THESIS

ASSESSING THE MARKET CHANNEL PERFORMANCE OF COLORADO FRUIT AND VEGETABLE PRODUCERS

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ABSTRACT

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The growing popularity of locally sourced fruits and vegetables in the United States provides an opportunity for small and mid-sized farms to improve viability through sales to local markets. However, there is little research that looks at differences in business performance in these markets, and specifically, how labor allocation and marketing expenditures may vary by market. Based on the Market Channel Assessment Tool (MCAT) protocol developed in New York, variable costs (except those associated with production) and revenues were collected via market channel through farm interviews and labor logs recorded by producers during a one-week period spanning the peak marketing season in 2016 in Colorado. Following the New York model, it is expected that richer cost and revenue information can be used to support improved market decisions related to balancing market channel portfolios for individual farm participants. Moreover, aggregated data was used to establish performance benchmarks by market channel and region for producers to use for comparisons to peers. In addition, a two-dimensional fixed effect model quantified the impact of farm level attributes on market channel profitability. Results indicate channel profitability is positively impacted by the share of harvest labor involved in marketing and number of market channels, while negatively impacted by the share of labor facilitating sales (staffing market stands or making calls to buyers) and the number of crops grown. Extension agents and other agriculture support providers can use these results to support more

involved farm market channel decision-making and efficient variable input expenditure recommendations.

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GLOSSARY OF ACRONYMS

CSA	Community Supported Agriculture
CSU	Colorado State University
DTC	Direct-to-consumer
FM	Farmers' Market
FS	Farm Stand
MCAT	Market Channel Assessment Tool
MP	Marketing Profit Margin
NCFI	Net Cash Farm Income
YBS	Young, Beginning, and Small

CHAPTER 1: INTRODUCTION

Locally sourced foods represent a small but rapidly growing segment of the U.S. agricultural economy. The relocalization of the food system is thought to provide an opportunity for small and midscale fruit and vegetable operations to access a larger share of the consumer's food dollar. In contrast to conventional agriculture, local fruit and vegetable producers are often characterized by operations that integrate a diversity of products and markets into their business enterprise. Local food markets are generally characterized by two types of markets: direct-to-consumers (e.g., farm sales through Community Supported Agriculture marketing arrangements (CSA), at farmers' markets, and farm stands), and intermediated (e.g., farm sales to restaurants, institutions, and food hubs). While intermediated channels typically allow producers to move larger volumes of product at a lower price, direct-to-consumer (DTC) channels provide the farmer with a higher price but likely require more labor to manage more customer interactions. In addition, DTC channels may introduce some risk related to the potential for lower sales volume because transactions are not pre-determined, and reliant on a high volume of cash transactions. These factors are just a subset of the factors to motivate the need for a better understanding of the costs and returns of the diverse set of market channels as a key resource in assisting farmers to make optimal market portfolio decisions.

Previous research uses national level data to explain the marketing decisions and variables influencing profitability of farms marketing locally. However, because national data is limited to broad definitions of direct and intermediated markets, these studies do not address the heterogeneity of market channels within these two broader marketing strategies. The few studies that track the costs and returns of specific market channels use a detailed case study approach that

does not account for regional variation in market channel performance, and also, generalizability of the previous results are limited by small sample sizes.

This study will use primary farm-level data to evaluate market channel profitability and sales efficiency by region. The Market Channel Assessment Tool (MCAT) methodology developed by LeRoux et al. (2010) was used to record the costs and returns by individual market channels for twenty-five producers throughout three regions in Colorado during the summer of 2016. Market channel specific benchmarks and regression analysis were applied to the collected data to analyze the differential performance between market channels and across regions within the state, thereby allowing me to address farm expenditure characteristics that influence channel profitability.

Background

Over the last century, the share of U.S. household income spent on food has significantly declined. In 1947, food expenditures as a share of disposable personal income was 23%. By 2014 this share dropped to under 10% (USDA-ERS, 2017). Part of this shift is due to the fact that relative food costs have decreased over time due to farms increasing in scale through consolidation to reduce production costs, combined with vertical and horizontal integration of supply chains and consolidation intended to reduce transaction costs. Yet, this consolidation across the food system poses a challenge to producers who cannot compete with the slim margins that commonly accompany commodity markets, and moreover, these farms (that are commonly smaller or limited resource) cannot access competitive food markets because of the less competitive structure that emerges when there are fewer and larger buyers in the supply chain (Drabenstott, 1999).

In response to consolidation across the food system, starting in the 1970s, ecological, cultural, and political factors were more commonly considered as food market analyses began to

focus on a vision of a more local, ecologically sustainable, and democratically controlled food system (Feenstra, 1997). Increased environmental awareness and consumer demand fueled the growth of the organic industry as one food system model that addressed issues of concern to some consumers (Friedman, 2003). From 1997 to 2008, retail sales of organic foods increased from $3.6 billion to $21.1 billion (Dimitri and Oberholtzer, 2009). Following the successful establishment of the organic sector, other business model derivations for producing and marketing food have emerged, including local food markets. Hinrichs (2000) refers to local food systems as the 'stepchild' of sustainable agriculture because of the association between local, direct agricultural markets and organic or low-input farming. In recent years, local food has increased in importance when compared to food attributes such as organic, certification, and origin of production (Moser, Raffaelli, and Thilmany-McFadden, 2011).

Though 'local' is not defined by the Federal Government per se (unlike organic), for a few key programs in "the Farm Bill" (i.e., The Food, Conservation, and Energy Act of 2008) it is considered a product that has traveled less than 400 miles from its origin or is sold within the same state as production. In fact, the U.S. Department of Agriculture has explicitly decided not to define 'local' in part to the many attributes with which it is associated by diverse communities (Low et al., 2015). Thilmany (2015) concludes that local food has several 'civic agriculture' dimensions in addition to purely geographic notions in the eyes of consumers including environmental, economic competitiveness, consumer motivations for direct purchases and linkages to broader non-profit initiatives. Consumers who demand high-value foods produced with low environmental impact often are also willing to pay more for locally produced food (Martinez et al., 2010), because demand for private quality attributes tend to be positively correlated with public dimension attributes for these consumers (Thilmany, Bond, and Bond, 2008). In summary, local foods are

increasingly attractive to consumers because they embody explicit benefits such as quality and freshness, as well as implicit benefits, including supporting local producers and environmental stewardship.

Local food sales in the U.S. totaled an estimated $6.1 billion in 2012 (Low et al., 2015), and are anticipated to reach over $20 billion by 2019 (Tarkan, 2015). This emerging form of 'Retail Agriculture' addresses consumers' increasingly heterogeneous and sophisticated tastes by requiring the farmer to use market channels with a significant retail influence (Matteson and Hunt, 2012). Accordingly, the number of U.S. farmers' markets increased by 180% and the number of food hubs increased by 288% between 2006 and 2014 (Low et al., 2015). The 2015 Local Food Marketing Practices Survey found 35% of local food sales were DTC, 27% were through retailers (grocery stores, restaurants, food cooperatives, etc.), and 39% were through institutions and intermediary businesses (USDA-NASS, 2016).

Only eight percent of farms sell through local food markets, and the majority of these farms are categorized in the small economic class (gross cash farm income below $75,000) (Low et al., 2015). On average, this smaller scale of farms spends the lowest share (8%) of variable expenses on labor (Shideler et al., 2017). A possible explanation for the low labor costs could be attributed to the high reliance on unpaid family or volunteer labor. Evidence from unincorporated[1] farms show that, although small farms require overall less unpaid hours, the value of unpaid labor is a significantly larger percentage of gross cash farm income (GCFI) (Figure 1).

[1] Adjustments for operator and unpaid labor apply only to unincorporated farms.

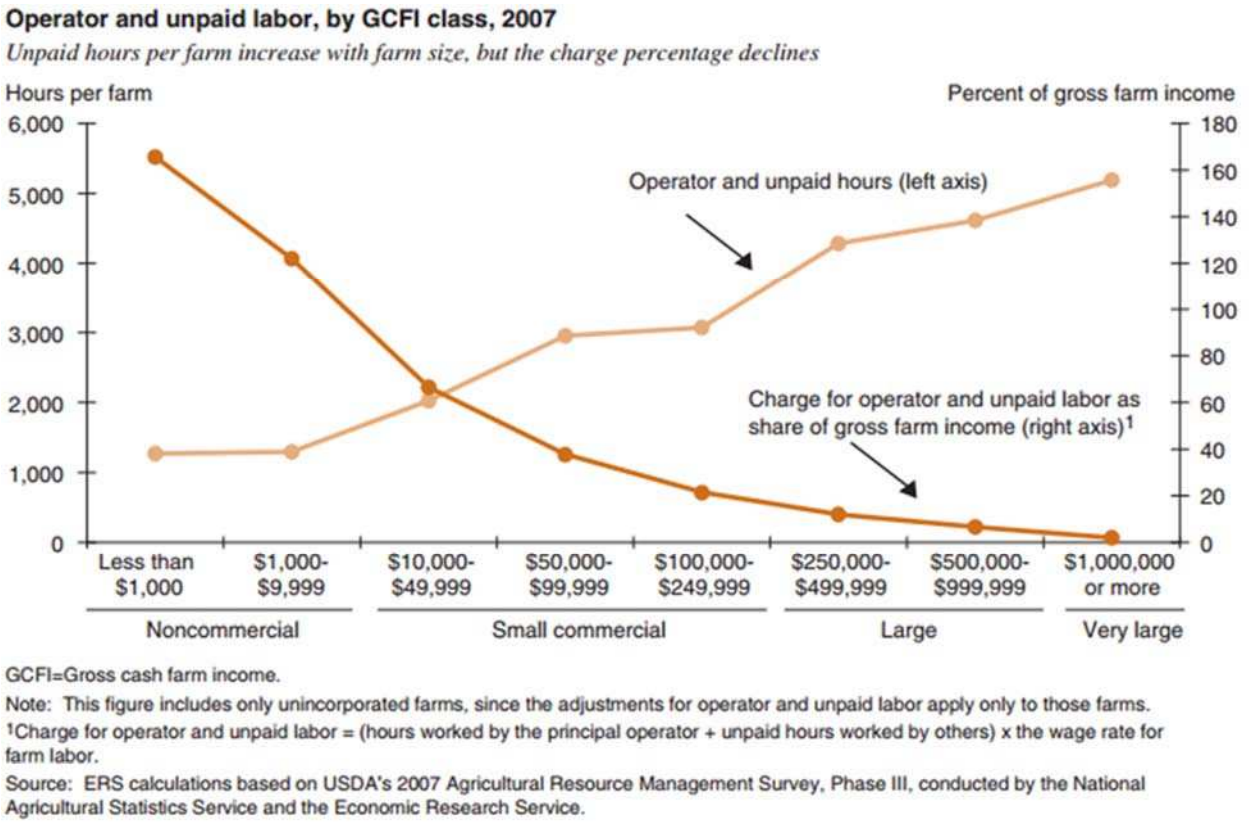


Figure 1: Operator and Unpaid Labor by GCFI Class

Preliminary research has shown that labor requirements are a major determinant of profitability for small-scale fruit and vegetable producers when comparing different market channels (LeRoux et al., 2010). By not accounting for labor, farms may make sub-optimal marketing decisions that can adversely affect profitability. Unpaid labor exhibits an opportunity cost, therefore, accounting for the value of paid and unpaid labor is important in allocating scarce labor time to the most productive use. The methodology, initially employed by LeRoux et al. (2010), emphasizes the importance of recording the labor spent on completing a variety of marketing activities to get an accurate account of the costs associated with each market channel used by a farm.

Due to the perishability of fresh fruits and vegetables, and risks of predicting variable sales volumes for a particular market channel, producers often combine different channels to maximize

firm performance (LeRoux et al., 2010). LeRoux et al. (2010) found important differences in expenditure and labor requirements between direct and intermediated marketing strategies. In a DTC market strategy, the farm performs all marketing functions within the supply chain to receive a larger share of the consumer's food dollar. Farms using a DTC market strategy are more likely to be small in scale (Low et al., 2015) and access to urban markets is crucial (Martinez et al., 2010). However, as Bauman, Jablonski, and Thilmany McFadden (2016) conclude, farms using only DTC markets may need to diversify into some wholesale markets in order to remain viable by scaling up to a higher volume of sales.

Intermediated market channels often result in a lower per unit price to the farmer, but they may allow the farm to spend less time marketing and more time on production (Martinez et al., 2010). Small scale producers often face barriers to selling wholesale due to volume requirements, seasonal demand, heightened Food Safety Modernization Act regulatory requirements[2], and buyers unwilling to deal with multiple suppliers. Farmers have overcome these limitations by pooling resources and working cooperatively/collaboratively through food hubs (Martinez et al., 2010). According to Fischer, Pirog, and Hamm (2015), a food hub is a financially viable business that demonstrates a significant commitment to place through aggregation and marketing of local food.

The heterogeneity of marketing strategies among small and midscale diversified crop producers – and limited data classifying markets as direct or intermediated - makes creating generalizable results for financial performance and recommendations for best practices difficult. Establishing benchmarks to represent the variation in market channel profitability and labor

[2] Sullins and Jablonski (2016) found farms with a diversified market portfolio (selling through DTC and intermediated markets) may have risk exposure beyond DTC and intermediate only farms. These diversified farms had the largest median total food safety costs per acre compared to DTC only and intermediated only farms.

utilization practices would benefit a wide range of stakeholders. Benchmarks can be used for efficiency and productivity analysis in developing frontiers to capture relationships between inputs and outputs (Fleming et al., 2006). Farmers can potentially benefit from such performance benchmarks by comparing their own market channel performance to farms in their region to refine their own business choices. This will assist in market portfolio management decisions such as entering a new market or dropping a poorly performing market. Marketing labor utilization benchmarks by channel category demonstrate the labor activity allocation of profitable market channels, assisting farmers in labor management decisions.

The federal government acknowledges the increasing importance of local food markets for small and midscale producers, as evidenced by the recent increase in programs to support such channels (largely through the farm bill). For example, the USDA's Farmers' Market Promotion Program (FMPP) provided $60 million in assistance to over 900 projects nationwide since 2009. In 2014, Congress expanded the FMPP to include the Local Food Promotion Program (LFPP), which supports more complex local food supply chains including aggregation, distribution, storage and processing of local food. The LFPP funded over 350 projects totaling almost $25 million since its launch. The Specialty Crop Block Grant Program funded 5,484 projects totaling $392.9 million. The USDA also provided $37.4 million to 186 Community Food Project awards in 48 states since 2009 (Vilsack, 2016). Yet, the absence of benchmarking information on performance by market makes it difficult to evaluate the effectiveness of these programs. Regional benchmarks would serve to communicate the strengths and weaknesses of market channels to producers, and other supply chain partners in an emerging sector, which could improve the efficacy of these programs.

The rapid development in retail agriculture, characterized by an increasing diversity of products and markets, exposes producers to market risk that traditional insurance products are

unequipped to handle. Concerns about the effectiveness of crop insurance for specialty crops resulted in the development of a Whole Farm Diversified Risk Management Insurance Plan (Collins, 2012)[3], which one could infer will use those benchmarks to appropriately frame and price risk management products offered to this sector. Yet, the challenge in expanding insurance coverage for specialty crops is the current state of insufficient data related to price discovery and business benchmarks for more localized marketing strategies. Generally, the only insurance plan available is Actual Production History, however some producers are requesting Revenue Protection insurance plans given that farms selling through local food markets receive a premium over commodity market prices (that are well tracked). Without organized exchanges for specialty crops that facilitate price discovery, the insurance value is likely below the effective retail price many specialty crop producers receive. The 2012 Farm Bill partially addressed this issue by calling for collection and reporting of wholesale and retail prices for organic crops (Section 11021) (Collins, 2012). Although the USDA Risk Management Agency offered an Adjusted Gross Revenue plan, participation among farmers was low relative to other existing specialty crop programs. By 2015, the Adjusted Gross Revenue program was converted to Whole Farm Revenue Protection (2015 FCIC Specialty Crop Report to Congress). In 2016, Whole Farm Revenue Protection insured 50-85% of whole farm revenue which was specifically developed for diversified farms that tend to sell to direct, local or regional, and farm-identity preserved markets, such as organic (Vilsack, 2016). Because of this transition from insuring individual crops to protecting

[3] Through Section 10006 of the Farm Security and Rural Investment Act of 2002, the USDA was directed to conduct a study of crop insurance and specialty crops, which resulted in the 2004 *Report on Specialty Crop Insurance*. Subsequently, the Federal Crop Insurance Corporation published the 2010 *Report to Congress: Specialty Crop Report* as a requirement of Section 508(a)(6)(B) of the Federal Crop Insurance Act. The results of these reports prompted Section 11015 of the Senate-passed Agriculture Reform, Food, and Jobs Act of 2012, which developed new insurance product proposals for "under-served agricultural commodities including…specialty crops" through Section 508(h) of the Federal Crop Insurance Act. Sections 11019 and 11022 of the bill made research and financial benchmarking for specialty crop products a priority. Section 11016 of the bill called for the development of a Whole Farm Diversified Risk Management Insurance Plan (Collins, 2012).

against whole farm revenue, information on the performance of individual market channels would be useful to understand the income risk exposure of those producers who are choosing to participate in diversified market portfolios.

Credit availability is another unique concern for producers involved in local food production and marketing. One study found four-fifths of farmers' market vendors provide all of their own start-up capital from personal savings (Matteson and Hunt, 2012). Lending practices are beginning to adapt to the differentiated forms of local food system agribusinesses, including financing targeted toward young, beginning, and small (YBS) farmers. Some lenders are also becoming less reliant on traditional metrics that often make lending to YBS farmers difficult (Matteson and Hunt, 2012). For example, the senior vice president of specialized lending at Farm Credit Service of America and Frontier Farm Credit, Tim Koch, states, "We place less emphasis on equity and liquidity and more emphasis on cash flow, profitability and projected profitability" when determining the credit needs of YBS farmers (AgriBank, 2016). Developing performance benchmarks by market channel will help producers communicate and provide supporting evidence for their (projected) cash flow and profitability to lenders, ultimately improving credit availability.

Although there is technical support for specialty crop growers in the form of detailed crop enterprise budgets, best practices and financial support through government programs and lending opportunities, there are still limitations given most existing support focused on production, so this study is intended to improve market research assistance for this group of farmers. Specifically, since the body of research regarding the marketing of local foods that focuses on differences across channels is still relatively limited, this thesis contributes to what we know about the financial performance of producers using diverse marketing channels in Colorado.

The progression of this thesis is as follows. Chapter 2 evaluates the strengths and weaknesses of using national level data to assess marketing strategies used by local food producers, then explores how limitations in national level data analysis have motivated recent detailed case studies on market channel portfolio performance. Chapter 3 explains how one such case study method, the Market Channel Assessment Tool, was used to collect detailed farm level data. In Chapter 4, the collected data is used to develop market channel specific benchmarks and regression analysis to compare market channel performances, and the variables driving those performances. Finally, Chapter 5 will draw conclusions from the data analysis as well as address some limitations and explore potential for further research to evaluate market channel performance.

CHAPTER 2: LITERATURE REVIEW

There is a growing literature on marketing strategies and farm performance for farms utilizing local food markets. However, this literature is limited to the broad characterization of direct and intermediated market channels, primarily due to data limitations. The USDA, for example, historically focused data collection by commodity categories rather than market channel (Gupta and Jablonski, 2016). Researchers are addressing the dearth of market channel specific data primarily through a survey and case study approach targeted specifically at local food producers (Brown et al., 2007; Tegtmeier and Duff, 2005; Woods, Ernst, and Tropp, 2017; Gupta and Jablonski, 2016; Starr et al., 2003). However, other researchers have noted that a more structured and detailed case study approach might better illustrate the heterogeneity of market channel portfolios that specialty crop producers utilize, and the unique marketing and labor costs associated with various marketing outlets (Hardesty and Leff, 2010; Schmit and LeRoux, 2014; Murray and Gwin, 2016).

This literature review will start with an overview of the broad scope of U.S. studies using national data to evaluate determinants of direct or intermediated marketing strategies and the predictors of what makes a particular strategy successful. Next, studies analyzing individual market channels are reviewed to summarize successful traits across the market channel choices available to producers. Finally, the literature tying together direct and intermediated market strategies with a case study approach of market portfolio evaluation is explored.

Determinants of Marketing Strategy and Profitability

Marketing strategy and performance studies using national level data have generally used the USDA's Agricultural Resource Management Survey (ARMS) or the U.S. Agricultural

Census. However, these national data sources have limitations that restrict the analysis of market channel portfolios into three broad categories including DTC sales only, intermediated sales only, and a combination of DTC and intermediated sales without accounting for the heterogeneity of market channels within each category. The U.S. Agricultural Census records the number of farms using DTC sales and the value of DTC sales, however, the number of farms using intermediated sales was just added in the most recent Census (2012) and the value of intermediated sales was not yet included until subsequent ARMS surveys. The U.S. Agricultural Census provide geographically representative benchmark counts of local food farms, but the ARMS data contains more detail on the farm and farm operator as well as the value of local food sales. The ARMS survey began surveying farms who report producing and selling food direct for human consumption through DTC and through intermediate markets in 2008, but the multiframe, stratified sampling methodology is designed to be geographically representative by oversampling large farms in the 15 core agricultural states (it should be noted that Colorado is not included). Furthermore, the ARMS questionnaire used to estimate local food sales has changed methods twice since 2008 in response to the growth and innovation in local food marketing channels, thereby reducing the reliability of those estimates (Low et al., 2015). Despite the limitations of these data sources for evaluating local marketing strategies, the data analysis methods used in local food marketing research using national data provide a useful framework of analysis as more detailed data becomes available.

Studies analyzing the choice of participating in a DTC marketing strategy, and the profitability or sales of a DTC marketing strategy generally evaluate three categories of variables: household or operator characteristics, farm-level characteristics, and demand or supply (external) characteristics. These studies are broad in scope and use national data from ARMS (Park, Mishra,

and Wozniak, 2014; Uematsu and Mishra, 2011; Ahearn and Sterns, 2013; Detre et al., 2011). Brown, Gandee, and D'Souza (2006) used data from the U.S. Agricultural Census and the U.S. Census to estimate a regression of direct market farm sales. Farmer and Betz (2016) used a survey consisting of 219 participants (29.2% response rate) to elucidate the variables that predict whether a farm will sell through DTC market channels.

Household characteristics included in past studies (e.g., the age, education, off-farm work, and experience of the primary operator) have been reported with mixed results. Detre et al. (2011) found the probability of adopting a DTC marketing strategy decreases after age 65, confirming their a priori expectation that older farmers recognize the additional management time associated with a DTC marketing strategy. For determinants of NCFI generated through a DTC marketing strategy, Ahearn and Sterns (2013) found age to be insignificant, but age squared was significant, implying older operators have higher financial performance when engaged in DTC markets.

In terms of education and experience of the primary operator, Uematsu and Mishra (2011) found operator's years of education had a positive relationship with the number of DTC channels used. Farmer and Betz (2016) found farmers who adopted a DTC-only marketing strategy had higher educational attainment and less dependency on external financing. Uematsu and Mishra (2011) used a zero-inflated negative binomial model and found farm operators with more farming experience were less likely to adopt a DTC marketing strategy. In their second stage, the quantile regression to estimate gross cash farm income found experience was positive, but experience squared was negative. This indicates the marginal impact of experience increases the probability of adopting a DTC marketing strategy, but at a decreasing rate.

Mixed results for the effect of off-farm income were also reported across studies. Uematsu and Mishra (2011) found farmers who declared farming as their primary occupation are more likely

to adopt a DTC marketing strategy. Park, Mishra, and Wozniak (2014) show an increase in off-farm income corresponds to an increase in sales through DTC channels. Ahearn and Stern's (2013) models for short-term and long-term profitability of DTC marketing found off-farm income was negatively related, leading them to conclude the intensive time commitment of DTC channels is at odds with operators working another job.

Several researchers also examine the relationship between farm-level characteristics (i.e., farm size, number of employees, type of products, production practices, and management skills) and participation and performance of marketing strategies. Detre et al. (2011) found large farms (those with annual gross sales greater than $500,000) are 1.2% less likely to adopt a DTC marketing strategy, and farm size had a negative relationship with DTC sales. Similarly, Uematsu and Mishra (2011) found that larger farms are less likely to use a DTC marketing strategy, however gross cash farm income had a positive relationship with farm size for all income quantiles. Ahearn and Sterns (2013) found farms with DTC sales were more likely to have positive NCFI and a return on asset of 0.1 or greater as farm size increased. Park, Mishra and Wozniak's (2014) log linear model for value of DTC farm sales found a positive elasticity for acres farmed; a 1% increase in acreage farmed is expected to increase farm sales by 0.36%. Combined these results show that, although larger farms are less likely to use a DTC marketing strategy, larger farms that sell DTC are generating more sales.

The type of crop produced and the production practices are also shown to play an important role in marketing strategy and performance. Detre et al. (2011) found farms producing high value crops such as fruits or vegetables are 2.4% more likely to adopt a DTC marketing strategy as well as to increase gross sales. Park, Mishra and Wozniak (2014) found participation in a DTC marketing strategy increased with an operation's increasing share of income from vegetables,

fruits, and nursery. This finding is consistent with Uematsu and Mishra's (2011) result that farms selling high-value crops (i.e., fruits and vegetables) had higher gross cash income from DTC channels across all income quantiles.

The most commonly linked production practice when analyzing the adoption and performance of a DTC marketing strategy was organic production. Detre et al. (2011) found farms producing certified organic products were 22% more likely to adopt a DTC marketing strategy, which increased gross sales by 3.39%. Related to growing with organic practices, Farmer and Betz (2016) found the group of farmers selling only through DTC channels had higher concerns about farming practices and the environment, they were also more willing to try new production methods. That same study found that non-certified organic producers were more likely to use intermediated market channels.

Park, Mishra, and Wozniak (2014) applied a selectivity approach to a multinomial logit model using 2008 ARMS data and determined that management and marketing skills significantly affect DTC sales. They created an index to capture the number of management and marketing skills used on farm operations. The index of management skills consists of: forward purchase contracting, using farm management for advice on input sources/pricing, shopping for the best price from multiple suppliers, negotiating price discounts and participating in buying clubs. The marketing skills index consisted of seven skills: the use of advisory services, options, futures, on-farm storage, contract shipping, collaborative marketing or networking to sell commodities and participation in a farmer owned cooperatives. The elasticity for the marketing skills index in the DTC sales model predicted that adopting an additional practice increases farm sales by an estimated 0.21%. The authors note several different post-harvest activities such as on farm storage, developing collaborative marketing arrangements, and participating in farmer-owned cooperatives

are the most frequently reported practices by DTC farmers and these activities can be implemented at a relatively low cost.

Studies on Individual Market Channels

Studies that analyze the performance of specific DTC and intermediated marketing channels rely on survey and/or interview data. Brown et al. (2007) surveyed over 300 farmers' market vendors to develop an OLS model to determine which variables impact the level of sales, percent of household income and amount of income from the farmers' market venue. Tegtmeier and Duffy (2005) mailed surveys to 144 Upper Midwestern U.S. farms (obtaining a 38% response rate) utilizing a CSA in 2002 to understand the attributes and practices that contributed to farm profitability. In 2014, Woods, Ernst, and Tropp (2017) sent a national survey to CSA operations yielding 495 useable surveys (a 24% response rate). Gupta and Jablonski (2016) conducted phone interviews with 28 grocery stores in two counties in Hawaii and surveyed 47 farms in the same region to understand the farm-retailer dynamics for farm-to-grocery sales. Starr et al. (2003) surveyed 154 (37% response rate) Colorado restaurants that sourced local products and 101 Colorado farmers selling directly to restaurants.

The results from the Brown et al. (2007) multiple regression analysis found full-time producers (both with and without off-farm jobs) were more likely to have higher total farmers' market sales and earn a higher percentage of household income from farmers' markets. The number of days per week and the number of weeks per season a farm attended market had a positive and significant impact on the level of sales, percent of household income and amount of income from farmers' markets. What is interesting to note is that the number of farmers' markets attended, organic labeling, and promotional strategies (such as bulk discounts or free samples) were not significant in any model.

Uematsu and Mishra (2011) found farmers' markets had a negative impact on gross farm income for farmers using a DTC marketing strategy. They attribute this result to competition among farmers within a market, competition among farmers' markets, inadequate management resources, a low profit margin, and an intermittent operation schedule. The authors note that the farmers may still choose to continue to participate in farmers' markets because of nonpecuniary benefits such as promotion for other market channels such as CSA and the development of entrepreneurial skills. Feenstra et al. (2003) studied human capital development at farmers' markets and found 80% of vendors surveyed reported that farmers' markets provided the greatest opportunity for development of their business as compared with other possible marketing outlets. Farmers reported that farmers' markets helped them improve skills in customer relations, merchandising, and pricing. Entrepreneurial activities such as expanding a product line, adding a new product category, or making new business contacts were enhanced at market.

Woods, Ernst, and Tropp's (2017) survey of CSAs found the average share of farm sales from using CSA as a market channel was 53.2%. A CSA channel was the largest market for 58.1% of the responding farms. The study concludes that, although farms using a CSA model expected to experience continued growth in CSA sales and profitability, including strong demand for their products, this optimistic outlook varied by region as well as whether the farm was urban or rural. Out of the four regions of the U.S. into which the survey respondents were divided, the Western region had the lowest number of respondents (45.9%) who believed the contribution of their CSA to overall farm profits would "Increase Some" or "Increase a Lot". However, 53% of the same producers checked the categories, "Increasing some" or "Increasing a lot," when asked about their expectations on the future profitability of their CSA (Woods, Ernst, and Tropp, 2017). Tegtmeier and Duffy's (2005) CSA study found the average net returns per acre for CSA farms was $2,467,

which is much larger than that reported by commodity crops such as corn ($172), soybeans ($134), or wheat ($38). The study also found unpaid family members often provide the majority of the labor (75-100%) for the CSA, and 57% of respondents did not believe the share price provided them a fair wage.

Few studies exist that evaluate the buyer-seller relationship between farms selling locally through intermediated channels such as grocery stores and restaurants. The results from Gupta and Jablonski's (2016) study found that as producers increase in scale, they are significantly more likely to be satisfied with the volume of product sales, lifestyle preferences, risk, associated costs, physical infrastructure, and social infrastructure associated with sales to grocery stores. Farms producing fruits and vegetables were significantly less likely to be satisfied with the costs, physical infrastructure, and social infrastructure associated with sales to grocery stores. This is likely due to the additional costs and regulatory hoops associated with Good Agricultural Practice (GAP) requirements of fruit and vegetable producers who choose to sell through some grocery stores.

Starr et al.'s (2003) logistic regression using the Colorado farm-to-restaurant survey results found that as farm size decreases, farmers are more interested in sustainable farming practices and selling locally. The smallest farms were far more likely to direct market and sell something to restaurants. They concluded restaurants accounted for a very small proportion of total farm sales and noted it would be helpful to find out what percentage of direct sales are in each category of the market channels available to producers. Overall, although studies have focused on the performance of individual market channels such as farmers' markets and CSAs, there are major gaps in analysis of sales through intermediated market channels. A complete market portfolio research approach addresses these gaps as many farms use a combination of direct and intermediated channels.

Limited Information on Profit by Market Channels

For studies that focus on the complete marketing portfolio of a farm, researchers conduct detailed case studies using in-person interviews, given the detailed and sensitive nature of data collection. Perhaps due to the financial and time requirements of this approach, these studies are scant in the literature. Hardesty and Leff (2010) conducted a case study of three producers in Northern California, LeRoux et al.'s (2010) case study consisted of four small-scale fruit and vegetable farms in Central New York and resulted in the development of the Market Channel Assessment Tool (MCAT) that was used in this study. Murray and Gwin (2016) also used the MCAT methodology developed by LeRoux et al.'s (2010) case study approach with six farms in Oregon.

Although the case study approach provides detailed information on factors impacting the performance of the marketing channels used by farmers, the limited quantity of data and the one week data collection period impedes generalizability of results. Since 2008, thirty-one New York small and medium sized fruit and vegetable producers participated in market channel assessments. In total, this comprises 133 unique farm-market channel combinations (Schmit and LeRoux, 2014). In addition, as mentioned above six farms in Oregon completed market channel assessments in the summer of 2014 using the same methodology. As more states adopt the standardized MCAT methodology, a database of marketing costs and returns by individual market channels can be compiled and analyzed with the statistical tools used by the studies previously mentioned.

Before the MCAT methodology was developed, Hardesty and Leff (2010) used a similar methodology and found marketing costs were lowest for wholesale channels and highest for farmers' markets. They determined the high costs of labor required for farmers' market sales and transportation can offset the higher prices and minimal packaging costs associated with farmers'

markets. In their preliminary market channel assessments, LeRoux et al. (2010) found, on average, that CSA was the top performing market channel in terms of volume, unit profit, labor requirements and risk preferences. In terms of the type of marketing labor used, Murray and Gwin (2016) found harvest was the most time-consuming marketing activity, representing an average 56% of total marketing labor. Similar to Hardesty and Leff's (2009) results, Murray and Gwin, found significant sales labor associated with farmers' markets. They considered time spent selling at farmers' market a fixed cost, and subsequently recommended integrating other market channels such as CSA share pick-up or restaurant order pick-ups at the farmers' market site in order to spread those fixed costs across more channels.

A common finding from these three studies was that producers diversified their market channels to reduce risk. Hardesty and Leff (2009) discuss the inclusion of specific channels within farms' market portfolios for 'cosmetically challenged' products that could not be sold through wholesale, or alternatively, markets that can handle small volumes in the beginning and at the end of the season. LeRoux et al. (2010) discuss the participating farmers' strategy of a first priority 'steady' channel for which the product is grown, then a second priority 'variable' channel. Each farm had a slightly different strategy for their 'steady' and 'variable' channels, further demonstrating the necessary heterogeneity in local specialty crop marketing strategies.

The background research summarized here synthesizes analyses done at several levels of the marketing strategy, from broad categories of DTC and intermediated marketing to specific market channel type, using different types of data and methodological approaches. While studies using econometric analysis and national level data to understand the determinants and performance of direct marketing strategies are useful in explaining the farm-level, household, and external market characteristics, they do not provide information on specific market channel performance

or how market channels perform within a market portfolio. Research using survey level data is addressing this gap by evaluating the determinants of successful individual market channels. However, the heterogeneity of diversified market strategies and the challenges of resource use, particularly labor utilization, limit the applicability of channel specific results on diversified market portfolios. A handful of case studies use an interview approach to evaluate the costs and returns of these diversified market portfolios using a systematic method such as the MCAT, but often cite the importance of further data collection to make the results generalizable. The research in this paper uses the MCAT methodology to collect detailed information by individual market channel to contribute to the body of research and improve the understanding of successful market channels used by fruit and vegetable producers. The next chapter will explain the MCAT methodology and results from the Colorado study in more detail.

CHAPTER 3: MARKET CHANNEL ASSESSMENT STUDY

Colorado, like the rest of the United States, has experienced growth in sales through direct and intermediate marketing channels. In Colorado, the 2016 Colorado Farm Fresh Directory lists over 100 farmers' markets (CDA, 2017), and the number of US farms marketing through CSAs increased by almost 10% to 234 farms between the 2007 and 2012 census years (USDA-NASS, 2014). Food hubs and local distribution companies are also expanding and connecting farms to the thriving health food, restaurant, and hospitality services sector that supports the growing population of Colorado. There are currently three food hubs in the Colorado Food Hub Directory (USDA-AMS, 2017). Yet, the growth in local food marketing options in Colorado also poses a challenge for farmers who may not have the information and market research necessary to select the best channels for their products based on their lifestyle preferences, risk aversion, or production and marketing skill sets. The MCAT provides a useful methodology to analyze the variation in market channel performance, given the diversity of marketing choices that Colorado producers face.

As described above, labor is often the largest expenditure for farms selling into local food markets (Jablonski and Schmit, 2016). Further, there is evidence to suggest that labor varies within local food markets and the share of expenses for labor increases as farm scale increases (Shideler et al., 2017). Although Shideler et al.'s (2017) results show small scale farms have the lowest share of variable expense paid to labor, small scale farms are more likely to use a DTC marketing strategy which requires more labor. One reason why the smallest local market producers have the lowest share of labor as a variable expense could be a greater dependence on unpaid or volunteer labor. As LeRoux et al. (2010) note, not accounting for unpaid labor could lead to producers

choosing suboptimal marketing strategies because of seemingly greater cash returns, but only because one ignores opportunity costs associated with those unpaid workers. The MCAT methodology can partially address this issue because it applies a value to labor, including unpaid family or volunteer labor.

Another rationale for this research is to address a common sentiment expressed by farmers with whom the research team interacted in Colorado, which is that the prices offered by distributors or intermediaries are too low compared to the prices the producer could receive marketing directly (perhaps with little regard to the labor needed to manage those markets). As LeRoux et al. (2010) describe in the rationale for the MCAT methodology, optimizing a market portfolio involves equating marginal revenue (price) with the marginal cost across all market outlets. By tracking labor for all marketing activities, the marginal cost of each market channel is more explicit as the opportunity cost of each worker's time is assigned a value, and therefore, true costs can be more accurately compared to the returns.

Finally, an important rationale behind the MCAT methodology as a decision tool for diversified fruit and vegetable crop operations is that it uses a multi-criteria approach to evaluate market portfolio performance. The heterogeneity of specialty crop producers described above, results in different prioritization of values. Some producers may not be solely profit maximizers, and they have the option in the MCAT tool to more highly rank the importance of lifestyle preferences, which may impact market channel selection.

The common theme across each of these rationales in support of the MCAT approach is to support the viability of small and midsized farms. The MCAT methodology supports farm viability by presenting farm operators with information about the labor utilization by marketing activity and

by market channel relative to those channels' returns. Herein the operator can identify possible improvements in terms of labor resource use, volume, and market channel selection.

Beyond individual market channel reports, aggregated MCAT data are used to develop benchmarks by market channel so that producers participating in a market channel or adopting a new marketing strategy have a reference point for their operation to compare to the market channel performance of peer producers within their state. Further motivation for collecting this type of information is to provide guidance to government agencies, lenders, and insurance product providers on the relative labor use, returns and overall profitability by market channel rather than by product. This new approach to data collection may be more appropriate for policies and programming meant to target YBS farms.

Methods

Approach

The methodological approach used in this study was adapted from the MCAT developed by LeRoux et al. (2010). The primary focus of the analysis was to attribute marketing costs to each individual market channel to assess the channel's relative costs and returns. Farmers with diversified marketing portfolios face tradeoffs. As described by LeRoux et al. (2010), wholesale channels are generally able to move large quantities of products, but at a lower price where farmers retain less of the retail dollar than direct channels. Although direct channels typically have higher prices, they also require more customer interaction, regulatory compliance effort, and marketing/sales labor.

Another challenge, particularly for specialty crop producers, is the perishability of their product. This requires greater flexibility offered by combining different channels capable of accepting alternative sizes and types of products, or absorbing unpredictable volumes at short

notice (LeRoux et al., 2010). The framework to analyze the choice of marketing outlet can be explained as a profit maximization problem. To maximize profit, marginal revenue must equal marginal costs, which must be true for all costs associated with every marketing outlet. As LeRoux et al. (2010) show, the higher price of a direct market must be equal to the marginal cost of direct marketing, and similarly, the lower price of wholesale channels must be equal to an expected lower marginal cost of selling through wholesale to achieve profit maximization. As Biermacher et al. (2007) note, not accounting for unpaid labor could substantially impact perceived market channel profitability, and lead to misallocation of product across channels. Therefore, accounting for all marketing labor is necessary to determine whether the higher prices of direct channels justify the additional labor required.

This raises the question about the types of labor for which one should account, and how it should be recorded. Hardesty and Leff (2010) sort marketing labor into three activities: packing and storage, transportation, and selling and administration. LeRoux et al. (2010) used a similar approach, but made the decision to include harvest labor as a marketing activity based on interviews with farmers who explained how a product could be harvested differently based on the ultimate market channel destination. Murray and Gwin (2016) speculated that crop mix could affect market channel performance through the harvest and processing time. Accordingly, they recommended evaluating channel performance with and without harvest and processing labor included. Through informal interviews with the Colorado participants this logic and justification for including harvest labor was confirmed, therefore in this analysis harvest is considered a marketing activity. Both studies chose to ignore production costs (including labor) as it was perceived that these costs did not vary by market channel.

LeRoux et al. (2010) applied an hourly rate of $8.50/hr to unpaid labor to reflect the minimum wage (2009), as a means to more explicitly account for opportunity costs. In the Colorado analysis, we asked the farm operator what rate they would like to apply to unpaid or volunteer labor, but required that a nonzero value be used. This was intended to capture the full opportunity costs of unpaid labor as the farm operator valued the labor. If the labor were to be paid (or accounted for as opportunity cost), such data would give the farm operator a more accurate idea of the costs and returns for each channel.

Given the already lengthy data collection requirement in the MCAT approach, LeRoux et al. (2010) use a modified definition of profitability. Usually, profit is the difference between a firm's total revenue and total cost. However, the MCAT methodology limits the collection of variable expenses to marketing labor and transportation cost, and completely excludes fixed costs including but not limited to building and equipment depreciation, input costs. Therefore, herein profitability refers to 'marketing profit' (MP) to describe the margin left after marketing expenses (labor and fuel) to cover production costs and the opportunity cost of management.

Participants

Recruiting participants for this study was complex and challenging, as the criteria to participate were strict (fruit and vegetable crops sold through multiple market channels), and the information requested was proprietary and time-consuming to collect. Furthermore, to meet the study standards, the data had to be collected in peak production and marketing season (Christensen et al., 2017). The researchers received IRB approval on July 20, 2016 under IRB ID: 169-17H.

When LeRoux et al. (2010) conducted their first round of MCATs, they intentionally selected specific farms to illustrate a diverse array of marketing channels. Our recruitment requirements were broadened to develop a larger data set, and we recruited producers via online

webinars, visiting farmers' markets and food hubs, as well as distributing recruitment materials through project partners (i.e., Colorado Fruit and Vegetable Growers Association, Colorado State University Extension, Colorado Farmers Market Association, Northern Colorado Food Cluster, Colorado Department of Agriculture). Farms were recruited for the market channel assessment based on the following criteria: 1) the farm is located in Colorado; 2) the operation uses at least two distinct marketing channels; and 3) the farm produces and sells fruit or vegetables. The recruitment process started in early 2016 with a brief producer survey. Throughout the spring of 2016, Colorado State University (CSU) Extension agents were contacted to conduct outreach by describing the MCAT study so they could promote the research on behalf of the project, refer producers to an online survey, and assist with farmer recruitment in their regions. In June 2016, CSU Extension in collaboration with Matt LeRoux from Cornell Cooperative Extension, presented an informational webinar in conjunction with the Colorado Fruit and Vegetable Growers Association to describe the process to their membership and further assist in recruitment[4].

For the 2016 MCAT study, the specific regions of Colorado targeted for farm visits included the Western Slope (which consists of the Uncompahgre Valley and Grand Valley), the Southwest region (consisting of the Montezuma and Animas Valleys), and the Northern Front Range, stretching from Denver to Fort Collins (Figure 2). Additional regions throughout the state will be targeted for further data collection in the summer of 2017. The enumerator spent approximately one month in each of these three regions recruiting producers, communicating the methodology to participants, collecting initial data from farms, and facilitating the "peak season' data collection. Upon arriving in a new region, the enumerator contacted Extension agents, regional food distributors and local purchasers of specialty crops including restaurants and grocery

[4] Webinar available online: http://foodsystems.colostate.edu/research/market-channel-assessments/state-benchmarks/

stores to find fruit and vegetable growers. The enumerator also visited various farmers' markets to recruit participants directly.

Figure 2: 2016 Colorado Regions Surveyed by Months of Data Collection

The response rate for this study is 18.4%[5] of an estimated 145 farms contacted in person or on the phone. This estimate is based on the number of farms the enumerator contacted directly, considering the number of eligible farms contacted by project partners could not be elicited. Of the eligible farms who refused to participate in the study, the most common objection was a lack of available time to collect data for a week during peak production.

[5] This is a weighted average of each region's response rate (22.9% Southwest, 15.6% Western Slope, and 16.7% Front Range), weighted by the ratio of the sample in each region to the total sample.

Farms contacted via farmers' market were given a packet of materials including an article about the use of the MCAT in New York, a sample MCAT report, an invitation letter and a postcard containing a link to the CSU Food Systems' website for more information, and the enumerator's contact information. Farmers were also told that if they completed the data collection, they would receive $100 cash in recognition of their time spent on data collection and reporting. The producers then contacted the enumerator to schedule a farm tour where a consent form was signed and the enumerator completed the pre-MCAT questionnaire. After completing the questionnaire, the enumerator trained the producer and their harvest crew on completing labor logs.

The pre-MCAT farm questionnaire (Appendix A) contained information for completing the MCAT spreadsheet, as well as additional information the research team needed to collect about the farm's characteristics. The pre-MCAT information included the names and wage rates of employees; the days of sales, average revenues, and round trip mileage of each market channel; and the farmer's ranking of perceived risk and lifestyle preferences for each market channel in their portfolio. The farm level information included the types of crops produced (over the whole year), whether the farm had a business plan, their pricing strategy, the acres of their farm they rented vs. owned, and whether they sold any value-added products.

Once the participating farm initiated their week of data collection, the enumerator either visited or called to check in with the farm to answer any potential questions about completing labor logs. Generally, questions involved allocating time between channels when the farm used a batch harvesting method which is channel indeterminate. This type of harvest required additional information such as the producer's pick-list and itemized sales by channel. Labor logs and farm information sheets were picked up in person or mailed to CSU for compilation. If there were

missing or incomplete data, the enumerator called the producer to get the most accurate approximation if the exact data could not be recalled.

Labor Logs

The Colorado market channel assessment study used the same format for labor logs as the Cornell Cooperative Extension study. Labor logs were customized for each farm to include the farm name, names of farm workers, and market channels that were expected to be used during the week of data collection[6]. When possible, the enumerator asked to have the whole farm staff available for training on filling out labor logs to ensure reliable and consistent data collection. Participants were instructed to record labor logs during a week of peak production or marketing so the week of data collection would most likely be representative of the operation's activity during peak growing season.

Each labor log included the farm name, worker name, date, time (in 5 minute increments), labor activity, market channel and any clarifying notes or details. Workers were instructed to use separate labor log entries for each individual crop and activity. Figure 2 shows an example of the labor log worksheet. Some context of how producers were coached to classify labor was an important step to standardize data collection, and is worth further discussion here.

[6] If a farm had over 25 employees, workers were grouped into crews and wage rates were combined accordingly.

FARM NAME:	WORKER NAME:	DATE:

TIME SPENT (to nearest 5 min):		PRODUCT(S):	
ACTIVITY: (Each log sheet should cover one activity at a time)			
◯ **Harvest** e.g., create pick list, organize staff for harvest, harvest	◯ **Process/Pack** e.g., cull, grade, sort, wash, bunch, bag, package	◯ **Travel/Delivery** e.g., load/unload truck, travel to/from market, deliveries	◯ **Sales/Bookkeeping** e.g., bookkeeping, billing, sales calls, sales time, set up/take down
◯ **Other (please describe):**			
PRODUCT DESTINATION: (Check all that apply)			
◯ *Channel 1*	◯ *Channel 2*	◯ *Channel 3*	◯ *Channel 4*
◯ *Channel 5*	◯ *Channel 6*	◯ *Channel 7*	◯ *Channel 8*
◯ *Channel 9*	◯ *Channel 10*	◯ *Channel 11*	◯ *Channel 12*
NOTES (e.g., case split out -6 cases of cukes harvested, 2 for FM 4 for restaurants, including names of markets):			

Figure 3: Sample Labor Log

Harvest is determined to be the first marketing activity since production activities are generally standardized, and not impacted by market channel. Further, a wealth of information exists on production budgets by commodity, so additional information on those costs was deemed beyond the scope of this study. LeRoux et al. (2010) found that, in general, harvesting a crop for wholesale marketing channels requires more labor. Although the production process is assumed to be the same across marketing channels, as one example, producers may have to bunch rather than top produce or harvest directly into packaging, depending on the marketing channel into which produce is sold. The differentiation of harvest methods and, therefore, harvest labor, is what defines this as a marketing activity.

In practice, producers had a difficult time separating their harvest time by product and market. A common practice amongst producers was batch harvesting where multiple products for multiple markets were harvested at the same time. Therefore, labor logs for harvest were commonly not completed until after packing, which blurred the harvest differentials by market channel as harvest time allocations were commonly allocated after the fact based on relative shares

that went to each channel. In short, the rationale for including harvest was sound, but implementing such detailed data collection was a challenge.

Processing the harvested product includes sorting, culling, washing, packaging and packing product into boxes. Some farms would bunch product while harvesting so the process pack stage may just involve washing and packing into boxes, while other farms would harvest loose products and wash and bunch them in their wash station. Process and pack time varies by market channel. For example, in some cases, packing can be shorter for wholesale when producers can combine large volumes of product in a single package, as opposed to individual packages for their deliveries to farmers' markets or their farm stand. In other cases, the farmers would have to package product in individual packages for wholesale or grocery stores, while they could take a scale to the farmers' market and the consumer would bring their own packaging.

Transport and delivery involve loading product in a vehicle, driving to the buyer or market destination, and unloading the product. Delivering to multiple market channels in a single delivery posed an additional challenge for accurate data collection. The enumerator spent time coaching participants on how to allocate transport and delivery time when one truck/delivery made several stops en route. Relative to the context of the delivery, some producers chose to allocate travel time and mileage based on sales percentages if some channels had a higher priority in the delivery schedule, whereas other producers chose to allocate time based on mileage if they felt all delivery destinations had a relatively similar importance on their delivery schedule. The allocation of travel costs based on mileage for individual locations within a route is likely more accurate of the true travel costs because the time spent driving and the fuel used should be independent of the volume of sales. However, because the MCAT is intended to ultimately serve as a decision tool for the

participating producers, they were encouraged to allocate costs in a way that is consistent with their managerial decision-making process.

The final stage of the marketing process is transferring product to customers, which varies significantly by market channel. Though we group sales and bookkeeping together for the MCAT, the time spent making sales dominated this category. For example, if the farmer sells product to the consumer personally through direct markets, such personalized service is likely to include more sales time (such as through a farmers' market). In contrast, intermediated markets involve a customer who will resell the product and generally involves less face time for the producer, but may involve more time with business processes such as bookkeeping, invoicing, and negotiating sales volumes and prices, which was found to be an especially time-consuming aspect of managing restaurant accounts.

CSAs offer a unique challenge for fully accounting for sales time because of the upfront investment in recruiting CSA members in the off-season (where is labor not captured in the MCAT exercise). As Schmit and LeRoux (2014) note, the under-reporting of sales time involved in recruiting new member shares could overestimate the performance of that channel. Murray and Gwin (2016) recommend including the farmer's estimates of developing and distributing recruitment material, attending events, and communicating with CSA customers to allocate a portion of that time in the weekly labor commitment to manage that CSA market channel. Because the MCAT methodology collects data during a single week of peak production, we assume the operator's time for production and marketing is at its most scarcest. Therefore, it is a relative advantage of the CSA model that there is both a reduced risk of lost sales and time spent marketing during peak season. If the MCAT methodology is expanded to cover a complete season, the opportunity cost of recruitment should be included in the sales labor for that channel. But, for

peak-season analysis, asking the producer to keep track of time spent recruiting members before the off-season would likely yield a more accurate representation of the labor requirements than asking them to recall that information later in the year.

Compiling Data

Once the labor logs were collected, the data were entered into an MS Excel spreadsheet application developed by Cornell University and Cornell Cooperative Extension. The spreadsheet application has the capacity to include 12 unique market channels and 25 employees for each farm (or 25 groups of employees). The spreadsheet calculated the final market channel ranking based on the data compiled and inputted for each farm. The channel ranking is based on five evaluation criteria: sales volume, (marketing) profit margin, labor hour requirement, risk perception and lifestyle preferences. Each evaluation criterion is assigned a weight determined by the producer, which are summed to 100% to reflect their relative importance when determining the final weighted channel ranking.

LeRoux et al. (2010) provide justification for including these five evaluation criteria in the MCAT methodology. Sales volume is noted as especially important for producers of more perishable crops as it suggests a market is a good outlet to absorb unpredictable volumes. Price is generally the trade-off between high and low volume channels. Profit margin is an important measure for long-run firm viability because it relates to gross revenue. Although volume is important for generating revenue, MP should also be considered when making market channel choices. The sales volume score is determined by the relative magnitude of sales per market channel reported by the producer for the week of data collection. The profit margin score takes gross sales of the market channel, subtracts the marketing labor cost and travel cost, the result of which is then divided by gross sales of the market channel.

The labor hours required for a market channel is an important criterion for time management and planning. As described above, the MCAT labor hour includes all labor – paid and unpaid. Labor hour requirements proved to be very important in LeRoux et al.'s (2010) study, as farmers' beliefs in many cases contradicted MCAT results. Surveyed farmers believed wholesale channels were more labor intensive, however; the case study revealed the return in gross sales per each hour worked for wholesale was average relative to all channels. In fact, farmers' market and staffed u-pick operations had higher than average gross sales per labor hour. The labor hour score sums the total labor hours for each marketing activity and for each employee, therefore, the scores are determined by the relative magnitude of labor hours required by each marketing channel.

A farmer's perception of marketing risk can play an important role in market channel selection and producer's comfort level with particular markets. LeRoux et al.'s (2010) case-study of Central New York vegetable farms categorized perceptions of marketing risks into seven basic challenges to inform producers how to rank channels by risk: low volume of sales, high labor and marketing costs, the ability to provide product of consistent quantity and quality, buyer failure to fulfill commitments, competition, unpredictable customer turnout, and low prices and profits. The discussion of risk with farmers brought up another important evaluation criterion farmers appear to use to determine their marketing mix: lifestyle preferences. For example, some farmers enjoy facetime with customers at a farmers' market, whereas others do not. Given results from the pre-MCAT survey, lifestyle preferences and stress aversion were the two main reasons for avoiding a particular marketing channel.

Risk perception and lifestyle preference scores are assigned by the producer in the initial farm questionnaire after the enumerator has explained how to evaluate each channel. Producers

are asked to rank their market channels from lowest risk to highest risk based on perceptions of risk for each market channel, which could include any of the factors listed above. The ratings were scaled so that the highest score for an individual market channel is a value of one, and the lowest scoring market channel is equal to the number of market channels the farm sold through during the week of study. Market channel rankings between the lowest and highest could take on fractional values to express the relative magnitude of risk (i.e. rankings were not required to be strictly ordinal). Similarly, lifestyle preferences require the producer to rank the market channels according to their perceptions of which is most enjoyable or least stressful relative to the others.

Individualized Reports as a Validation and Outreach Tool

Individualized reports were prepared for each participating farm in an effort to ensure that the results were accessible for producers. They also served both as an incentive to participate and to support results validation by the research team. An example report can be found in Appendix B. Information on labor was broken down by day of the week, market channel and worker. Labor costs and channel gross sales were compared, and financial metrics such as sales and profit per labor hour were included. Each report included seven sections:

- Farm Description
- Labor Hours per Marketing Channel
- Labor hours per Marketing Activity
- Gross Sales vs. Labor Costs by Channel
- Sales and Labor Allocation by Channel
- Sales and Gross Profit per Labor Hour by Channel
- Final Channel Ranking

The first three sections of the report provide an overview of the farm and the labor data collected. First, the farm description gives a brief overview of the farm's characteristics, including who operates the farm, where it is located, how long it has been in existence, unique attributes about production or marketing practices or any other useful information to give context to the

information that follows. Next, the labor hours per marketing channel section shows the time allocated to each market channel by marketing activity. This was presented early in the report so the producer could verify the accuracy of the information used to construct the measures. Benchmarks for labor utilization by market channel allow producers to compare their farm's channel performances to the top performing market channels in the sample by share of labor spent on marketing activity. Finally, the labor hours per marketing activity section shows the producer how much time was spent on each of the marketing activities, by employee. The hours of marketing labor by day of the week and employee were also presented to assist with labor management decisions on how and when employees perform marketing functions.

The next three sections use the labor data and sales information to evaluate the relative performance of the market channels. First, the gross sales vs. labor costs by channel section visually compares the marketing labor costs to the revenue generated by channel with bar charts to show the relationship between the volume of sales and the labor costs used to generate those sales. Next, the sales and labor allocation by channel section shows the percentage of revenue each channel contributes to the weekly gross revenue, compared to the percentage of labor each channel requires out of the total week's marketing labor. The difference between these values can reveal underperforming channels if the share of revenue is significantly less than the share of labor it requires. The final set of metrics in the performance section is sales and gross profit per labor hour by channel, including sales per hour of labor, marketing profit per hour of labor, and profit as a percentage of sales for each market channel within the portfolio. Benchmarks for each of these performance measures are also included so the producer can compare their channels' performance to the performance of market channels by category within the Colorado sample.

The final section of the report is the channel ranking which gives a weighted and unweighted ranking of the market portfolio based on the five performance criteria described above and the producer's choice of weights for each. Based on the results of the final channel ranking, interpretation of the results is summarized along with the research team's recommendations. The final report table in which the final channel rankings are presented reflect a summary of the previous sections' results to concisely demonstrate strengths and weaknesses of each market channel.

Consulting

In January 2017, once reports were compiled and edited, each participating farm was contacted to schedule a thirty-minute consulting session. The consulting session served two purposes: first to explain the results of the market channel assessment to participating producers, and also, to get producer feedback on the validity of the data collected and analyzed. Farms were provided an opportunity to verify the accuracy of the data contained in the report. The farm could change any information in the report, and an updated final report was then mailed to producers. This process was important in calibrating the benchmarks for accuracy, and to allow the producer to reflect on what was reported during a rushed peak season period, and now with more time and reflection, they were allowed to more carefully refine any data they felt was not representative of their operations.

Consulting services provided by CSU also generated value for the participants beyond simply receiving an MCAT report as the agricultural economists provided interpretation of the business implications from the findings and recommendations based on the farm's results relative to others in the Colorado market. The consulting sessions ensured the producers understood how the results were calculated, helped to interpret the market channel benchmarks for the state, and

provided an opportunity for the participant to provide feedback and recommendations for the study. Although the benchmarking results were presented as preliminary (given the small sample), producers were instructed on how benchmarks could be used to evaluate their farm's performance relative to the top and bottom performers in the state. The responses from individual consultations revealed producers generally anticipated the top and bottom performing channels within their own portfolios, however, some expressed interest in better understanding the relative magnitude of strengths or deficiencies among those channels when compared to the top and bottom performing market channel categories throughout the state. The economists who presented the individual MCAT reports gave a disclaimer that the benchmarks presented would become more robust in the future as more farms and market channel information is collected.

Data and Results

Summary Statistics

Twenty-five farms in three regions of Colorado participated in the MCAT study during the 2016 growing season (Figure 2). On average, farmers actively produced on 3.8 acres (median of 1.5 acres) with a range in size, from a small farm on one-tenth of an acre up to twenty acres of intensively managed produce. Farms produced between 2 to 58 types of crops on their operation with an average of 26 crops. The average gross sales during the week of data collection was $3,290, but this varied markedly from $304 to $20,630 per week (Table 1). Almost all farms utilized a market channel portfolio consisting of both direct and intermediated channels. Direct markets were disaggregated into three subsets including CSA, farmers' market and farm stand. Intermediated markets were also disaggregated into three subsets including distributor, grocery store and restaurant. For intermediated market channels, there was also a miscellaneous category that included farm to school accounts, donations and group CSAs facilitated by any entity other than

the farm. Farmers' markets and farm stands were used by 68% of the sample. Thirty-two percent sold directly to a grocery store, representing the least prevalent market channel (Table 2).

Table 1: 2016 MCAT Participant Overview

N=25	Acres	Weekly Gross Sales	Crop Types
Max	20	$20,630.00	58
Average	3.8	$3,290.25	26
Min	0.1	$304.00	2

Table 2: 2016 MCAT Market Channel Participation

Market	Direct	FM	CSA	FS	Interm.	Dist.	Res.	Groc.
% Total	96	68	52	68	91	48	48	32

Note: Farm operators could choose more than one category, so the number of market channels exceeds the sample. Also, Direct and Interm represent subtotals of the three categories directly to their right.

Table 3 summarizes the weights the sample of farms placed on the five market channel evaluation criteria given their values, motivations, and goals. Each producer was asked to apply percentages based on relative importance to each market channel evaluation criteria. By default, each evaluation criteria is given the same weight at 20%. By allocating a weight larger than 20%, the final channel ranking will place more weight on that evaluation criteria, but at least one other evaluation criteria must be allocated a weight less than 20% so the total weights sum to 100%. On average, the largest weight applied by the farm operators was on the labor requirement of a channel, reflecting the importance many producers placed on labor management and its challenges. The lowest average weight was placed on risk perception, indicating it was the least important attribute of market channel selection across the full sample of farms. On average, sales volume and lifestyle preferences and profit margin had very similar weighting across the sample. This reveals that, although on average farms were prioritizing market channels based on the labor hours required, other key variables (sales volume, lifestyle and profit margin) had a similar impact on their market portfolio decisions.

Table 3: Summary of Farm Operator's Evaluation Criteria Weighting

N=25	Sales Volume	Labor Requirement	Profit Margin	Risk Perception	Lifestyle Preferences
Max.	0.4	0.4	0.5	0.2	0.4
Ave.	0.212	0.227	0.214	0.133	0.213
Min.	0.1	0.1	0.1	0.03	0.03

Note: These weights were assigned by the farm operator(s) with a default value of 0.2, signifying equal weights across all criteria.

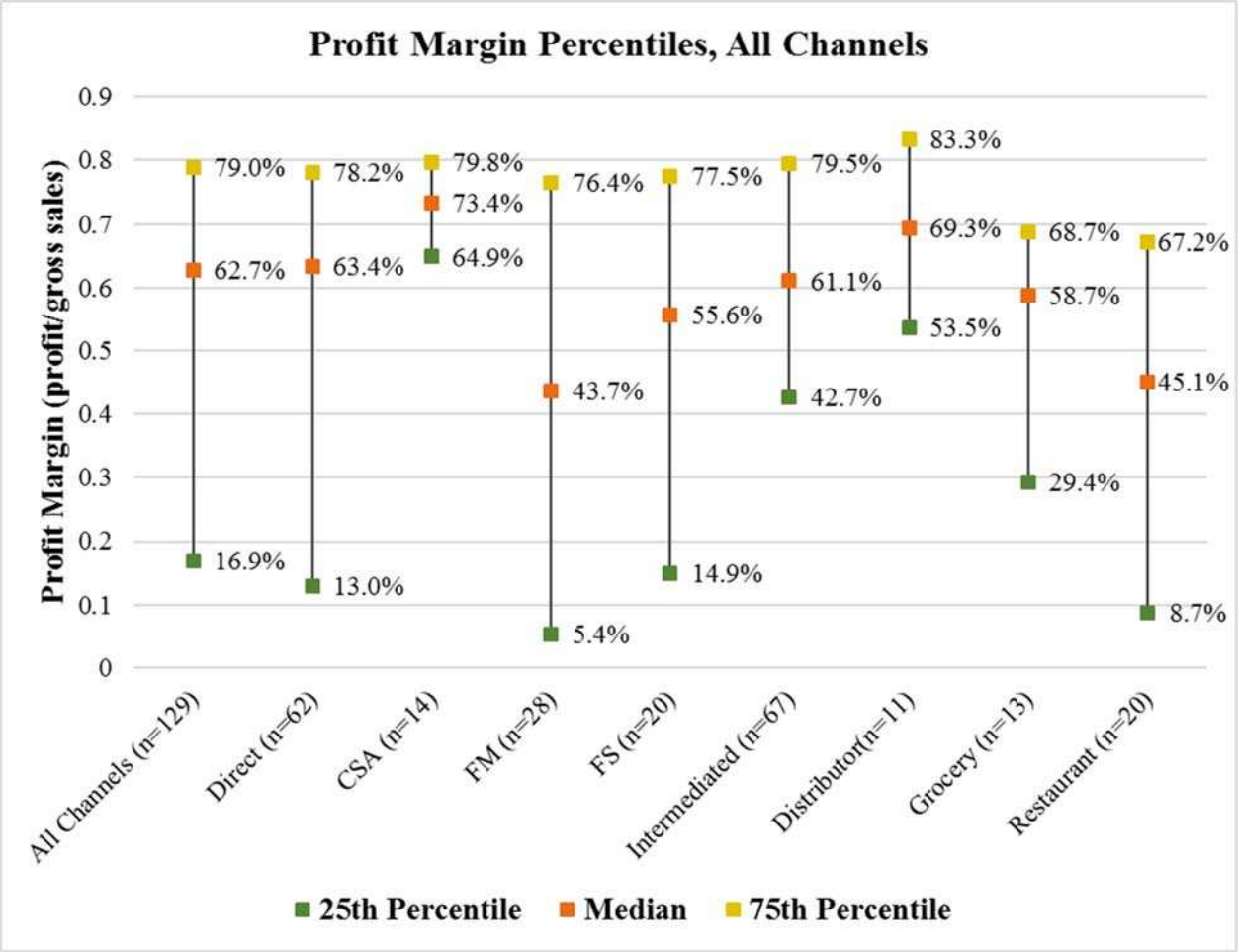
Benchmarks

Once the reports were compiled for all 25 farms and participants validated the data, information on each individual market channel was aggregated into a spreadsheet. Market channels were separated into direct and intermediated sales, and then further sub-grouped into channel categories (e.g., farmers market, roadside stand). Within each category, benchmarks were developed for sales per labor hour, profit per labor hour and profit as a percentage of sales based on the top 75th percentile, median, and bottom 25th percentile. Showing the median and the ranges of performance proved to be a useful visual benchmark for the producers to refer to during the consulting sessions.

For the market channel assessment analysis, as described above marketing profit margin (MP) is defined as gross revenue minus marketing labor and travel cost divided by gross revenue, for each market channel. Figure 4 shows the difference in MP for direct and intermediated market channels. Across all channels, the median marketing profit margin was 62%, with the top 75th percentile reporting just below 80%. The median MP was higher for direct markets, however, the variation between the top 75th and bottom 25th percentiles of intermediated markets is relatively less than for direct markets. Schmit and LeRoux's (2010) market channel assessments results found the median MP for wholesale channels (68%) was slightly below that for direct markets (71%), while both direct and intermediated channels showed top performers reporting a MP above

80% (Schmit and LeRoux, 2014). In comparison, Colorado top performers for direct and intermediated channels reported just below 80% MP.

By individual market channel category, the highest median MP was for the CSA channel which also had the lowest variation between top and bottom performers. Although the CSA channel had a higher median MP, as Hardesty and Leff (2010) point out, the CSA model can be constrained by slower market growth (as it requires a commitment from consumers in terms of a large initial cost of a CSA share), so as producers increase in scale they may need to seek intermediated markets for higher volume to offset lower prices. Among top performing intermediated channels, the distributor finding is consistent with the theory that intermediaries are taking on the majority of market activities, and therefore marketing costs, in return for offering producers a relatively lower wholesale price. And again, in such intermediated markets, the distributor channel has a higher MP than the farmer selling directly to restaurant or grocery customers.

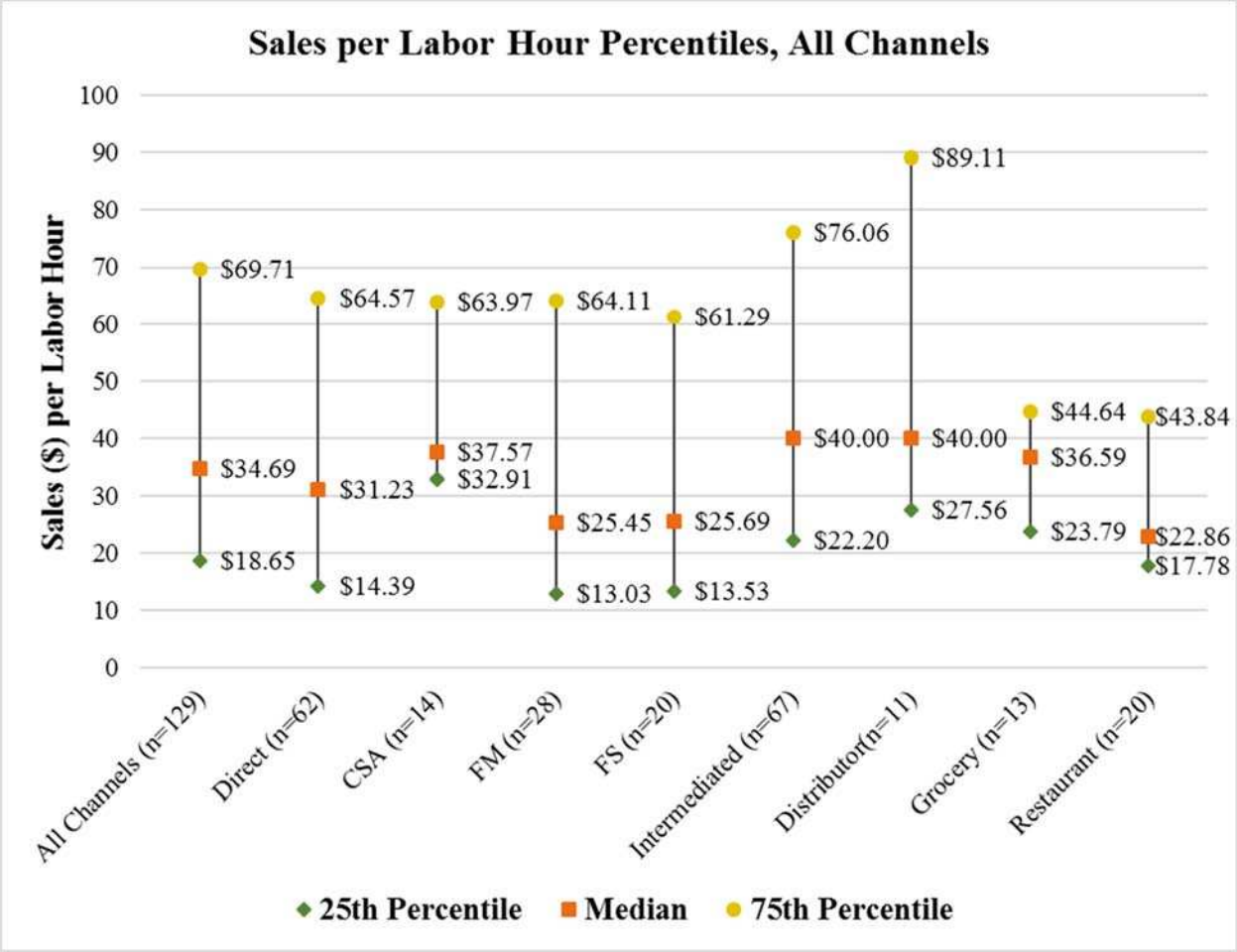


Note: 'All Channels' aggregates CSA (Community Supported Agriculture), FM (Farmers' Market), FS (Farm Stand), Distributor, Grocery, and Restaurant. 'Direct' aggregates CSA, FM, and FS. 'Intermediated' aggregates Distributor, Grocery, and Restaurant.

Figure 4: Marketing Profit Margin by Individual Channel Type

Sales per marketing labor hour was used as a proxy for sales efficiency (Figure 5). While MP reflects the relationship between the marketing costs and gross revenue by channel and therefore, the margin left to cover production costs, it does not reflect the volume of sales relative to the labor required to market the product. Across all market channels, the median sales per labor hour was $34.69/hr: a figure very similar to Schmit and LeRoux's (2014) finding of $32/hr. However, the top 75th percentile of channels in the Colorado study reported almost $70/hr compared to New York's $55/hr. The median sales per labor hour for intermediated channels was almost $9.00/hr higher than the median for direct market channels. And, the top performing

intermediated channels yielded sales per marketing labor hour over $76/hr which was driven by $89/hr for the top performing distributor channels. The top performing grocery and restaurant channel had similar sales efficiency values ($44/hr) which was half the value of the distributor channel. As a result, the intermediated market channel benchmark was reduced by these two lower performing channels.

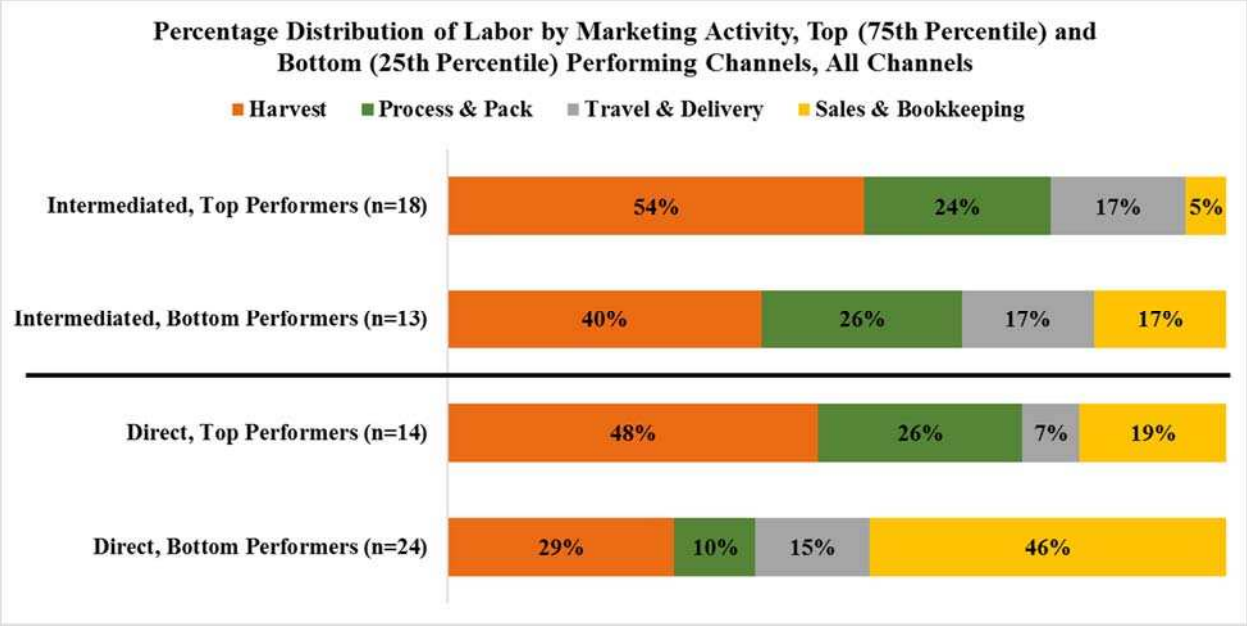


Note: 'All Channels' aggregates CSA (Community Supported Agriculture), FM (Farmers' Market), FS (Farm Stand), Distributor, Grocery, and Restaurant. 'Direct' aggregates CSA, FM, and FS. 'Intermediated' aggregates Distributor, Grocery, and Restaurant.

Figure 5: Sales per Labor Hour by Individual Channel Type

By dividing the performance of market channels by the top 75th percentile and bottom 25th percentile of channel categories, benchmarks were developed based on the percentage of labor by task for each type of marketing channel (Figure 6). These benchmarks were included in the

individualized reports to producers to explain how their operation performed relative to the 2016 sample of producers. Consistent among both direct and intermediated channels, the top performing channels had a larger share of labor allocated to harvest and a lower share allocated to sales labor, supporting the theory that increasing harvest labor equates to increased profitability, while increased sales labor leads to less profitability.



Note: 'Intermediated' aggregates Distributor, Grocery, and Restaurant channels. 'Direct' aggregates CSA (Community Supported Agriculture), FM (Farmers' Market), and FS (Farm Stand) channels.

Figure 6: Labor Allocation by Activity for Direct and Intermediated Channels

Process and pack labor was similar between top and bottom performers for the intermediated markets, however; the top performers spent less time processing their product which warrants investigation into the impact of processing and pack efficiencies (or perhaps the quality of pack facilities on farm) on profitability. The top performing direct markets had a much larger share of process and pack time than bottom performers: one hypothesis is the added labor in

washing and preparing harvested product is a key activity to generate more sales and a higher price, based on the greater perceived value in the direct market.

An interesting difference when comparing the Colorado MCAT labor allocation benchmarks to New York's farm report benchmarks is the level of sales labor associated with intermediated markets. Schmit and LeRoux (2014) attribute the large portion of sales time with the top performing intermediated channels as time spent communicating with the customer and building sales relationships. In the Colorado market channel assessments, the top performers spent only 5% of their marketing labor on sales (compared to the 20% in New York). The next chapter breaks down the market labor utilization by market channel categories to explore possible explanations for this difference.

Market Implications and Next Steps

At the end of the one-on-one consultations, farmers were offered the opportunity to participate in a follow-up MCAT assessment during the 2017 growing season. Many farmers reported the market channel assessment revealed that they were spending more time marketing products than they realized. For example, one farmer reflected on the tables presenting the labor utilization and profitability by market channel by stating: "It's all about how far you have to travel and how much time you have to put in…that's the real kicker here". Another farmer, one just starting out, stated that they had not considered their labor utilization until participating in the MCAT: "I never honestly kept track [of labor usage] until you guys came along. . ."

Similarly, attaching a value to unpaid labor changed many producer's perception of the relative performance of market channels. For a couple of the farm consultations, attaching a value to unpaid labor resulted in some contention because of their perspectives on volunteer labor or how the resulting increase in labor costs affected relative market channel performance. The CSU

agricultural economists explained the importance of applying a value to unpaid labor in order to reflect the opportunity costs of labor time and make comparisons between channels more representative. Even if applying labor costs makes the market channels seem less profitable, farms were not necessarily encouraged to drop the channel but rather consider the value of each employee's time. Labor management decisions should aim to use that value to reach desired business outcomes not necessarily profit maximization.

Some farmers anticipated changing their marketing mix in the coming season and agreed that a follow up MCAT evaluation would be helpful to compare their modified market portfolio to the previous year's performance. As Schmit and LeRoux (2014) note, the change in performance following a change in a farm's marketing strategy can be evaluated using a follow-up MCAT assessment. From a research perspective, we are interested in tracking the effects of record keeping on the decision making and performance of farm participants. Ideally, farms would participate for multiple years to develop a time series of performance benchmarks to optimize the marketing mix based on farm attributes and farm operator preferences; CSU is currently evaluating its resource availability to support this effort.

In addition to improved knowledge of farm performance for participating growers, CSU, CSU Extension, and the Colorado Department of Agriculture, and the Colorado Fruit and Vegetable Growers Association will begin to use the preliminary data collected to develop benchmarking reports for fruit and vegetable growers that participate in these alternative marketing channels. These benchmarking reports will allow producers to compare their business to an average of other producers, facilitating the farmer's ability to analyze their competitiveness and financial situation, set future goals, and make sound financial and investment decisions.

Additionally, the research team will begin to derive best practices associated with non-commodity food marketing channels.

Limitations

The most significant limitation to this study is the small sample size which restricts the generalizability of the results. The sample is further constrained by the heterogeneity among the participating farms. Three regions were surveyed with approximately the same number of participants in each region. These regions are very diverse. For example, many of the producers of the West Slope travel to sell at direct markets in Denver. The additional labor requirements associated with distribution in these situations make it difficult to compare Western Slope and Front Range growers. Further, crop mixes, market selection, experience and scale were quite varied among participants. The subsample of non-profit, greenhouse, and urban farms was so limited that it could not be isolated and analyzed, and could skew results based on the unique attributes of those operations.

Finally, inherent to the methodological approach of the MCAT is that data must be collected for one week during peak production. Similar, to the LeRoux et al. (2010) study, producers cited they were too busy with production, harvest and marketing to complete labor logs throughout the work day. When the farmer completes labor logs at a separate time the validity is compromised because the farmer may use the time they anticipate performing a task, rather than the actual time which may not effectively expose potential inefficiencies in labor utilization.

Collecting data during peak production posed a challenge for the enumerator as the time spent training producers on data collection then following up with producers had to be balanced with recruiting more producers. Strong relationships with project partners were pivotal in establishing trust and credibility with producers to facilitate recruitment in the geographically

diverse regions of study (Christensen et al., 2016). Most producers were limited in the time they could spare for data collection training, the enumerator found working alongside the producers on their farm was an effective method to ensure understanding and quality data collection. This effectively extended the farm-tour, initial survey, and data collection training without causing an excessive burden to the producer (Christensen et al., 2016).

CHAPTER 4: ANALYSIS OF CHANNEL PERFORMANCE, REGIONALITY, AND FARM LEVEL ATTRIBUTES ON FINANCIAL PERFORMANCE INDICATORS

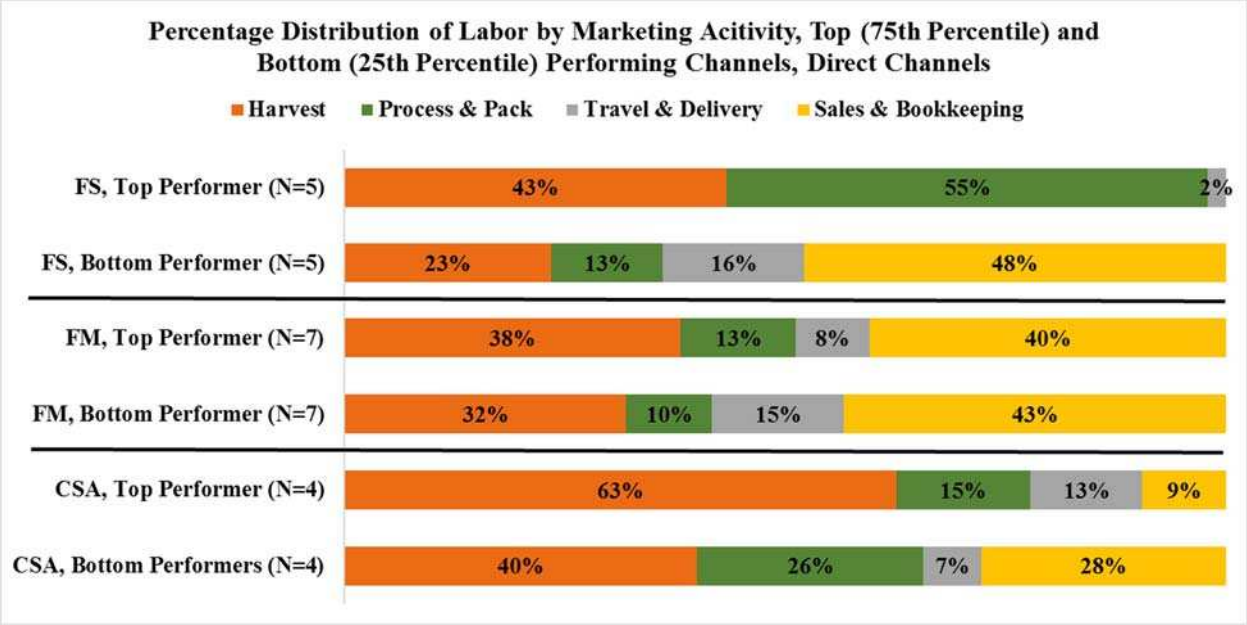
The diversity of performance across measures of market profitability (MP) presented in the previous chapter raise question as to what causes the differential performance of each market channel. This chapter analyzes several performance measures across farm level characteristics to further explore relationships between key factors and performance. First, I compare marketing labor utilization by specific direct and indirect market channel categories. Next, I evaluate the performance of direct and intermediated market channels by region and subsequently present a model to analyze farm level characteristics and marketing profit margin accounting for fixed effects of market channel category and region.

Market Channel Analysis

Graphical representations are one effective way to show differences in several factors across operations that exhibited the best and worst performance in various marketing channels. Figure 7 demonstrates the marketing labor utilization by specific direct market channel categories. Next, Figure 8 compares labor utilization by specific indirect market channel category. Finally, Tables 4 and 5 test whether the market channel categories have significantly different average profitability or sales efficiency from the rest of the market channels.

The results in Figure 7 indicate different marketing labor utilization between different types of direct market channels, as well as how those shares vary between the highest and lowest performing percentiles. Among top performing market channels, the farmers' market used the greatest share of sales labor, which is to be expected when one considers the considerable face time such producers invest in selling product to individual buyers at market. The farm stand

channel used the greatest share of processing labor, as the time spent cleaning and preparing product is necessary to attract customers to the farm stand, but little extra postharvest effort may be necessary to complete such a transaction. CSA top performers recorded the largest share of harvesting labor out of the direct market channels. Because the marketing necessary to acquire customers for a CSA occurs in the off-season, the producer is allowed to focus on fulfilling the CSA contract with product during the peak-season rather than looking for a buyer (sales and bookkeeping). The bottom performing CSAs spend a larger share of time on sales and bookkeeping which is likely due to the common choice among some of the farms to provide a manned distribution point for shares as opposed to a self-pick-up model, however further analysis to support this inference is warranted.



Note: FS denotes Farm Stand, FM denotes Farmers' Market, and CSA denotes Community Supported Agriculture

Figure 7: Labor Activity Share by Direct Marketing Channel

Next, the labor utilization for specific intermediated channels are presented in Figure 8. The results from Figure 8 show relatively less variability than the direct market channels from Figure 7. Most notably, top performers marketing to restaurants had the largest share of travel and

delivery labor, those with grocery accounts had the largest share of processing and packing labor, and those working with distributors had the largest share of harvest labor but only slightly more than the top performers marketing to grocery buyers.

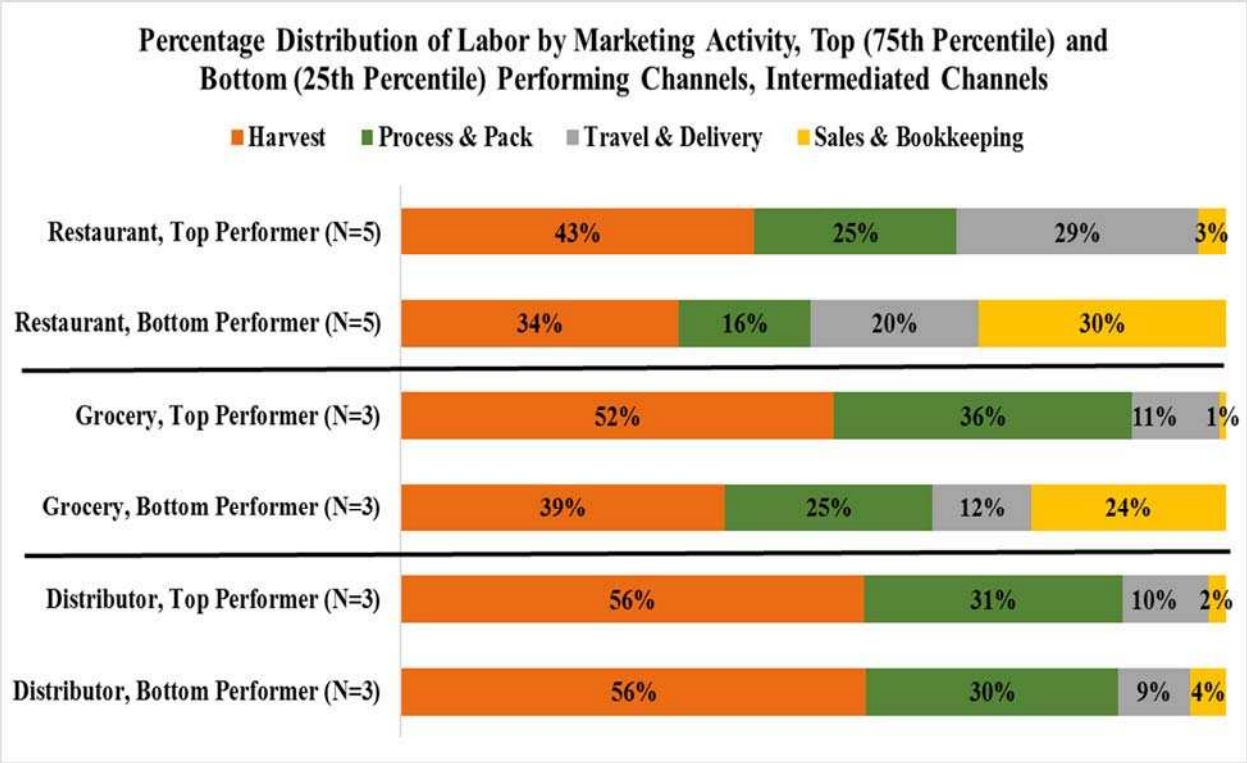


Figure 8: Labor Activity Share by Intermediated Marketing Channel

An interesting result is the very similar distribution of marketing labor between the top quartile and bottom quartile for the distributor marketing channel. This is consistent with the fact that those selling to distributors also had the least variability with respect to profit margin (Figure 4). It suggests that distributors may be the most standardized marketing outlet, relying less on the producer's marketing acumen, and instead, shifting key decisions related to logistics and office work to the distributor's staff. Since grocery stores require a significant amount of process and pack labor they could be considered a similar option to the farm stand result shared earlier, in which more labor is needed for cleaning and preparing the product for sale because of the importance of merchandising.

The comparisons of labor utilization by marketing activity among top and bottom performing channels within each category show evidence of some interesting differences. Next, to analyze if these differential labor utilization patterns systematically affect profitability or sales efficiency, a difference of means tests for each market channel is conducted to show if each channel is statistically different from the rest of the market channels. Table 4 shows farmers' markets and restaurant channels, on average, have a lower marketing profit margin than the remaining sample. On the higher end, the distributor market channel has a higher average marketing margin than the rest of the channels.

Table 4: Difference of Means of Marketing Profit Margin for each Market Channel

Marketing Profit Margin by Channel					
	Mean of Sample without Channel	Mean of Market Channel	Difference	T-Test	Result
CSA (n=14)	0.417	0.52	-0.103	-0.639	
Farmers Market (n=28)	0.461	0.306	0.155	1.275	Pr(T>t)=0.102
Farm Stand (n=20)	0.436	0.383	0.053	0.378	
Distributor (n=11)	0.407	0.646	-0.239	-1.332	Pr(T<t)=0.0926
Grocery (n=13)	0.422	0.482	-0.06	-0.359	
Restaurant (n=20)	0.466	0.217	0.249	1.811	Pr(T>t)=0.036

Table 5 summarizes the average sales efficiency represented by gross sales per marketing labor hour for each category of market channel. For sales efficiency, farmers' markets and restaurants have lower sales per hour of marketing labor than the rest of the sample. The low sales efficiency coupled with the low marketing profit of the restaurant channel indicate a low return to marketing labor when compared to the distributor channel. The higher MP and sales efficiency for the distributor channel supports the hypothesis that, on average, distributors used by producers in the sample are more efficient options for selling and distributing product than farmers conducting those marketing functions, and this may be particularly true for restaurants. Maintaining restaurant accounts can be time consuming because of the individual deliveries and invoicing.

Restaurants can also be unreliable buyers due to high turnover among chefs, short planning horizons for ordering, and the common situation where no dedicated office staff is available for the producer to address ordering and billing issues. As one example of innovation within the distribution space, food hubs provide an opportunity for small-scale producers to aggregate and distribute their product to retail and institutional buyers. The MP and sales efficiency results of the distributor channel warrant further investigation into the ability of food hubs to mimic distributors and similarly reduce the transaction costs between farmers and customers.

Table 5: Difference of Means of Sales per Labor Hour for each Market Channel

Sales per Labor Hour by Channel					
	Mean of Sample without Channel	Mean of Market Channel	Difference	T-Test	
CSA (n=14)	52.66	55.6	-2.94	-0.177	
Farmers Market (n=28)	57.26	37.52	19.73	1.592	Pr(T>t)=0.057
Farm Stand (n=20)	54.17	46.47	7.7	0.541	
Distributor (n=11)	52.52	57.81	-5.29	-0.286	
Grocery (n=13)	53.68	46.66	7.03	0.41	
Restaurant (n=20)	55.76	37.83	17.93	1.265	P(T>t)=0.104

Regional Analysis

Next, the regional aspects of the market channels are analyzed to identify spatial differences in profitability and sales efficiency across Colorado. The market portfolios of MCAT participants varied by region of the state, as reflected in Table 6. Many of these differences are to be expected given that the Front Range region is the most densely populated in the state (and direct markets are more concentrated in metro/urban areas, Low et al., 2015). Most notably, only 10% of Front Range Region farms used distributors, even though it is Colorado's most populated region. Instead these producers were more commonly marketing directly to grocery stores (40%) and restaurants (60%), when compared to the less densely populated Western Slope and Southwest regions. The CSA and farm stand market channel was the most utilized direct channel by Front

Range farmers, where 75% of Southwestern region farmers used farmers' markets to sell their product.

Table 6: Market Channel Utilization, Share of Participating Farms by Region

Market Channel	**Direct**	Farmers' Market	CSA	Farm Stand	**Intermediated**	Distributor	Restaurant	Grocery Store
Front Range	100%	70%	60%	80%	80%	10%	60%	40%
Western Slope	86%	57%	43%	43%	100%	86%	43%	14%
Southwest	100%	75%	50%	75%	100%	63%	50%	38%

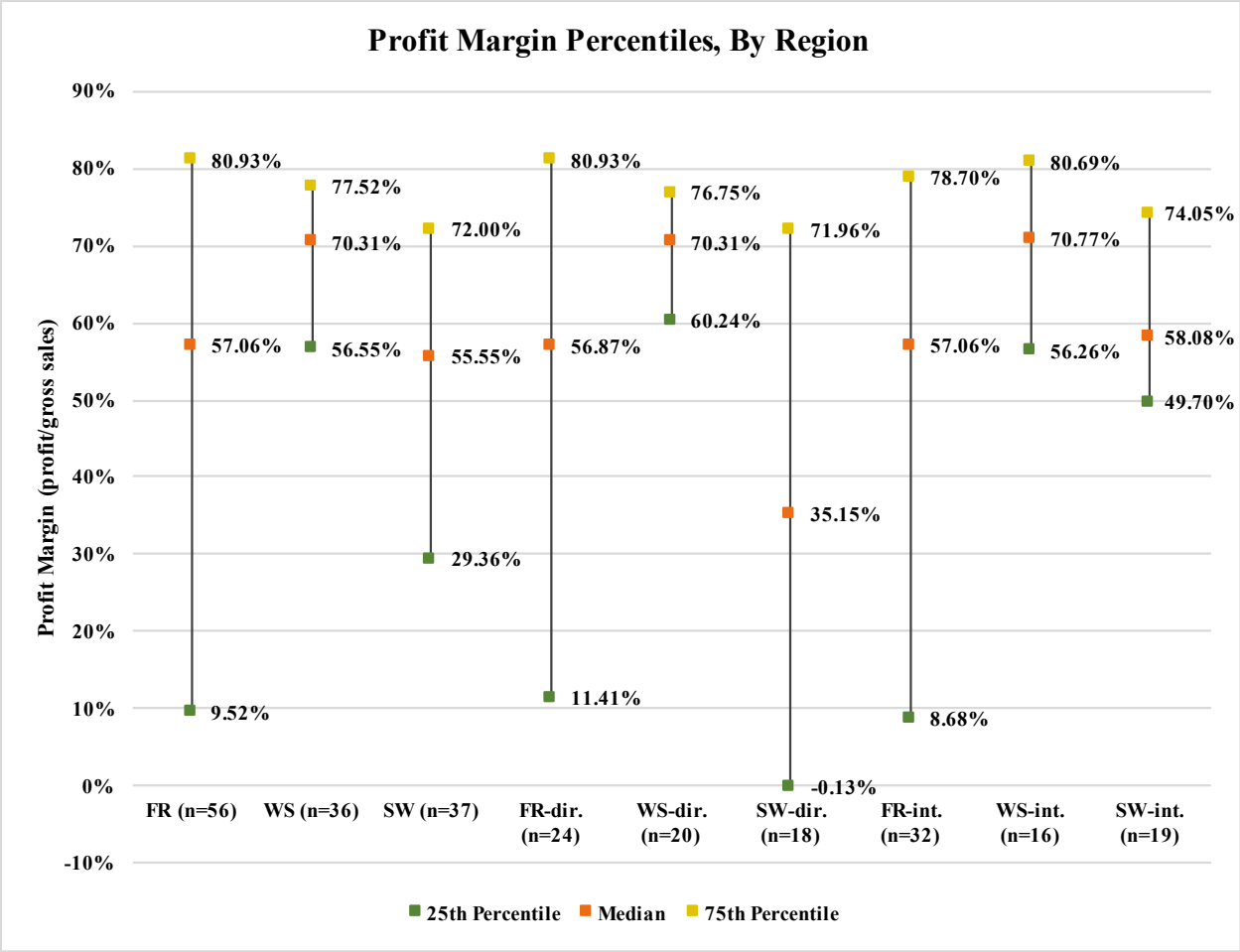
Note: Direct column reflects total of Farmers' Market, CSA, and Farm Stand. Similarly, intermediated column includes Distributor, Restaurant, and Grocery Store.

Farm size, sales volume and crop diversity also varied by region (Table 7). On average, farms in the Southwest had the largest average acreage farmed, whereas the Front Range had the least land under production on average (perhaps due to higher land prices in that region). The Front Range sample also contained a sub-sample of non-profit urban farms and greenhouse operations not represented in the other regions. The average gross weekly revenue during the week of data collection was similar between the Front Range and the Western slope at approximately $3,660/wk. Although the Front Range contained one particular farm with the most types of products (58 crop types), the Southwest region had a higher average of 27 crop types with the least diversified farm growing 19 crop types in that region.

Table 7: MCAT Participant Farm Summary Statistics by Region

	Acres	Weekly Gross Sales	Crop Types
Front Range (n=10)			
Max	7.0	$18,715	58
Ave	1.97	$3,665	25
Min	0.1	$304	5
Western Slope (n=7)			
Max	10.5	$20,630	45
Ave	2.9	$3,652	26
Min	1.0	$419	2
Southwest (n=8)			
Max	20.0	$4,447	38
Ave	4.3	$1,427	27
Min	0.25	$642	19

Examining the MP percentiles by region, the Western Slope has the highest median at 70%, while the Front Range and Southwestern regions are both at 56%. The Front Range had the greatest variance in profit margin from 81% for the top 75th percentile to 10% in the bottom 25th percentile. The Western Slope had the least variance between the top and bottom percentiles (77.5% and 56.6% respectively). Comparing the direct and intermediated market channel performance for each region, the most substantial variation comes from the differences reported in the Southwest. The median MP for direct markets averaged 35% while the median MP for intermediated markets was 58% (Figure 9).



Note: 'FR' denotes Front Range, 'WS' denotes Western Slope, and 'SW' denotes Southwest. Direct Markets are denoted by 'dir' for the given region and include an aggregate of CSA, farmers' market and farm stand channels. Intermediated markets are denoted 'int' and include an aggregate of distributor, grocery, and restaurant channels.

Figure 9: Marketing Profit Margin by Region and by Marketing Channel

Figure 9 suggests market channel profitability could vary across region. An ANOVA test is used to determine whether market channel mean MP is equal across regions. The ANOVA test was run with STATA/IC 14.1 using the *oneway* command. The results in Table 8 imply at least one of the regions has a mean MP statistically different from the others at a 5% significance level. The Bonferroni post-hoc pair-wise mean test indicates the mean MP for the Western Slope is statistically higher than Front Range at a 5% significance level. This seems counter-intuitive because the Front Range has a larger population, and therefore, greater sales potential. The relatively low mean for the Front Range could be attributed to sampling bias. All farms in the

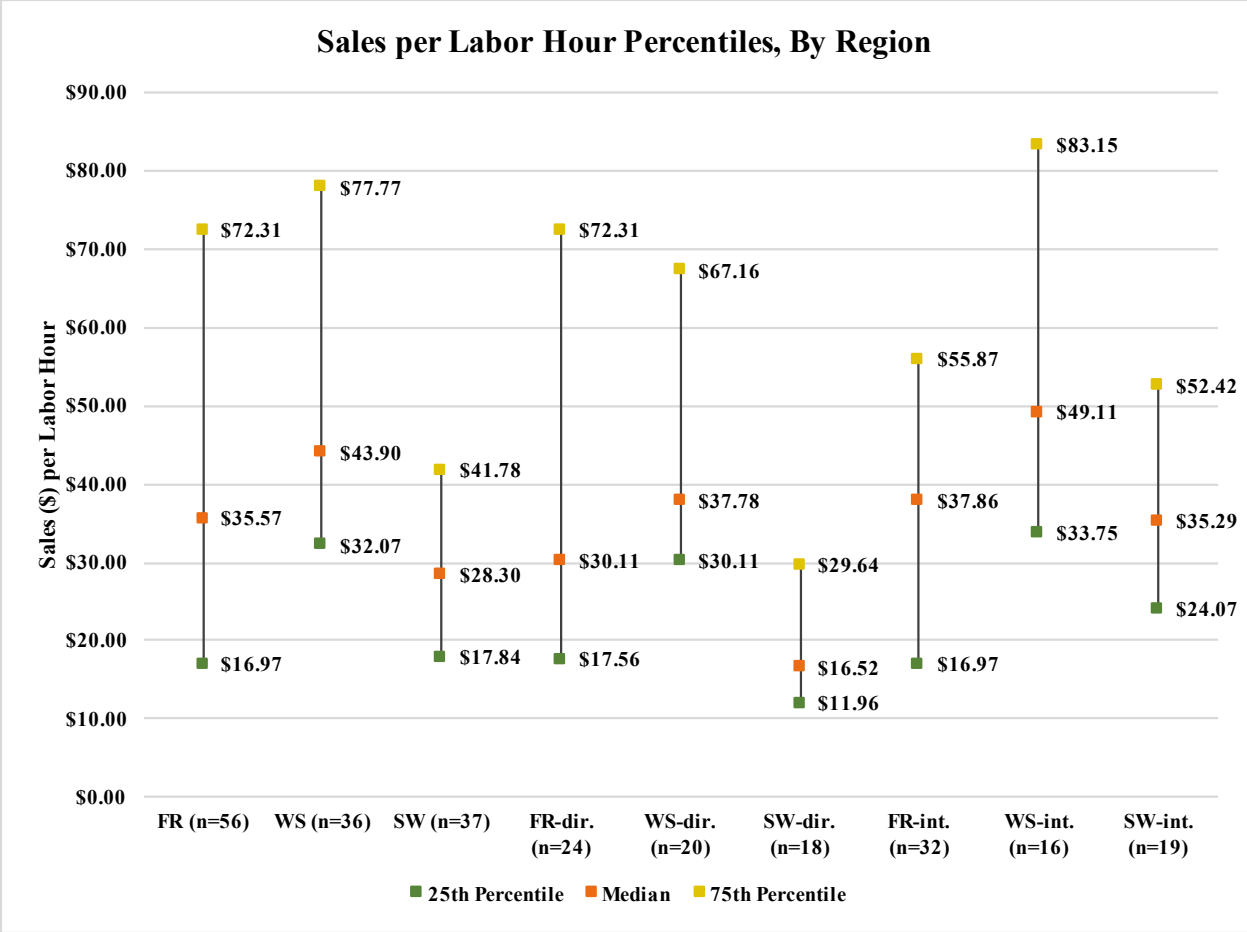
Western Slope were for-profit private businesses, while the Front Range sample contained a sub-sample of non-profit urban farms, which could partially account for the relatively lower average MP.

Table 8: ANOVA of Marketing Profit Margin by Region

Marketing Profit Margin by Region					
ANOVA					
Source	SS	df	MS	F	Prob>F
Between Groups	1.96	2	0.98	3.11	**0.048**
Within Groups	39.69	126	0.31		
Total	41.65	128	0.33		

Note: The Bonferroni difference of means post-hoc pair-wise mean test found only the Western Slope and Front Range mean profit margins were significantly different at the 5% significance level.

A farm's sales efficiency gives another perspective as to what is driving the relative performance of direct and intermediated markets by region. In the MP benchmarks (Figure 9), the median lies closer to the top 75th percentile with longer tails for the bottom 25th percentile, indicating potential outliers in poor performing market channels for each region. In contrast, sales efficiency (Figure 10) has a closer grouping between the median and bottom 25th percentile for sales per marketing labor hour. And, the top 75th percentile has a larger upward tail, especially for Front Range direct markets and Western Slope direct and intermediate markets. The Southwest region's sales efficiency is significantly greater for the intermediate markets compared to direct markets possibly because of the distance producers have to travel to attend and staff direct markets in that more rural, less population dense region.



Note: 'FR' denotes Front Range, 'WS' denotes Western Slope, and 'SW' denotes Southwest. Direct Markets are denoted by 'dir' for the given region and include an aggregate of CSA, farmers' market and farm stand channels. Intermediated markets are denoted 'int' and include an aggregate of distributor, grocery, and restaurant channels.

Figure 10: Sales per Marketing Labor Hour by Region and by Market Channel

Multivariate Model of Market Performance

The benchmark analysis presented earlier indicates notable variation in the performance of individual market channel categories. Chapter 2 reviewed studies that used regression analysis to identify the impact of farm level attributes on marketing decisions and the performance of those marketing decisions. The approach follows and builds upon past research that similarly explored relationships between participation in marketing channels and financial outcomes.

Uematsu and Mishra (2011) account for fixed effects of region and market channel selection in their quantile regression analysis of the impact on DTC marketing intensity on farm

business income. Similarly, Detre et al. (2011) account for region in their double hurdle binary choice model. In their analysis the first hurdle determined whether a farm used a DTC marketing strategy before estimating the income level from the DTC marketing strategy. Since the majority of the Colorado sample use a combination of DTC and intermediate channels with data available for each individual channel, a linear fixed affects model accounting for region and market channel is preferred.

To better understand the determinants of MP for a market channel, a multi-dimensional, fixed effect model is estimated using the cross-sectional Colorado market channel assessment data. A fixed effect model is used to account for the heterogeneity between market channels and regions. The dependent variable, marketing profit margin (MP), consists of two dimensions represented by the indices: y_{ij}, i=1,…,6, j=1,2,3 to account for the six market channel categories and three regions surveyed. The specification of the empirical model is:

$$y_{ij} = \beta' x_{ij} + \alpha_i + \gamma_j + \varepsilon_{ij} \quad [1]$$

where α and γ are market channel and region fixed effects, the x variables are the covariates, β (Kx1) structural parameters and ε is the idiosyncratic disturbance term (Matyas and Balazsi, 2012).

Data and Variables

The data used in the model were collected during the 2016 growing season using the MCAT methodology. Twenty-five farms participated, and each farm used between two and nine market channels, which yields a total sample of 129 distinct market channel observations. The dependent variable in the model is a continuous variable, MP, which is calculated as:

$$ProfitMargin = \frac{rev - C_l - C_m}{rev} \quad [2]$$

Where *rev* denotes the revenue generated by the market channel during the week of data collection, C_l is the cost of marketing labor for that market channel, and C_m is the mileage cost associated

with the market channel (calculated as the number of round-trip miles the respondent reported for transporting product to the market channel times a mileage rate of $0.57/mile)[7].

The variables included in the model are described and summarized in Table 10. Harvest percentage (*Hp*) is the percentage of total marketing labor spent harvesting for a market channel. Sales and bookkeeping (*SBp*) is the percentage of total marketing labor spent conducting sales for a market channel. From the marketing labor utilization analysis presented earlier, top performing market channels in every category used a larger share of harvest labor and a lower share of sales and bookkeeping labor.

The key research question addressed with this modelling exercise is: can producers improve the profitability of their market channels by reducing the share of labor spent selling product while allocating more time to harvest. The hypothesis this model will test is: the share of harvest labor associated with a market channel has a positive impact on channel profitability. Similarly, another hypothesis is: the share of sales and bookkeeping labor associated with a market channel has a negative impact on channel profitability. Therefore, the harvest labor percentage is expected to have a positive coefficient with market profitability while sales labor percentage of total marketing labor is expected to have a negative coefficient.

[7] The $0.57/mile rate was used to compare results with the NY MCAT study. This mileage rate is slightly higher than the 2016 Federal Standard Mileage Rate ($0.54/mile) available at: https://www.irs.gov/uac/newsroom/2016-standard-mileage-rates-for-business-medical-and-moving-announced.

Table 9: Description and Summary Statistics of Regression Model Variables

Variable Name	Description of Variable	Mean (St. Dev.)
ProfitMargin	Marketing profit margin of market channel observation	0.428 (0.570)
Hp	Percentage of total marketing labor in harvesting	0.444 (0.220)
SBp	Percentage of total marketing labor in sales and bookkeeping	0.193 (0.216)
Crops	Number of types of crops produced by farm	24.85 (15.25)
Risk	Risk rank of market channel within portfolio	0.514 (0.292)
Lifestyle	Lifestyle rank of market channel within portfolio	0.507 (0.286)
Nummkts	Number of market channels in farm's market portfolio	6.12 (2.25)
csa	=1 if market channel is a CSA, 0 otherwise	0.108
dist	=1 if market channel is through a distributor, 0 otherwise	0.085
fm	=1 if market channel is a farmers' market, 0 otherwise	0.217
fs	=1 if market channel is a farm stand, 0 otherwise	0.155
groc	=1 if market channel is a grocery store, 0 otherwise	0.101
res	=1 if market channel is a restaurant, 0 otherwise	0.155
dreg1	=1 if market channel is in Front Range, 0 otherwise	0.434
dreg2	=1 if market channel is in South West, 0 otherwise	0.287
dreg3	=1 if market channel is in Western Slope, 0 otherwise	0.279

N=129
Note: Standard deviation of continuous variables is reported in parenthesis

The number of crops the farm produces (*Crops*) describes the number of different fruits or vegetables the farm produces at any time of the growing season, but not necessarily during the week of study (and does not include the number of varieties of a single type of crop[8]). This variable is intended to represent the level of product diversification on the farm. Brown et al. (2007) found the number of products produced had a positive and significant impact on the percentage of household income a farm reported from farmers' market sales. Although this does not directly translate to a more profitable overall market portfolio, the impact of higher diversity of crops is anticipated to increase the marketing profit margin because the producer will have a greater variety of products to attract customers to their CSA or farm stand at the farmers' market, or a greater diversity of product offerings to provide wholesale accounts.

[8] For example, if a farm grows three varieties of tomatoes and two varieties of cucumbers, the *Crops* variable would have a value of 2 and not 5.

The variable (*Risk*) is standardized by dividing the rank the producer gave to that market channel's perceived risk score (one being the least perceived risk and the highest risk score is equal to the number of market channels in the farm's market portfolio) by the number of market channels used by that farm. Therefore, a score of one for the risk variable indicates that market channel was reported as the highest perceived risk out of the farm's market portfolio, while a score closer to zero represents the channel with the lowest perceived risk. The coefficient on *Risk* is expected to be negative because the riskier the market channel, the more one would expect variation in sales volume, and therefore profitability. Although the farmer's channel ranking for the perceived risk score can represent a number of reasons they perceive a market channel to exhibit risk, the participants consistently cited variability or chance of lost sales as their reasoning for ranking a channel with a high risk score. Therefore, the hypothesis is that a market with a higher risk ranking (*Risk* value close to one) is associated with volatile sales, and therefore, likely to be less profitable.

The variable (*Lifestyle*) is calculated in the same method as the risk variable. A *Lifestyle* value of one is the farmer's choice for the market channel with the lowest lifestyle compatibility (associated with more stress), while a score closer to zero reflects a market channel with the most compatibility with the farmer's lifestyle. As Silva et al. (2014) found, farmers selling into institutions and restaurants demonstrated higher satisfaction with their profitability, however, were less likely to be very satisfied with their quality of life. This tradeoff between profitability and lifestyle compatibility explains why the coefficient on the lifestyle variable is expected to be positive. An increase in the *Lifestyle* variable represents a more stressful channel, which is anticipated to yield a higher profit. Therefore, the *Lifestyle* variable is expected to have a positive coefficient.

The variable (*Nummkts*) captures the farm's level of market diversification, which is the total number of market channels the farm's market portfolio. Bruch and Ernst (2010) explain how the marketing costs for farmers' market are high because of labor, marketing fees, transportation and packaging. Therefore, finding ways to add additional product sales to existing marketing time can increase direct marketing profitability. This can include coordinating CSA pick-up or restaurant deliveries. Bauman, Jablonski, and Thilmany (2016) concluded that farms that diversify beyond selling through only DTC channels are more profitable, ceteris paribus. As LeRoux et al. (2010) describe, diversifying farm income through a combination of 'steady' and 'variable' market channels is one potential means to optimize sales of unpredictable levels of harvest. Thus, given past results and findings, market channel diversification is expected to have a positive impact on profitability because of the expanded opportunities the farmer has to sell their product and seek out the best prices. However, a challenge for market diversification is the increased costs of food safety compliance. Sullins and Jablonski (2016) found farms using diversified (DTC and intermediated) marketing strategies had the overall largest food safety costs when compared to DTC or intermediated only.

The variables *csa, dist, fm, fs, groc, res* are dummy variables corresponding to whether the channel MP is for a CSA, a distributor, a farmers' market, a farm-stand (or on-farm sales), a grocery store, and a restaurant, respectively. Based on the table of means for market channels (Table 4), restaurants are expected to have the lowest fixed contribution to MP, while working with a distributor is expected to have the largest contribution. Finally, the variables for region of the state *dreg1*, *dreg2* and, *dreg3* represent dummy variables for the farms located in the Front Range, Southwest and Western Slope regions of Colorado, respectively. Using a logit model on survey data from New Jersey direct market farmers to estimate the probability of attaining higher

income levels, Govindasamy et. al (1999) found farmers utilizing markets in urban and suburban areas or commercial zones have a higher probability of attaining higher income levels than those in rural areas. However, the previously presented ANOVA test table (Table 8) revealed the Western Slope had a statistically significant greater average MP than the Front Range. Therefore, the summary statistics lead us to expect the Western Slope dummy coefficient to have a positive contribution to the marketing profit margin when compared to the regional dummy variables.

The linear model was estimated using StataIC 14.1. A linear regression was estimated using the *regress* command with the constant suppressed to account for the multiple fixed effects. The model had an adjusted R-squared of 0.476 and an F-statistic of 9.38 indicating the overall model fit is significant at the 1% level. Using the post-estimation command, *estat imtest*, a Cameron-Trivedi decomposition test for heteroscedasticity, skewness, and kurtosis (Cameron and Trivedi, 1990). The results indicate heteroscedasticity is present in the model, however the tests for skewness and kurtosis did not indicate these moments were present at the 10% significance level.

Results

The regression results are presented in Table 11. As expected, the share of labor spent on harvest activities is positive and significant. This means that as the share of labor used for harvest increases by one percent, the marketing profit margin will increase by 0.0035 percent.

Table 10: Marketing Profit Margin Fixed Effects Model Results

Variable	Coefficient
Harvest Percentage (*Hp*)	0.354*
	(0.208)
Sales and Bookkeeping Percentage (*SBp*)	-0.871***
	0.284
Number of Crops Produced (*Crops*)	-0.008**
	(0.003)
Channel Risk Score (*Risk*)	-0.110
	(0.181)
Channel Lifestyle Score (*Lifestyle*)	0.294*
	(0.179)
Number of Market Channels (*Nummkts*)	0.055***
	(0.017)
Channel is a CSA (*csa*)	0.251
	(0.178)
Channel is Through a Distributor (*dist*)	0.088
	(0.186)
Channel is a Farmers' Market (*fm*)	0.084
	(0.170)
Channel is a Farm Stand (*fs*)	0.195
	(0.156)
Channel is a Grocery Store (*groc*)	0.006
	(0.03)
Channel is a Restaurant (*res*)	-0.188
	(0.149)
Channel Located in SW CO (*dreg2*)	0.209*
	(0.113)
Channel Located in Western Slope (*dreg3*)	0.238*
	(0.121)

N=129
Numbers in parentheses are standard errors.
, **, and * indicate significance at the 10%, 5%, and 1% level, respectively*
Adjusted R-square = 0.476
F-statistic 9.38

The number of crops produced by the farm is negatively correlated with marketing profit margin and significant, indicating crop diversity has a negative impact on profitability. Increasing the crop mix by an additional product is expected to decrease the marketing profit margin by almost one percent. Consistent with the a priori expectations, the number of market channels (*Nummkts*) variable was significant and positive. Increasing the market channel portfolio by one market channel is expected to increase the marketing profit margin by five percent.

The *Risk* coefficient was not significant. Consistent with Silva et al.'s (2014) assertion of a tradeoff between lifestyle preferences and market channel profitability, the lifestyle coefficient is positive and significant.

None of the market channel dummy variables were significant. All of the market channels had positive coefficients except for the restaurant, which was the lowest performing channel in the benchmark and means test analysis. For the region dummy variables, the variable for the Front Range *dreg1* was dropped from the regression indicating the coefficients for the remaining regions are relative to the Front Range. Both the Southwestern and Western Slope regions were positive and significant which is consistent with the results shown in Table 8 that the Front Range had the lowest average profit margin.

CHAPTER 5: CONCLUSIONS AND IMPLICATIONS

Changing consumer trends in food demand have been driving the growth of the local foods segment of the United States' agricultural sector. This segment has responded to consumers' increasingly heterogeneous and sophisticated tastes through a growth in the number and diversity of marketing arrangements including farmers' markets, CSAs, food hubs, specialty food in grocery stores, and institutional buyers purchasing locally-sourced products. Matteson and Hunt (2012) have dubbed these rapidly developing marketing arrangements in the local food sector as 'Retail Agriculture'. Retail Agriculture is distinct from the conventional agricultural sector by differentiated marketing and distribution channels of high-value products. Generally small and medium-scale farms are best able to meet this type of demand (Matteson and Hunt, 2012).

The analysis of the choice and performance of the diversified marketing arrangements used by local food farms has generally relied on national level data such as the USDA's ARMS survey and Agricultural Census. However, despite efforts to update the types of information collected on local food farms and market channel sales, the growth and innovation of local food marketing channels changed faster than the questionnaires could be adapted (Low et al., 2015). In response, some researchers (Hardesty and Leff, 2010; LeRoux et al., 2010; Murray and Gwin, 2016) have focused on a detailed case study approach to understand how local food producers develop their market portfolios and how the specific market channels within those portfolios perform. Similarly, the project partners involved in this study were interested in understanding how participation in different market channels impact farm viability and what economic and strategic aspects make certain markets more successful compared to others. Since previous

research has shown that labor is the largest marketing cost for non-commodity markets (Hardesty and Leff, 2010; LeRoux et al. 2010), the MCAT methodology was used to analyze the differential marketing labor utilization between market channels within a farm's market portfolio. This study examined variations in market performance between channels and regions in Colorado using benchmark and statistical analysis. Finally, a multi-dimension fixed effects model identified farm level characteristics that influence the marketing profit margin while controlling for the effects of the market channel type and region of the state.

Conclusions

The market channel evaluation criterion with the highest average weight selected by producers was labor requirements (Table 3), further supporting the importance of marketing labor management as a key to overall business viability. Further examination of labor utilization within marketing activities revealed that top performing market channels consistently utilized a higher share of labor for harvest compared to sales (Figure 7 and Figure 8). The model results similarly found a positive and significant relationship between harvest labor and marketing profit and a negative and significant relationship between sales labor and marketing profit (Table 11) holding all else constant. These results suggest efforts aimed to support farm profitability should aim to maximize sales efficiency, therein enabling producers to allocate scarce labor towards harvest activities.

Profit margin was the second largest average weight for a market channel evaluation criterion closely followed by lifestyle preferences (Table 3). The model implies there is in fact a tradeoff between a market channel's lifestyle compatibility and profitability. Anecdotally, many beginning and young farmers choose to enter farming for lifestyle reasons, but an opportunity exists to identify marketing structures that increase efficiency while still allowing producers to

select markets that work well for their lifestyle. As one example, farmers in the Southwest region jointly operated a CSA with the local food hub as a means to reduce their peak season sales burden.

A proxy for management practices is the number of crops and market channels used by a producer, as it represents the decision maker's choice to diversify products and markets. Brown, Gandee, and D'Souza (2006) found the number of fruits and vegetables grown in a county in West Virginia increases gross sales through direct markets. Although more varieties of crops can be appealing to CSA members and farmers' market customers, as a farmer produces more types of crops, the harvest and processing time is more differentiated, which may impede efficiency. Crop diversity can reduce harvest efficiency by transitioning between crops as each one has slightly different needs. In addition, crop diversity imposes greater demands on the harvest crew to have a diverse set of harvest and packing skills for each crop (Grubinger, 2010). Experience talking to the farm participants over the summer revealed that while experienced producers preferred to specialize in fewer crops and focus on quality, newer producers tried many varieties of crops to bring customers to their farm stand or to recruit for their CSA with a promise of variety in shares. An interesting follow-up to this result would be to look at the relationship between the age of farm or the farmer's experience and the number of varieties grown to further explore this ad hoc observation and statistical finding.

Although crop diversity had a negative impact on marketing profit margin, market diversity had a positive and significant influence on market profitability. Park and Lohr's (2006) discrete choice model using Organic Farming Research Foundation (OFRF) farm survey data identified producers with less experience tend to use a single marketing channel while experienced producers diversify their marketing portfolio. Jablonski et al. (n.d.) found in the evaluations of the Building Farmers in the West program that farms that increased the variety of market channels used since

taking the Building Farmer course had an increase in net profit while farms that increased the variety of products grown had a decrease in net profitability. Therefore, a topic for future research would be to test the relationship between experience, market diversity, and profitability.

The market channel comparison found a significant difference in performance between restaurants and distributor market channels. A common sentiment from Colorado producers expressed over the period of data collection during the 2016 growing season was, "why would we take wholesale prices when we can get full price selling direct to the consumer or restaurant, etc.?". This comment is directly in line with research from Starr et al. (2003) showing that product quality is a more important attribute than price for restaurants purchasing local; this, in effect, means producers can potentially increase their revenue from selling directly to restaurants. However, many producers are not factoring in the full costs associated with marketing, distributing, and selling their products to restaurants. Our results present preliminary evidence that distributors can do these activities more efficiently than the producers managing such wholesale relationships themselves.

The regional analysis identified the Southwest region has the lowest average sales per labor hour (Table 9). This region exhibits characteristics of a "lagging rural region" considering its geographical remoteness, poor infrastructure, low population density, and limited employment opportunities (Jablonski, 2016). MCAT participants in the Southwest region were all from Montezuma and La Plata counties. Montezuma county has a population of 27,000 (12.6 people per square mile). La Plata county directly to the west of Montezuma has a population of 55,600 (30.3 people per square mile)[9]. Durango is the largest city in this region and is over 200 miles from Albuquerque and over 300 miles from Denver with no direct Interstate access. In contrast, MCAT

[9] Population data retrieved from United States Census Bureau: QuickFacts (2016). Available Online: https://www.census.gov/quickfacts/table/PST045215/00

participants on the Western Slope were from Mesa and Delta counties which have a combined population of over 180,000. The largest city in the region is Grand Junction which is 250 miles from Denver and 280 miles from Salt Lake City each by Interstate access. From the regional analysis, there is evidence to suggest marketing profit and sales efficiency are distinct by region. The low sales efficiency for DTC markets in the Southwest region is consistent with Martinez et al.'s (2010) claim that access to urban markets is crucial for DTC marketing strategies.

The variation in MP for intermediated market channels in the Southwest region was much less than for direct market channels, while the median MP was over thirty percentage points higher for intermediated markets (Figure 9). Comparing profitability to sales efficiency suggests Southwest region farms are reducing profitability by expending labor into direct markets, while the MP for intermediated markets for the Southwest region is on par with Front Range intermediate PM median and 75th percentile benchmark values. Supporting distribution and transportation infrastructure to move product from the rural Southwest region to urban markets would improve the sales efficiency of this region through providing growers better access to an urban market.

Implications

The goal of this research is to support farm viability for local food producers. In comparison to conventional farms that focus primarily on production, local food farms are more likely to both produce and market their products. This research focused specifically on the marketing functions earlier described as 'Retail Agriculture'. Matteson and Hunt (2012) explain the parallels between retail agriculture businesses and traditional small retail businesses including marketing differentiation, product differentiation, and relationship-based marketing. Retail agriculture businesses and traditional small retail businesses also face similar challenges such as access to business technical assistance and under-capitalization. Because of these similarities between retail

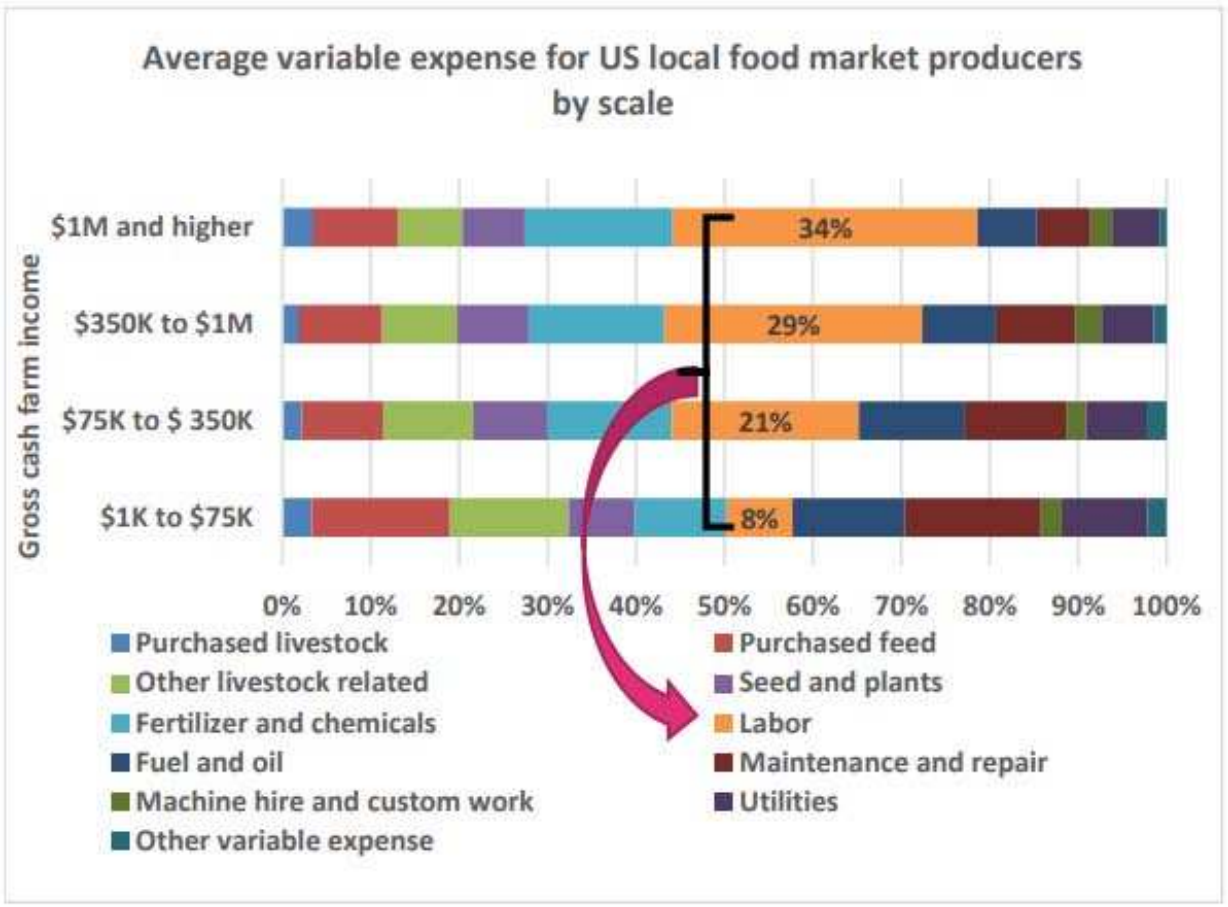
agriculture businesses and traditional retail businesses, literature on the performance of retail businesses can provide a useful framework of analysis for agricultural businesses with retail characteristics.

Often, the performance of retail businesses is measured by productivity, or the ability of the firm to generate sales using retail resources such as labor. Achabal, Heineke, and McIntyre (1984) note, however, that definitions of productivity in the retail sector are often confused with the concepts of efficiency and effectiveness, which, although closely related, are quite distinct. The information provided by MCAT analysis can address the concepts of productivity, efficiency, and effectiveness individually, thereby allowing for more refined inferences about the role of each of the factors in the discussion of effective market choices.

Productivity in retail is synonymous with a production function where the output variable measures the capability of the organization to meet demand as a function of the available resources (Achabal, Heineke, and McIntyre, 1984). The sales per labor hour benchmarks (Figure 5) show the volume of sales generated per marketing labor hour by individual market channel, while Figure 10 shows sales per marketing labor hour by region. The top quartile for these benchmarks could be interpreted as the marketing production frontier for an individual producer in a region to assess their market channel productivity relative to top performing market channels in their region. Sales per labor hour is a more comparable metric than MP for productivity because it does not include the wage rate, and is independent of scale.

Evidence shows that as local food producers increase in scale, the portion of average variable costs allocated to labor increases (Figure 11). Sales per marketing hour benchmarks could be particularly useful for YBS farms increasing in scale and hiring additional marketing labor to expand current market channels or diversify into new markets. To establish fair and reasonable

wage rates, the producer should consider the marginal productivity the worker offers, and align wages appropriately. Moreover, to offer up incentive pay, the production frontiers based on top performers could be useful as targets to use as criteria if a producer wanted to reward productive employees while also helping the operation to achieve greater returns.



Source: Shideler et al. (2017)

Figure 11: Average Variable Expense for US Local Food Market Producers by Scale

Sales per labor hour is a useful metric for average productivity for an employee at generating sales; however, this does not address whether that is the best use of the employee's time. Allocative efficiency relates the marginal productivity of an employee (the additional sales given an additional labor hour) to the marginal cost of labor (the wage rate). The MCAT methodology applies wage rates to unpaid labor to account for the opportunity cost of labor and

so that the labor can be allocated to the most productive use relative to the cost. In the MCAT reports (Appendix B) the labor hours of each employee are presented by day of the week and marketing activity to inform labor allocation decisions. To assist with resource allocation between market channels, the percentage of total labor costs by channel are compared to the percentage of total revenue by channel. Profit is maximized when marginal costs is equal to marginal revenue across all market channels, therefore the MP benchmarks can provide one measure for farmers to assess their market channel efficiency relative to top performing channels in their own business and among top performing peers in their region.

Efficiency relates to using resources in the best possible way, but only for a given organizational strategy (Achabal, Heineke, and McIntyre, 1984). Even if resources are used efficiently but towards a suboptimal goal, then those resources were not used effectively. Retail effectiveness is determining how to use available resources to maximize the return on invested capital (which is equivalent to choosing the retailing policies such as pricing, promotion, and assortment that maximize return on investment) (Achabal, Heineke, and McIntyre, 1984). The MCAT methodology addresses the concept of effectiveness with the final channel ranking in the MCAT report (Appendix B). From the evaluation criteria weighting results (Table 3), it is apparent farms have multiple objectives when determining their market portfolios. By focusing simply on productivity, farms would choose the channel that yields the most sales for the least amount of labor, however without accounting for cost this may not be the most efficient decision. If resources are used efficiently but the market portfolio is exposed to more risk than the farmer is comfortable with, or the efficient market channels are very stressful for the farmer, then the resources are not being used effectively to support long-term farm viability.

The MCAT methodology addresses productivity through benchmark analysis, efficiency through information presented in individualized MCAT reports, and effectiveness through the weighted channel ranking based on the farmer's business objectives. The MCAT is a useful tool that Land Grant Extension Agents could utilize to support YBS farms to reach marketing productivity goals and allocative efficiency with their scarce labor resources. Further regression analysis using MCAT data could contribute to best practices for local food marketing, giving Extension Agents more resources and information to support local producers who are seeking o make better management decisions. Experienced farmers can benefit from MCAT analysis when scaling production and marketing or seeking access to credit by relating their sales efficiency and profitability to benchmarks of peers, and considering where new investments and market growth would help them to increase returns. Finally, frequently updated market channel specific benchmarks would be useful for governmental agencies interested in supporting local food systems by identifying trends in utilization and performance of specific market channels.

Limitations

The main limitation to this research is the limited sample size, thereby restricting the generalizability of the results. Although the sample of 25 farms was disaggregated to 129 individual market channel observations to develop benchmarks and use regression analysis, further disaggregation would be a more accurate indicator of market channel performance. For example, the labor allocation benchmark for farm stands (Figure 7) suggests there is likely a difference in performance between manned and unmanned farm stands. A larger sample size would allow this market channel category to be divided into more specific sub-categories to explore that strategy further. Similarly, multi-farm CSA, Restaurant Supported Agriculture (RSA), and institutional buyer market channels were grouped in an 'other intermediated' category because of sample size

restrictions. In terms of regional benchmark analysis, the sample size restricted analysis to DTC and intermediated channels where specific market channel categories by region would provide more in-depth analysis and value to producers in those regions.

Another key limitation is the assumption that a week-long period of data collection is representative of the market channel performance over the full season. Variable sales through farmers' markets, orders from restaurants and distributors, or even an abnormally slow week at a farm stand would skew the results of the market channel's performance. Collecting data throughout a whole season and averaging the weekly performance would give a more robust representation of a channel's performance, however, it would also require significantly more time and effort dedicated to collecting and processing data.

Murray and Gwin (2016) also identified some limitations for the MCAT. For example, the crop mix can influence the labor cost of a market channel due to the additional time spent harvesting or processing a particular type of product. If the price increases in direct proportion to the additional cost of harvest and processing this is not an issue; otherwise they recommend evaluating market channels with and without harvest and post-harvest handling labor. Another limitation is that marketing labor for the CSA channel is largely conducted off-season. This understates the labor commitment to that channel. The researchers recommend including the farmer's estimates of developing and distributing recruitment material, attending events, and communicating with CSA customers to allocate a portion of that time in the weekly labor commitment to manage a CSA market channel.

The explanatory power of the model could be improved by including information on a greater set of farm management and farm attributes as discovered in the literature review, in particular off-farm income and farm size. Information collected in the MCAT questionnaire was

deliberately limited to increase participation rates. If additional questions are added to future MCAT questionnaires, the impact of the information must outweigh the added burden to the respondent. Yet, there are additional farm information questions that could support analysis of market channel selection.

Off-farm income has been shown to be an important indicator of farm decision making and could be important to understand moving forward. Off-farm income was shown to have a negative impact on DTC profitability in Ahearn and Stern's (2013) study, but Park, Mishra, and Wozniak (2014) found an increase in off-farm income corresponded to an increase in sales through DTC channels. However, there is limited information on the relationship between off-farm income and the performance of mixed market strategies. Considering almost all of the Colorado market channel assessment participants used a combination of DTC and intermediated channels, collecting this information would contribute to our understanding of mixed market strategies.

To capture farm scale more accurately, farm size using annual gross sales would be a better measure of scale than the single week of gross sales and acreage of the farm. By definition, weekly gross sales vary throughout the season despite the effort to collect MCAT data during peak week; a simple multiplication of the weekly sales by the number of weeks the farm participates in each market channel is a rough estimate of gross income. Further, acreage is a poor measure of scale given that many producers grow intensively in structures, and can gross significantly more than farms growing on ten times the acreage.

There is a tradeoff between collecting detailed information from each participant and encouraging a high participation rate. Therefore, the additional information collected from the farms must be succinct but impactful to strengthening analysis. The additional variables anticipated to improve the performance of the model would include farm operator's experience,

off-farm income or the share of income from farming, and farm size as reflected by annual gross sales. However, experience recruiting farmers to participate in the MCAT study revealed that collecting more sensitive financial information can adversely affect a producer's willingness to participate. Despite keeping personal information confidential, producers were slightly apprehensive to reveal their weekly sales, let alone their annual sales or personal income from other sources.

Future Research

As more states adopt the MCAT methodology to support their direct marketing producer sectors, the generalization of these results beyond the Colorado sample can improve the robustness and allow for benchmark comparisons with other states. To address the limitation of the one-week data collection period assumption, a complete season MCAT would be a useful next step. A full season MCAT analysis could help understand how marketing costs and revenues vary throughout the season. Not only would this bring validity to the 'peak season' week of data collection assumption, market channel performance benchmarks could be refined by season. In order to assess the benefits in participating in the MCAT study, and compile a greater volume of data moving forward, the 2016 participants are being contacted for a follow MCAT analysis in the 2017 growing season.

Collecting detailed data is costly, and an important tradeoff exists between collecting more detailed information per participant and collecting information from more participants. Innovation in the survey design and data collection method to reduce the effort on behalf of the participant would improve accuracy and participation rate. Ideally, the enumerator would complete labor logs during the week and ask clarifying questions to ensure the most accurate data. However, this would be prohibitively costly and significantly reduce the number of farms able to be surveyed during

peak production. Farms already committed to keeping records returned the best quality labor logs, so if the information required by the MCAT could be implemented to existing record keeping methods, the marginal cost of collecting data would be reduced. This however would require some flexibility in the data collection design and careful consideration as to maintain data validity across farms. An area for future research could be integrating data required for the MCAT into records already required for food safety compliance.

Future research exploring the capacity for local food farms to support sustainable jobs would contribute to the viability of local food systems. The use of MCAT analysis and benchmarks to evaluate the retail labor productivity could have useful workforce implications, such as whether there is potential for more skilled jobs and/or higher wages for agricultural workers is possible if farms choose a more profitable set of marketing channels in the long run. Historically, low relative wages in agricultural have attracted marginal workers which can further impact observed labor productivity (Achabal, Heineke, and McIntyre, 1984). However, the value added through consumer-orientated marketing of local foods provides an opportunity for farm workers to employ greater skill and earn higher wages through performing retail functions in addition to production tasks. Such retail agriculture jobs could be less physically demanding and financially sustainable than farm workers working solely in production and harvest tasks, and the MCAT tool is well suited to explore the mix of labor hours by workers. Further analysis of how local food farms build value through interactions with consumers integrated with MCAT metrics to evaluate retail productivity could be used to support job growth in the local food sector.

A possible application for MCAT data is the development of a farm marketing optimization model. An optimization model could determine the optimal product and marketing mix throughout the season. The MCAT labor utilization benchmarks by market channel would be used to estimate

the parameters for the marketing costs portion of the optimization matrix while crop enterprise budgets[10] would be used to estimate the parameters for the production cost coefficients. The Colorado Fruit and Vegetable Growers Association[11] provides a crop availability calendar to determine what time periods products would generally be available for marketing. The coefficients for contributions to the profit maximization objective function could come from the farmers' markets price reporting provided by CSU Extension[12] to reflect direct markets. Wholesale prices could be obtained from price lists provided by local distributors. Modeling optimal marketing strategies for specialty crop producers would be complex due to the diversity in products and markets, however, it could be useful in illustrating market opportunities based on changes in input and output prices faced by these producers.

Building a larger data set using the MCAT methodology will also create opportunities for more advanced regression analysis, as well as opportunities to estimate parameters for optimization models with diversified market outlets. Immediate use of the market channel assessment results presented in this paper could help Colorado specialty crop producers and policy makers understand relative marketing profitability and sales efficiency by individual market channels. Other states conducting MCAT analysis can generate similar benchmarks to determine whether the performance of the direct and intermediated channels are state-specific or whether there are attributes inherent to the market channels themselves.

[10] Crop enterprise budgets available online at: http://www.agmrc.org/business-development/business-workbench/business-worksheets-and-calculators/enterprise-budgeting-tools/

[11] Crop calendar available online at: https://coloradoproduce.org/produce-directory/

[12] Farmers' market price reports available online at: https://www.colorado.gov/pacific/agmarkets/farmers-market-price-reports

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APPENDICES

Appendix A: Farm Information Sheet

Marketing Channel Assessment Tool (25N, 12C)
Farm Information Sheet

Farm Name: _____ Start Date: _____

Operator Name: _____

All information will be kept strictly confidential. When reported to anyone but your farm, information and results will be aggregated with other farm data so no individual farm or worker data can be recovered.

1. List all people that worked on the farm during the studied week, including owners, family, friends, salaried staff, hourly staff, and volunteers (CSA work-shares and others). For hired labor, please write in their rate. For unpaid, denote their relationship to the farm.

Number	Name	Rate/Relationship
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

2. List the week's daily gross sales, for each channel as specifically as possible. For CSA shares, please estimate the value of all produce distributed. If using a value added channel, then please estimate the value of the product you will process. For wholesale sales, write in the amount invoiced.

Channel	Mon	Tues	Wed	Thur	Fri	Sat	Sun

Provide any supplemental clarification information, if needed, here:

3. List the week's total mileage for each day (including to and from markets/buyers) for each channel.

Channel	Mon	Tues	Wed	Thur	Fri	Sat	Sun

4. Rank your feelings on the perceived financial riskiness of each channel. Financial (business) risk is defined as the probability of lost or lower-than-expected sales. The channel perceived to be the LEAST risky gets a "1", and the channel perceived to be the MOST risky gets a value UP TO the maximum number of channels. Rankings need not be whole numbers, and if you feel that two channels are equally risky, assign them the same number.

Channel →						
Risk Rank						

Channel →						
Risk Rank						

Provide any supplemental clarification information, if needed, here:

5. Rank your feelings on how well each channel fits with your overall lifestyle preferences and enjoyment of work. Lifestyle preferences are unique to the individual and can relate to a channel's labor requirements, the stressfulness of the work, how and what people are interacted with, or the style and presentation of products, etc. The channel perceived to be the MOST consistent with your lifestyle preferences gets a "1", and the least consistent channel gets a value UP TO the maximum number of channels. Rankings need not be whole numbers, and if you feel that two channels are equally consistent, assign them the same number.

Channel →						
Risk Rank						

Channel →						
Risk Rank						

Provide any supplemental clarification information, if needed, here:

6. Assign a "weight" to the importance that you feel each factor used to evaluate a marketing channel deserves. For example, if you don't care about profit and are very concerned about how much labor a channel takes, you would assign a low weight to "profit", and a high weight to "labor required." The sum of all weights must equal one (1). An example is provided.

Factor →	**Unit Profit**	**Labor Required**	**Business Risk**	**Lifestyle Preferences**	**Product Volume**	**Sum**
Weight (example)	0.10	0.40	0.10	0.20	0.20	= 1
Weight YOURS						= 1

7. Please check all the crops that you grow for market. (Write in any that are missing).

☐ Raspberries	☐ Asparagus	☐ Daikon	☐ Garlic
☐ Blueberries	☐ Sweet corn	☐ Carrots	☐ Cabbage
☐ Strawberries	☐ Tomatoes	☐ Beets	☐ Broccoli
☐ Gooseberries	☐ Tomatillo	☐ Kohlrabi	☐ Cauliflower
☐ Blackberries	☐ Sweet peppers	☐ Watermelon	☐ Brussels sprouts
☐ Currants	☐ Hot peppers	☐ Melon	☐ Kale
☐ Elderberries	☐ Eggplant	☐ Rhubarb	☐ Swiss Chard
☐ Cherries	☐ Okra	☐ Cucumbers	☐ Spinach
☐ Grapes	☐ Potatoes	☐ Turnip	☐ Collard greens
☐ Peaches	☐ Beans	☐ Rutabaga	☐ Escarole
☐ Plums	☐ Peas	☐ Parsnips	☐ Bok choy
☐ Apricots	☐ Summer squash	☐ Fennel	☐ Pac choi
☐ Nectarines	☐ Winter squash	☐ Celeriac	☐ Arugula
☐ Apples	☐ Pumpkin	☐ Onion	☐ Basil
☐ Asian pears	☐ Celery	☐ Scallions	☐ Parsley
☐ Pears	☐ Radish	☐ Leeks	☐ Cilantro

8. Do you raise livestock for market? If yes, what is the average number of head on your farm and type of livestock?

   Livestock: ___Yes ___No

   Number: ___Dairy ___Beef ___Hogs ___Poultry ___Goats/Sheep ___Other

9. Total acres in production: _____

10. Do you currently own or rent land for production? Please provide breakdown of acres in production.

    Own: __Yes __No Rent: __Yes __No

    Own: ____Acres owned Rent: ____Acres rented

11. Do you have a written business plan for your farming operation?

    Have a written business plan: ___Yes ___No

12. Do you sell value-added/processed products such as baked goods, preserves, other processed food products, or dried flowers? If yes, what is the average percent of total farm sales from value-added/processed products?

    Sell value-added/processed products: ___Yes ___No

    Average percent of total farm sales: ___%

13. On average, how many weeks per year do you typically market your farm products through each marketing channel?

Channel →						
# Weeks						

Channel →						
# Weeks						

14. Rank the top three methods that best describe how you normally price your products. Indicate "1" the most important method, "2" the second most important, and "3" the next most important. Select top three only.

___Grocery store comparison
___Match other retail vendors' prices
___Match other wholesale vendors' prices
___Price below other vendors
___Price above other vendors
___Cost of production plus mark-up
___Charge the same always
___Other:_____

Appendix B: Sample MCAT Report

Market Channel Assessment Report

Improving business planning resources and profitability of fruit and vegetable producers in Colorado by assessing the market channel performance of alternative marketing strategies

March 2017
foodsystems.colostate.edu

Funding provided by the U.S. Department of Agriculture Agricultural Marketing Service Federal State Marketing Improvement Program (No. ***15FSMIPCO0001).***

USDA Agricultural Marketing Service | CDA CO Colorado Department of Agriculture | Agricultural and Resource Economics Colorado State University | Colorado State University Extension

Colorado Farm MCAT Report

Week interviewed: 8/08/2016 – 8/14/2016

Farm Description

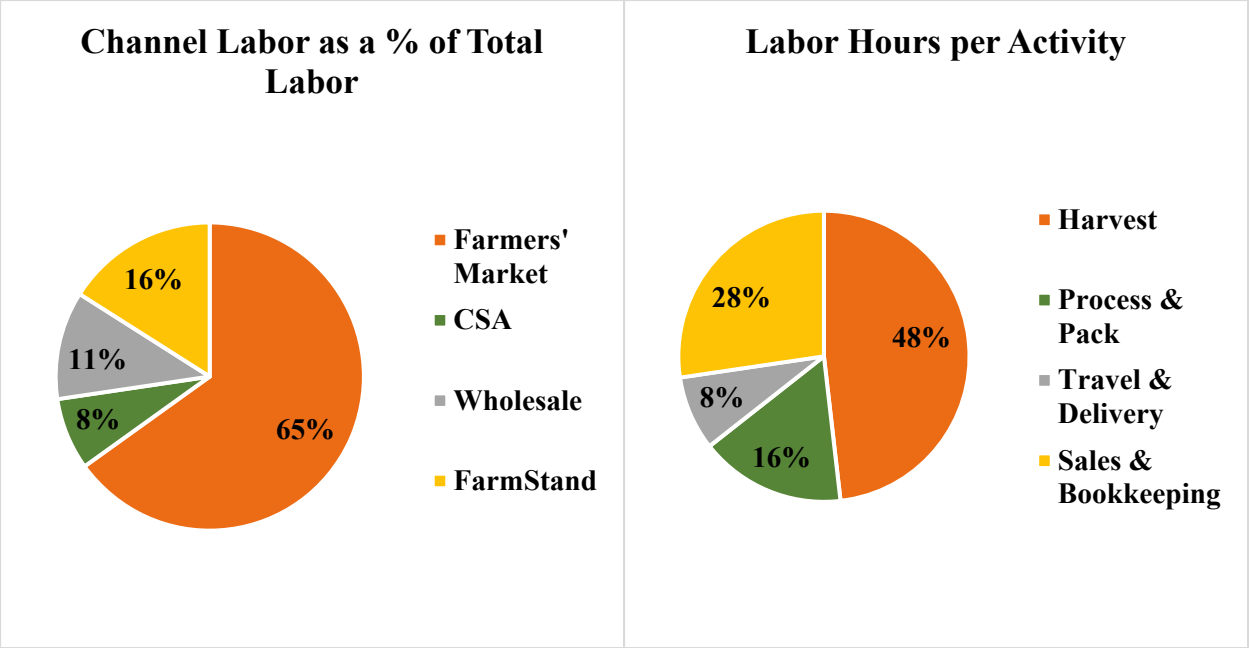
Personalized description for each farm here.

Labor Hours Per Marketing Channel

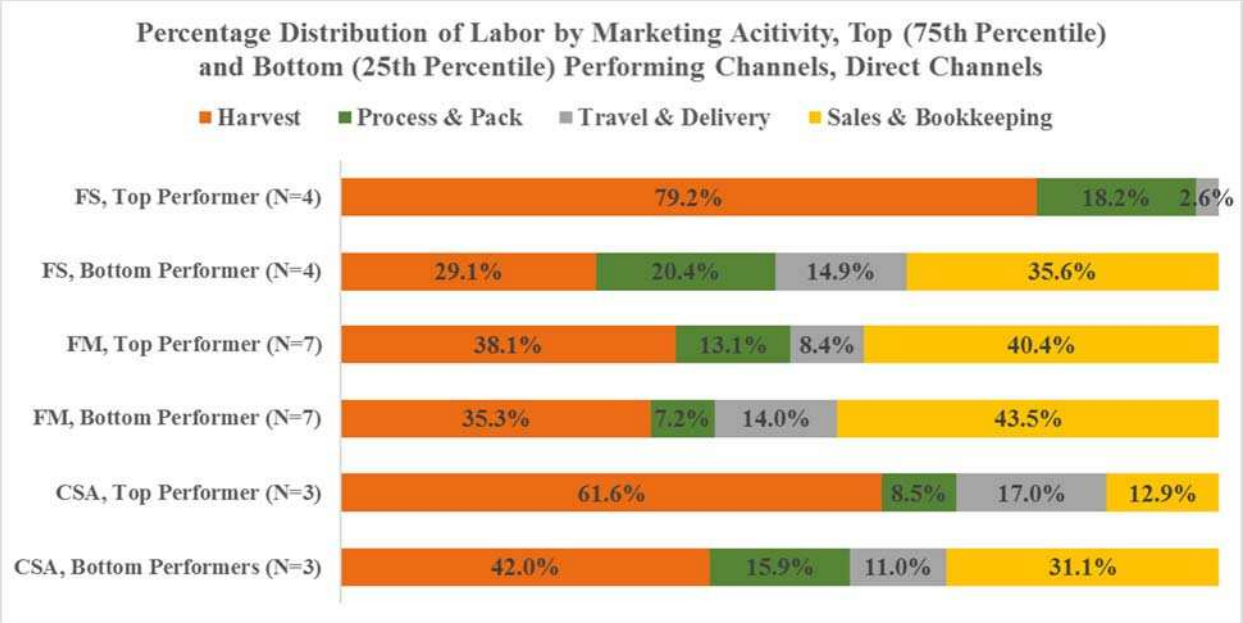
These tables show how many marketing hours each channel demanded in one "typical peak season" week. Results are presented by marketing activity and by channel. The green section denotes measurements in hours. The red section denotes measurements in percentage terms: a ratio of the activity by labor hours. For example, harvest time is 41.7% of total labor hours for Durango FM. Note that only marketing labor is included here (e.g., harvest, wash & pack, travel & delivery, and sales & bookkeeping). We assume that production labor requirements are consistent across market channels for these reports.

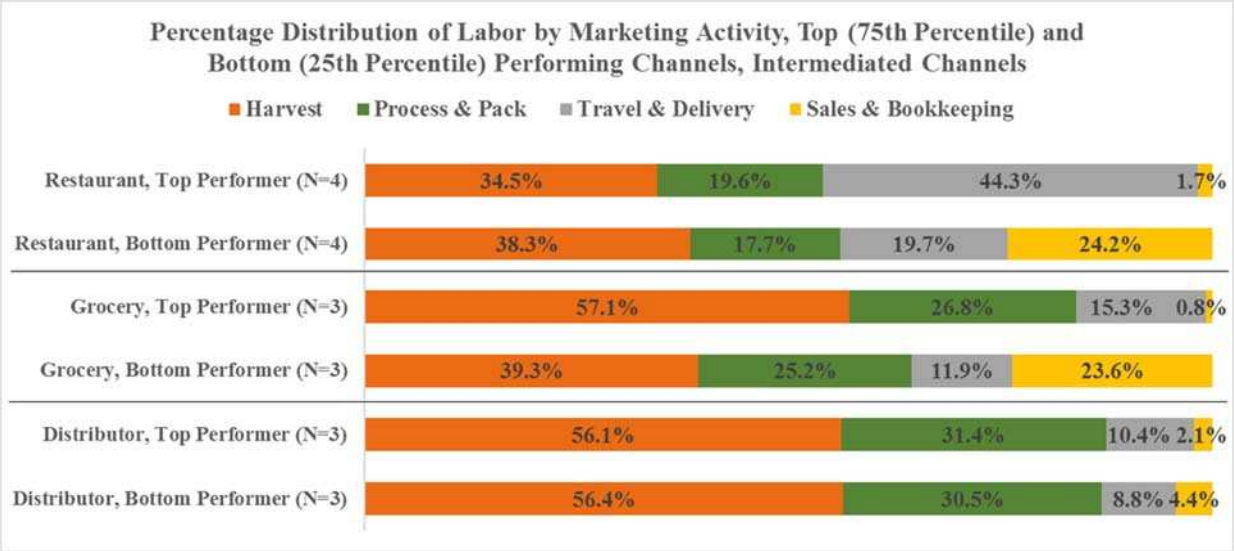
Market Channel	Harvest	Process & Pack	Travel & Delivery	Sales & Bookkeeping	Labor Hours
Farmers' Market	16.17	3.25	3.33	16.00	**38.75**
CSA	1.83	1.92	0.25	0.50	**4.50**
Wholesale	3.83	2.17	0.25	0.50	**6.75**
Farm Stand	6.37	2.17	1.00	0.00	**9.53**
Farm Total	**28.2**	**9.50**	**4.83**	**16.00**	**59.53**
Farmers' Market	41.7%	8.4%	8.6%	41.3%	**65.1%**
CSA	40.7%	42.7%	5.6%	11.1%	**7.6%**
WS	56.7%	32.1%	3.7%	7.4%	**11.3%**
Farm Stand	66.8%	22.7%	10.5%	0.0%	**16.0%**
Farm Total	**47.4%**	**16.0%**	**8.1%**	**28.6%**	**100%**

Next, the graph on the left shows the labor hours for each market channel as a percentage of total labor hours, as reflected in the yellow column (far right) in the red section. The graph on the right is total labor hours by activity for all market channels. This reflects the same information as the farm total percentages along the bottom of the table above.



This next section includes statewide benchmarks for top and bottom performers split by direct and intermediated market channels in Colorado during 2016. Note that this information is not specific to your farm. You can use these graphs to compare the amount of time you are spending on each individual market channel and marketing activity to the other farms that completed market channel assessments. This comparison can be done with the table above. Your performance will be discussed later in this report.





Labor Hours Per Marketing Activity

The table below shows marketing activity broken down by employee. This information may prove useful as you make decisions on work activity allocation within your farm business.

Marketing Activity (hours)	Harvest	Process & Pack	Travel & Delivery	Sales & Bookkeeping	Farm Total
Farmer 1	25.20	8.50	0.00	1.00	**34.70**
Farmer 2	3.00	1.00	4.83	8.00	**16.83**
Farmer 3	0.00	0.00	0.00	8.00	**8.00**
Farm Total	**28.20**	**9.50**	**4.83**	**16.00**	**59.53**

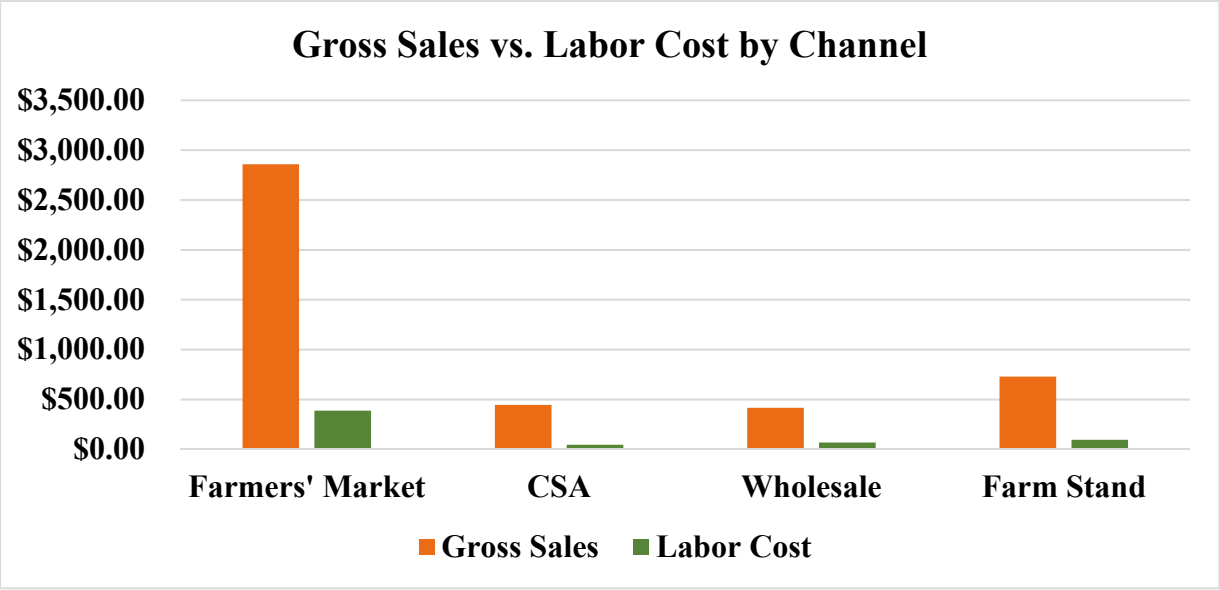
This next table provides a snapshot of how much time each person spent on marketing activities by day. These results could help to inform how you might decide to reassign some of your farm labor throughout the week.

Hours per Day				
	Farmer 1	**Farmer 2**	**Farmer 3**	**Total**
Monday	0.67	4.50	0.00	**5.17**
Tuesday	6.00	0.00	0.00	**6.00**
Wednesday	3.75	0.00	0.00	**3.75**
Thursday	3.87	1.00	0.00	**4.87**
Friday	0.00	0.00	0.00	**0.00**
Saturday	19.42	11.33	8.00	**38.75**
Sunday	1.00	0.00	0.00	**1.00**
Total	**34.70**	**16.83**	**8.00**	**59.53**

Gross Sales vs. Labor Costs by Channel

This table is a summary of your gross sales for each market channel during one "typical peak season" week. It compares the gross sales to the labor cost for each individual market channel. The graph visually demonstrates the relative difference between gross sales and labor cost for each market channel.

Market Channel	Farmers' Market	CSA	Wholesale	Farm Stand	Total
Gross Sales	$2,858.00	$445.20	$415.39	$729.00	**$4,447.59**
Labor Cost	$387.50	$45.00	$67.50	$95.33	**$595.33**



Sales and Labor Allocation by Channel

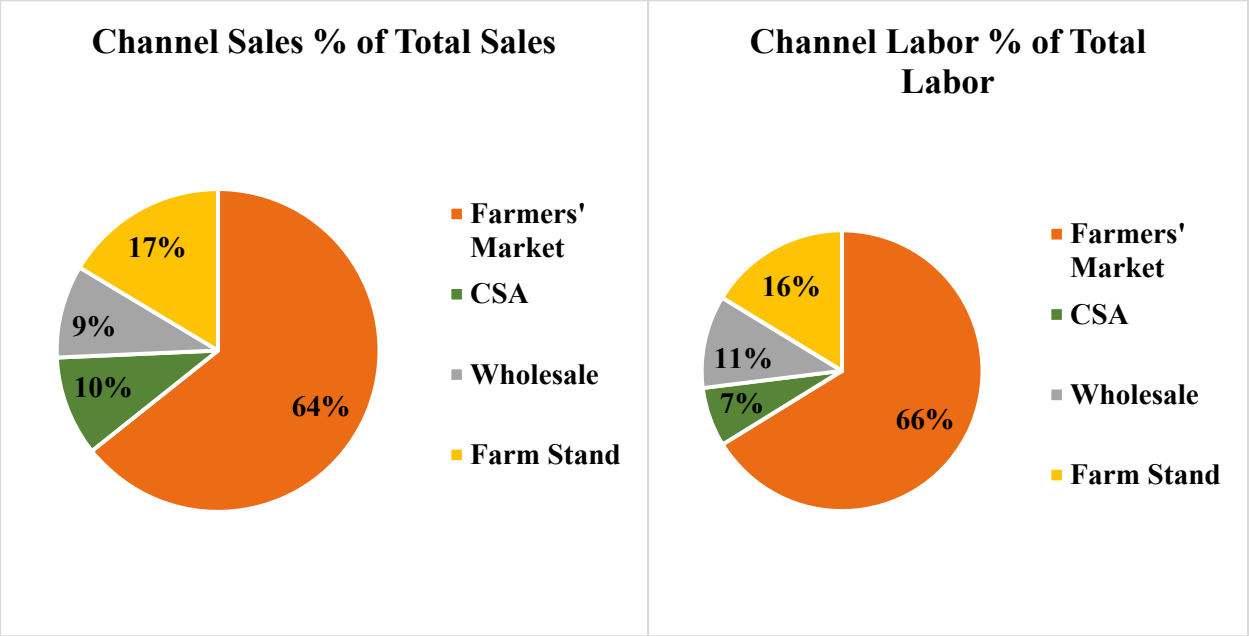
Now that we have reviewed the summaries of your sales and marketing labor data, we can use that information to calculate the relative "marketing profitability" of the channels.

For the purpose of this report, marketing profit is calculated as:

$$Marketing\ profit = Gross\ sales - (Cost\ of\ marketing\ labor + Cost\ of\ mileage)$$

One way to gauge the relative profitability of channels is to compare what percent of weekly labor each channel demands and what percent of weekly gross sales each channel contributes. Any channel that contributes significantly less of a share (~3-5% or more) of gross sales than it demands in labor is a channel that we consider to not be "pulling its own weight". Conversely, any channel that contributes significantly more to gross sales (>3-5%) than it demands in labor is a strong channel. In the column labeled "Difference", the larger the number, the more profitable the channel. Channels showing a negative number in the Difference column are poor performing in terms of profitability and are denoted with red font.

Market Channel	Channel Sales % of Total Sales	Channel Labor % of Total Labor	Difference
Farmers' Market	64.3%	66.2%	**-1.94%**
CSA	10.0%	6.8%	**3.18%**
WS	9.3%	10.7%	**-1.34%**
James Ranch FS	16.4%	16.3%	**0.10%**

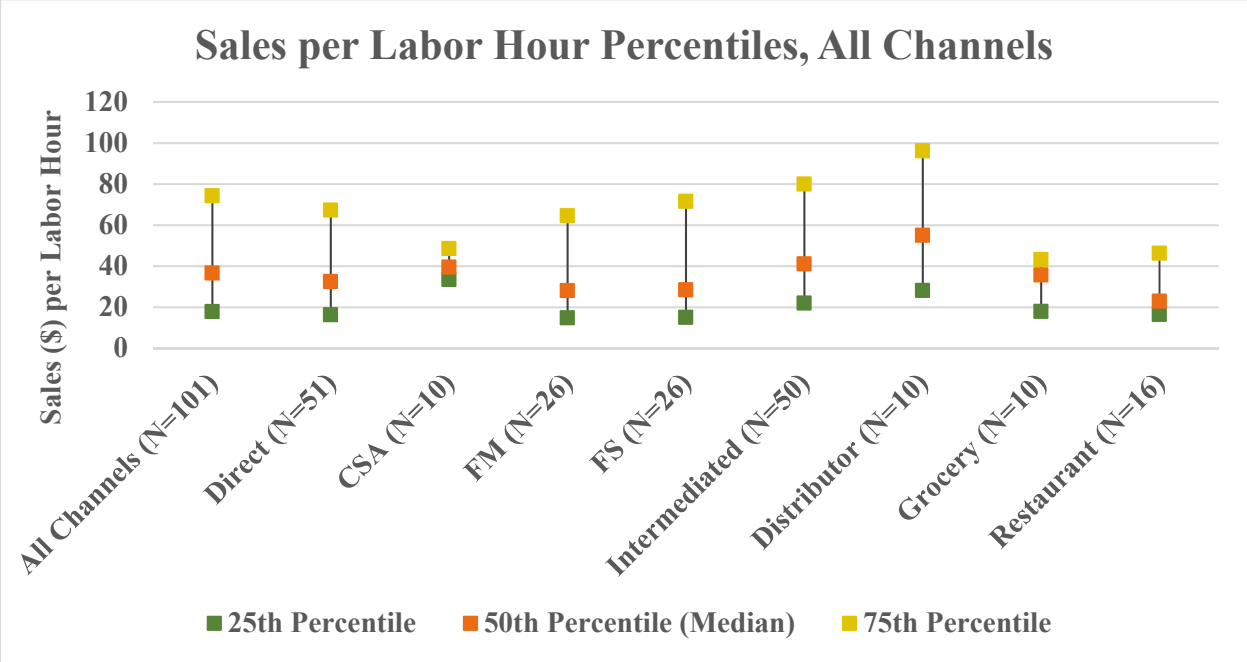


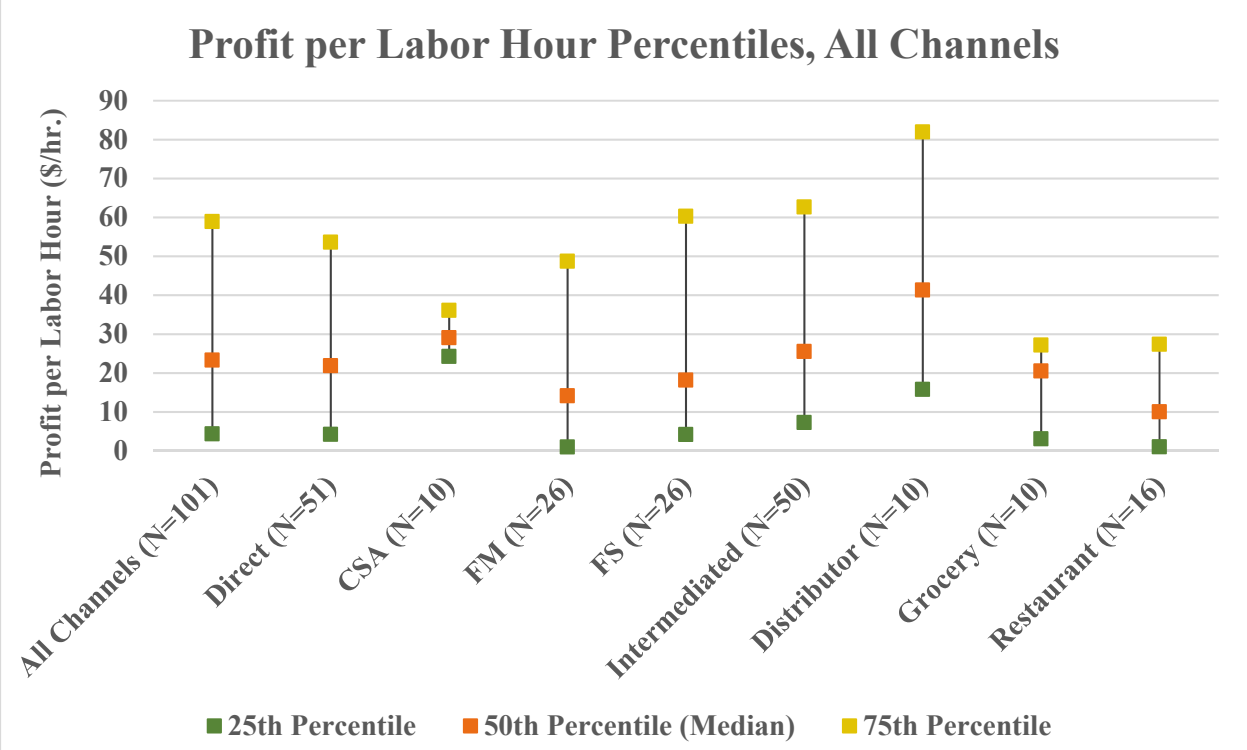
Sales and Gross Profit per Labor Hour by Channel

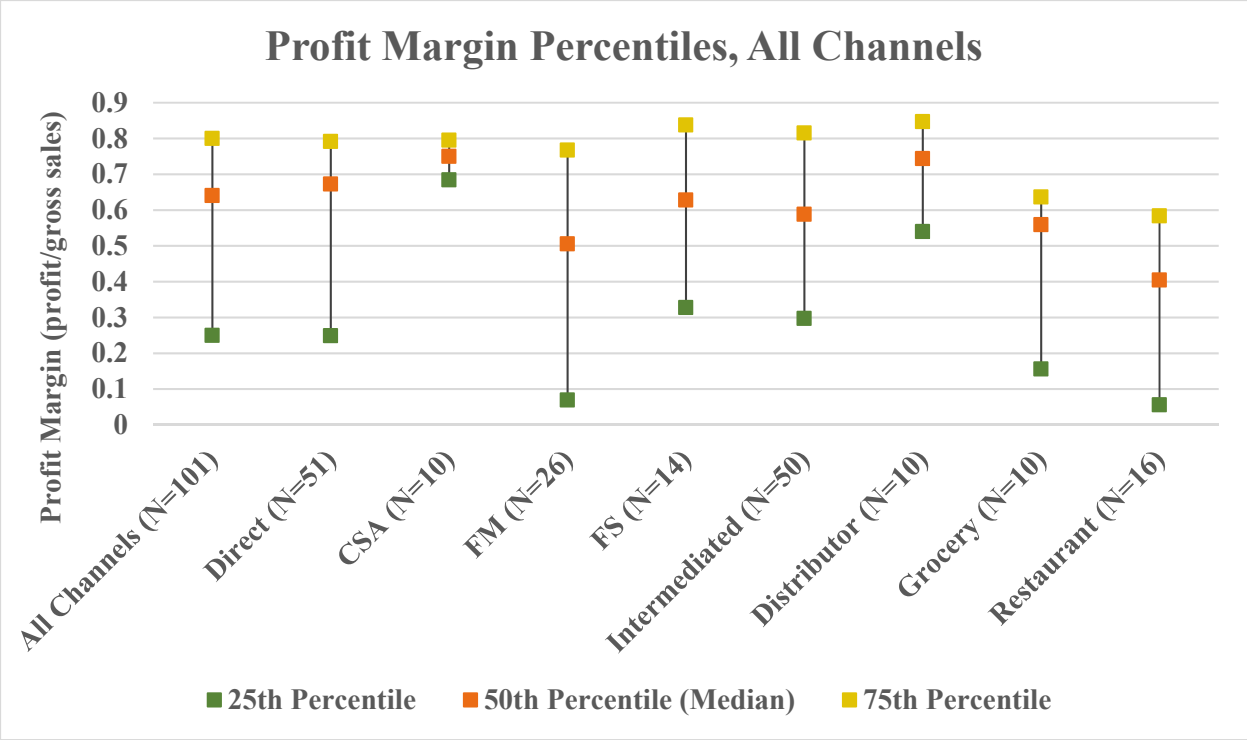
This table shows summaries and averages of your farm's sales per hour of labor, profit per hour of labor, and percent profit of sales across all channels. These statistics are the comparison points we recommend using to gauge your farm's performance to the benchmark information for other producers.

Marketing Channel	Sales per Hour of Labor	Profit per hour of Labor	Profit % of Sales
Farmers' Market	$73.75	$63.46	86.0%
CSA	$98.93	$86.40	87.3%
Wholesale	$61.54	$49.85	81.0%
Farm Stand	$76.47	$65.87	86.1%
Average	**$77.67**	**$66.40**	**85.1%**

These graphs present benchmark information for all farms that participated in market channel assessments in 2016. We divided all respondents by quartile. The yellow represents the top performing quartile (75%), the green represents the lowest performing quartile (25%), and orange is the median performer. One of the important pieces of information showed here is that some channels have relatively consistent performance (for example, CSAs), whereas others have wide variability (for example, farmers' markets).
The first graph represents sales per labor hour, which correlates to the first column of data in the table above.
The second graph represents profit per labor hour, which correlates to the second column of data in the table above.
The third graph represents profit margins, which correlates to the last column of data in the table above.




Profit per Labor Hour Percentiles, All Channels
Profit per Labor Hour ($/hr.)
90
80
70
60
50
40
30
20
10
0
All Channels (N=101)
Direct (N=51)
CSA (N=10)
FM (N=26)
FS (N=26)
Intermediated (N=50)
Distributor (N=10)
Grocery (N=10)
Restaurant (N=16)
25th Percentile
50th Percentile (Median)
75th Percentile


Profit Margin Percentiles, All Channels
Profit Margin (profit/gross sales)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
All Channels (N=101)
Direct (N=51)
CSA (N=10)
FM (N=26)
FS (N=14)
Intermediated (N=50)
Distributor (N=10)
Grocery (N=10)
Restaurant (N=16)
25th Percentile
50th Percentile (Median)
75th Percentile

Final Channel Rankings

Market Channel	Sales Volume	Labor Hours	Profit Margin	Financial Risk	Lifestyle	Final Scores	
						UW	W
Farmers' Market	1.0	4.0	1.6	1.0	4.0	**2.3**	**2.3**
CSA	4.0	1.0	1.0	1.0	1.0	**1.6**	**2.2**
Wholesale	4.0	1.2	4.0	1.0	1.0	**2.2**	**2.7**
Farmstand	3.6	1.4	1.6	1.0	2.0	**1.9**	**2.4**
Factor Weighting	**0.40**	**0.20**	**0.15**	**0.05**	**0.20**		

UW = unweighted, W = weighted

The final table displays the ranking results of each marketing channel across each performance factor. The final overall score for each channel is in the shaded columns on the right. The un-weighted (UW) scores show the final ranking when all factors are weighted equally. The weighted column (W) shows the final ranking in consideration of the relative weights that you assigned each factor (factor weights are displayed along the bottom row). The higher the number assigned in the "factor weighing" row, the more important you reported this factor in evaluating channel performance. Your performance factors were not weighted in this analysis.

The highest scoring market channel in your market portfolio is CSA for the unweighted and weighted rankings. This channel performed best in the labor hour requirement and profit margin categories, and still scored highest despite being the second lowest scoring channel in your highest weighted category: sales volume. Your lowest performing channel including the weighted rankings is the Wholesale. In the unweighted ranking, Farmers' Market's high labor requirement and low lifestyle ranking were responsible for the low score. However, the relatively large weight you placed on sales volume improved the farmers' market's score and penalized Wholesale (which scored lowest in terms of sales volume). Increasing sales through the wholesale account would improve the sales volume category score, the profit margin score could be improved through labor saving efficiencies in harvest and processing or negotiating higher prices for your products. During your market assessment consultation, we discussed the expansion of CSA as being an opportunity for increasing sales volume in the coming season. This will further improve the final ranking of the CSA market channel. Considering this channel has the best score for labor hour requirement, you will want to be conscious about using labor efficiently while scaling sales through this channel to maintain the level of profitability.

To learn more about the research and stay up to date on latest benchmarks/results, please visit:
foodsystems.colostate.edu

Additional questions about this project may be directed to:

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