." *American Finance Review*, 47(18=987):43-52.

Low, S. A., & Vogel, S. J. (2011). Direct and intermediated marketing of local foods in the United States. *USDA-ERS Economic Research Report*, (128).

Lyson, T. A., Stevenson, G. W., & Welsh, R. (2009). Food and the mid-level farm: Renewing an agriculture of the middle. MIT Press.

Martinez, S. (2010). Local food systems; concepts, impacts, and issues (No. 97). Diane Publishing.

Matson, Sullins, & Cook (2013). *The role of food hubs in local food marketing*. Congressional Research Service Report No. 74. Retrieved from: http://bit.ly/29QkTfk

Michigan Good Food Fund. (n.d.). Retrieved August 10, 2016, retrieved from: http://migoodfoodfund.org/about

Mishra, A. K., & Morehart, M. J. (2001). Factors affecting returns to labor and management on US dairy farms. *Agricultural Finance Review*, *61*(2), 123-140.

Mitchell, J. (2015). A Young Generation Sees Greener Pastures in Agriculture. Retrieved May 22, 2016, from: http://n.pr/1vZRHSn

Monson, J., Mainville, D., & Kuminoff, N. (2008). The decision to direct market: an analysis of small fruit and specialty-product markets in Virginia. *Journal of Food Distribution Research*, *39*(2), 1-11.

Morgan, T. K., & Alipoe, D. (2001). Factors affecting the number and type of small-farm direct marketing outlets in Mississippi. *Journal of Food Distribution Research*, *32*(1), 125-132.

National Agricultural Statistical Service (NASS). 2012. 2012 Census of Agriculture. Washington, D.C.: US Department of Agriculture, National Agricultural Statistical Service

Natural Resources Conservation Service. 2016. *High Tunnel System Initiative*. United States Department of Agriculture. Web. 01 Feb. 2016. Retrieved from: http://1.usa.gov/1xiTje0

Newton, D. J., & Ahearn, M. C. (2007). Management Strategies of Beginning Farmers and Ranchers. In *Selected poster, American Agricultural Economics Association Annual Meeting, Portland, OR*.

Patton, M. Q. (2005). *Qualitative Research*. John Wiley & Sons, Ltd.

Pirog, R., Miller, C., Way, L., Hazekamp, C., & Kim, E. (2014). The local food movement: Setting the stage for good food. *MSU Center for Regional Food Systems*

Reynolds-Allie, K., Fields, D., & Rainey, R. (2013). Risk Management Issues for Small Farms within Local Food Systems. *Choices*, *28*(4).

Rogus, S., & Dimitri, C. (2015). Agriculture in urban and peri-urban areas in the United States: Highlights from the Census of Agriculture. *Renewable Agriculture and Food Systems*, *30*(01), 64-78.

Rubin, H. J., & Rubin, I. S. (2011). Qualitative Interviewing: The Art of Hearing Data. Sage.

Schickele, R. (1949). Farm Business Survival Under Extreme Weather Risks. *Journal of Farm Economics*, *31*(4 Part 2), 931-943.

Stevenson, G. W., & Pirog, R. (2008). Values-based supply chains: Strategies for agrifood enterprises of the middle. *Food and the mid-level farm: Renewing an agriculture of the middle*, 119-143.

Store It Cold, LLC. (2016). Retrieved July 16, 2016, from: https://www.storeitcold.com/economic-advantages/

Tackie, N. O., Baharanyi, N., & Findlay, H. J. (1992). Marketing fruits and vegetables in south central Alabama: The diffusion approach. In *Workshop Year* (Vol. 21, pp. 38-9).

Tagtow, A. M., & Roberts, S. L. (2011). Cultivating resilience: A food system blueprint that advances the health of Iowans, farms and communities.

Know Your Farmer, Home | USDA. (n.d.). Retrieved July 18, 2016, from: http://www.usda.gov/wps/portal/usda/knowyourfarmer?navid=kyf-kyf

Uva, W. F. L. (2002). *An Analysis of Vegetable Farms' Direct Marketing Activities in New York State* (No. 122632). Cornell University, Department of Applied Economics and Management.

Yin, R. K. (2015). *Qualitative research from start to finish*. Guilford Publications.

Zepeda, L., & Li, J. 2006. Who buys local food?. *Journal of Food Distribution Research* 37(3): 1.