

Embrace. Learn. Grow.

Research & Experiences of a Borlaug-Ruan Intern
AVRDC-RCSA, The World Vegetable Center
Patancheru, India



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Table of Contents

| | |
|--|----|
| <i>Acknowledgements</i> | 3 |
| Introduction | |
| Personal Remarks | 4 |
| IACD: An Overview | 5 |
| AVRDC & IACD: Find Common Ground with Vegetables | 5 |
| Research & Analysis | |
| Research Summary | 6 |
| Objectives | 6 |
| Methodology | 7 |
| Results & Discussion | 11 |
| Conclusions & Recommendations | 23 |
| Final Thoughts | 25 |
| References | 26 |
| Appendix | 26 |

Acknowledgements

First and foremost, I would like to thank the World Food Prize foundation for providing me with such an incredible opportunity to experience the world through an international internship. This two-month internship has challenged me in ways I could not anticipate. From these experiences I have learned to embrace ideas, learn about food science and grow as a human being. I would not trade this experience for anything.

A special thanks to Dr. Norman Borlaug who devoted his life to science for the betterment of society. His relentless passion for learning and helping others will never be forgotten. My sincere gratitude goes out to the John Ruan family for their generous contributions to the World Food Prize Foundation to make this life-changing internship possible for me and so many others. Many thanks to the staff of the World Food Prize Foundation, especially Ambassador Quinn and Ms. Lisa Fleming. Over the past two months, Lisa Fleming has been my second mother, devoting countless hours to ensure that each student remained safe and had a positive experience. From last-minute emails to late-night phone calls and Skype chats, her unyielding diligence and care for others is nothing short of amazing.

During my two months I had the pleasure of working with three organizations: ICRISAT, IACD and AVRDC-RCSA. Thank you ICRISAT staff for taking time out of your busy schedules to complete my interviews and surveys. Another thank you to the staff and board members at IACD for devoting much of their time to assist me with my research. Surekha Babu, IACD's general manager, provided invaluable information and feedback. I could not have done this project without her help and dedication. Thank you, AVRDC-RCSA (Regional Center for South Asia) for hosting a naïve high-school intern. From the first to last day, AVRDC staff for taking the time to get to know me. Their relentless kindness made even the bad days good and the good days so much better. A special thanks to Dr. Warwick and Dr. Ram generously sharing their time and expertise. Thank you Dr. Warwick, Dr. Ram, Neeraja, Rehana, Vamsi, Kumar and Tomar for sharing their heart-felt kindness, smiles and laughs each and every day. I will remember these experiences for the rest of my life.

I must express my sincere appreciation to the ICRISAT campus interns: Deepa Jaganathan, Rachel Ganson, Kimberly Gibson, Ella Baar, Cassandra Admire, Virginia Hooper, Yo Liang (Yo Ya) and Rupsha Banerjee for being my friends and family these past two months. Lively and encouraging, each intern's unique personality served as motivation and encouragement. Thank you all for sharing your time and advice. I will forever remember these life lessons.

Thanks to my faithful blog readers, friends and family--many of whom kept in touch via multimedia tools. Maintaining a connection with the "Western-World" allowed provided comfort and relief of homesick feelings.

Thanks you to my high school teachers who helped me become a better student and leader. A special thanks to Mrs. Britz for selecting me for the Global Youth Institute and her support throughout the internship application process.

I must express my utmost gratitude to my parents, Eric and Teri Bruster, and brother Ben for their constant love and support. At times when I felt homesick our Skype dates and international dance parties (thanks to Ben) helped me to recharge and strive to appreciate my enriching experience.



A visit to Chowmahalla Palace with a few of the interns. From left to right, Ella, Cassandra, Rachel, myself, Soumya (our guide) and Kim.

Introduction

Personal Remarks

Two years ago, I never imagined that I would spend a summer half-way across the world to research social science and microfinance for a non-profit organization. Instead, I envisioned myself involved in music camps and running for cross country. I knew very little about the developing world, however, I remained eager to travel and learn about the world. While I expressed interest in working with non-profits such as Free the Children, I knew little about the significance of food research and agricultural development for the betterment of society. An invitation to attend the World Food Prize Global Youth Institute provided me with motivation to research prevalent key issues within developing world.

Attending the Global Youth Institute provided me with an opportunity to meet with like-minded, youth activists and world leaders from around the world. Their passion and dedication to others inspired me to become more involved in hunger-related causes. In December, I applied for the internship, hopeful that my passion and longing would allow the opportunity to become a Borlaug-Ruan intern. All hope prevailed! A congratulatory letter of acceptance as a 2012 Borlaug-Ruan Intern reached my house hold a few months later. Feelings of joy and exhilaration overwhelmed me. I was going to India!

At the time, I knew little about the research campus or culture of India. The idea of transitioning from a majority group to a minority group added an initial challenge; however, I soon learned to embrace the diverse culture.

“This is indeed India! The land of dreams and romance, of fabulous wealth and fabulous poverty...the country of a hundred tongues, of a thousand religions and two million gods, cradle of the human race, birthplace of human speech, mother of tradition, whose yesterdays bear date with the moldering antiquities of the rest of nations—the one sole country under the sun that is endowed with an imperishable interest for alien prince and alien peasant...the one land that all men desire to see, and having seen once, by even a glimpse, would not give that glimpse for the shows of the rest of the globe.”

-Mark Twain

As Mark Twain eloquently expressed, I would not trade this experience for anything.

ICRISAT Association for Community Development: A Brief Overview

Established in 1980 by wives of senior ICRISAT staff, IACD strives to provide underprivileged members of



ICRISAT Association for Community Development.

surrounding community with tools to improve their livelihood. IACD's programs separate into three main aspects: skill development, adult education and primary health care (Hoisington). Classes in sewing, computer skills and spoken English provide teenagers and adults essential structural and technical education. IACD presents students of all social standings an opportunity at a subsidized education unique to many of the local government schools. Upon completing the coursework, many students possess more qualifications to receive higher level jobs, start their own business or become employed at IACD. As a part of IACD's core goals, all employees receive health insurance enabling them to visit a local clinic at an affordable premium. IACD receives half of the earnings

from Telugu film shootings on the ICRISAT campus. They generate the other half of their income with sewing orders, purchases from the Mamta shop, class fees and vegetable sales.

In addition to emphasizing education and healthcare, IACD understands the correlation between eating healthy and living a healthy life. Since 2005, IACD has sold organic, home grown vegetables to employees within the ICRISAT campus. Their two part-time and one full-time gardeners attend to the garden in the morning by planting, weeding and harvesting the vegetables. In the afternoons, two gardeners weigh and package the vegetables while the other delivers them to customers' homes or offices for free. IACD's vegetable garden is to provide a variety of affordable, good quality, organic vegetables to ICRISAT staff members.



AVRDC & IACD: Finding Common Ground with Vegetables

The Asian Vegetable Research and Development Center, also known as AVRDC, was established in 1971 with a mission to alleviate "poverty and malnutrition in the developing world through the increased production and consumption of nutritious and health-promoting vegetables." AVRDC continues to research gardening methods to encourage home gardens and household nutrition. In turn, home gardens provide families of developing countries with a healthy, economical and more reliable source of income. Similar to home gardens, IACD strives to produce safe and healthy vegetables for people of the ICRISAT campus. AVRDC's guidance and support to gardeners and management at IACD can help the IACD garden to thrive in the future.

Over the course of my two-month internship, I divided my time between AVRDC, my host center, and IACD.

Objectives

The goal of my research is to propose strategic options for IACD to improve their vegetable garden operation. My research through market visits, personal interviews, data collection, and potential and existing customers provided vital information to understand IACD's vegetable garden through different perspectives. With this in mind, my personal recommendation to IACD provides them with additional ideas and possibilities to capitalize on their strengths and improve weaknesses of the vegetable garden.

Summary

My research project falls under the social science and microfinance area, specifically working to improve efficiency in the vegetable garden of ICRISAT Association for Community Development, also known as IACD. This research directly relates to my host center, Asia Vegetable Research and Development Center-Regional Center for South Asia, or AVRDC, as their mission is to encourage "Prosperity for the poor, health for all" (AVRDC). Through vegetable research and development, AVRDC develops new breeds of vegetables with better, more efficient features. In turn, this enables vegetable production to become less expensive, allowing poor families an opportunity to enrich their diet with nutritious vegetables. AVRDC's mission correlates closely with the goal of IACD's vegetable garden. Established in 2005, the IACD vegetable garden offers employment to impoverished people in neighboring communities as full time gardeners. Vegetables are grown organically and sold to staff within the ICRISAT campus (Hoisington). Currently, IACD prices vegetables at subsidized rates, generating low profits for the organization. Due to IACD's low net income, opportunities to expand or renovate their operations are rare. The purpose of my internship is to advise IACD on methods to improve their vegetable production and distribution amongst their customers. This study tested whether clear documentation of past sales and expenses as well as evidence of customer interest will allow IACD to become more efficient with their resources and develop a future business plan.

My research forms through three main parts: interviews, data collection and surveys. Each provides useful data to effectively comprehend IACD's past and present operations. Interviews with IACD's management provided information on IACD's core beliefs and goals for the future. Digitally recording vegetable receipt book data supplied non-biased, accurate data to better understand past and current production. Digital data was then formatted into Microsoft Excel graphs to perform a more thorough analysis. Finally, individual surveys for existing and potential customers allowed an opportunity to understand the buyer's perspective.

My research provided IACD with a perceptive recommendation for vegetable sales. Through various surveys, interviews and data analysis, my research provided me with adequate information to intelligently advise IACD on certain methods or strategies to maximize their impact on the community.

Methodology

IACD's Market Competition

Understanding IACD's market competition proved important to develop a larger perspective for the vegetable industry. To do so, I visited the weekly open-air market and several supermarkets. Here I compared prices well as positive and negative aspects each market to IACD's vegetable garden.

Open-Air Market

In the open air markets, the price of vegetables depends on consumer demand, the vegetable season, weather, and other market competition. A few positive aspects too open-air markets include a fairly wide variety of produce, affordable prices and fairly consistent vegetable supply. Negative factors such as less convenience and frequent pesticide use prevent these market vegetables from being completely safe and healthy for customers.



Interviewing a vegetable vendor in the B.H.E.L market.

Supermarkets

Unlike open-air markets, prices in supermarkets depend less on weather and more on consumer demand, vegetable season and market competition. Positive aspects of super markets include the wide variety of produce supplied consistently for long periods of time in convenient, nearby locations. In exchange for these benefits, super market vegetables are priced higher. It is unknown whether the vegetables have been sprayed with toxic pesticides.

General Comparison of Outside Markets with IACD

While IACD does not produce a consistent supply of a large variety of vegetables, they provide healthy, mostly organic vegetables at a reasonable price. In addition, vegetables are delivered to customers' offices free of charge. Such distinct and positive attributes to IACD's vegetable garden possess great potential to interest many customers.

Interviews of IACD's Key People

Gardeners

Two of IACD's three gardeners, Bala Reddy and Lakshmi, generously took time out of their busy schedule to answer a few of my questions. Gardeners select vegetables based on their prior knowledge and gardening experience. Maintaining the garden is difficult and time-consuming—especially during the monsoon season when unruly weeds and pests overtake many vegetable varieties. Bala Reddy and Lakshmi spend roughly half of the work day planting, maintaining and harvesting the vegetables. With the remaining time, they weigh, and package the vegetables according to each individual order. Due to an inconsistent supply of vegetables, most IACD

customers cannot depend on IACD alone to meet their vegetable needs. Henceforth, customers frequently purchase vegetables upon phone request by Surekha, IACD’s manager.

Management

IACD’s management consists of the general operational manager and IACD board members. The operational manager holds the only full-time and paid management position; all board members receive their position by election as non-paid staff. *Figure 1* shows a basic outline of IACD management positions.

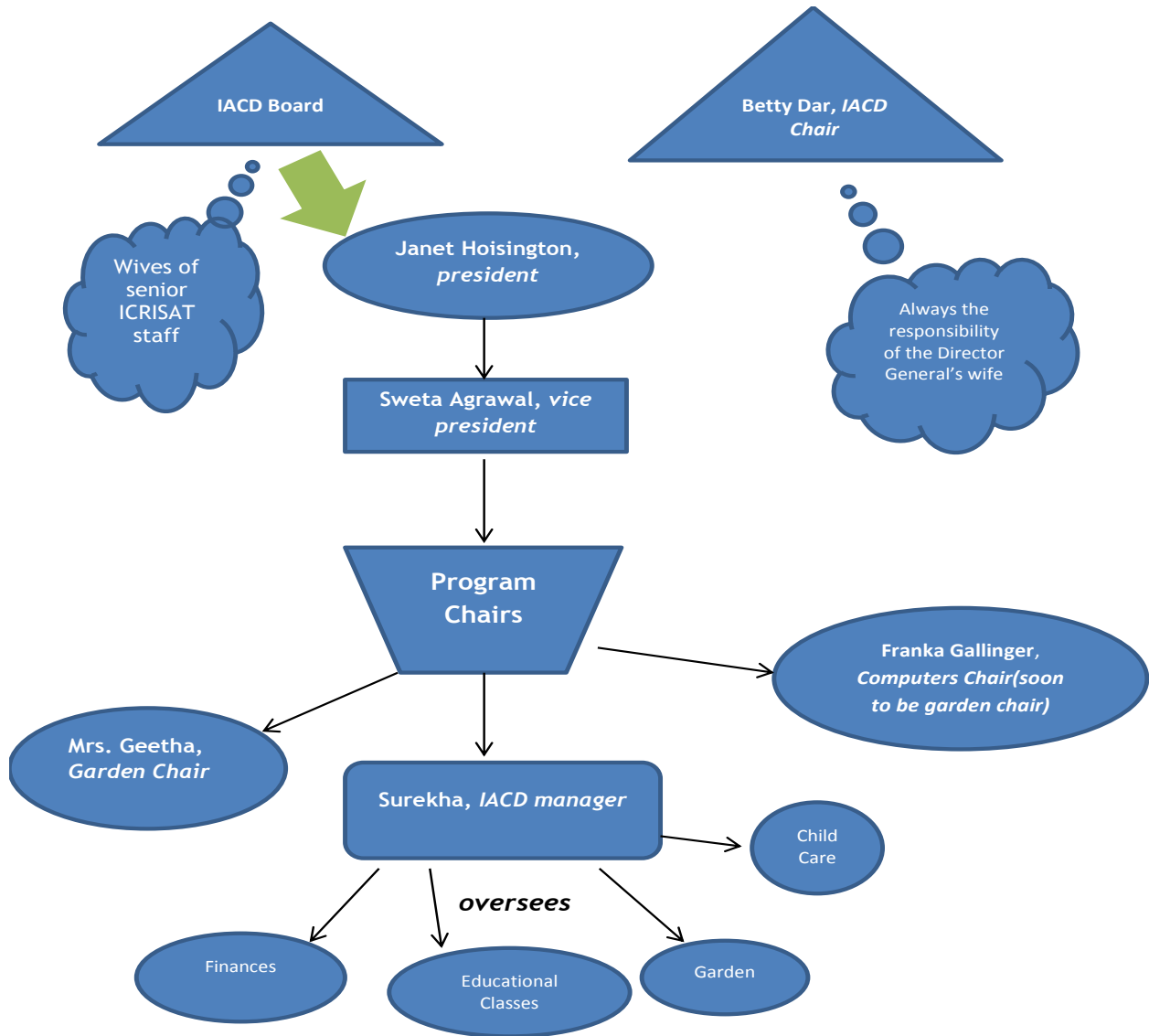


Figure 1

In addition to IACD staff members, I interviewed IACD’s president, Janet Hoisington, vice president, Sweta Agrawal, and garden chair, C Geetha to understand IACD from a management aspect. During the interviews they shared a brief history of IACD, and answered regarding current and potential problems.

Most importantly, they shared IACD's vision: to help more people become self-sufficient and work for their community.

An interview with Surekha showed IACD from staff management point of view. Each day she oversees operations in all of IACD's departments, answers countless phone calls and questions from staff and customers. "It is a challenge for me. I like being able to provide nutritious value [to the customers]," Surekha says. During our interviews, Surekha emphasized the importance of satisfying the customers and community members of IACD. While satisfying the customers remains a necessary aspect of a business, Surekha's initial hesitancy to make changes added additional complication to my research.

During the final weeks of my research, I met with IACD's future garden chair, Franka Gallinger to discuss my research. During our interviews, I addressed issues of inefficiency and proposed possible options for IACD's future vegetable garden. Some of the key issues we discussed include transitioning from an organic to semi-organic vegetable garden, increasing vegetable prices and revising IACD's free-delivery service to create more efficiency within the organization.

Personal interviews with IACD's board members, operational manager and gardeners allowed me to collect information from a range of sources. Their concerns and hopes for IACD's vegetable garden directed my research to optimize their effectiveness.

Data Collection

After understanding the foundational ideas of IACD, collecting and analyzing data of IACD's past vegetable sales proved necessary. Thus began the tedious process of collecting and recording IACD's vegetable sales in over fifty receipt books written in Telugu, the local language. Vegetable sales were taken from two months of each peak season in a six-month time period from 2011 to 2012. Digitizing IACD's vegetable sales with Microsoft Excel provided logical way to organize the data. With a visual representation of IACD's sales, trends in sales became clearer, allowing an accurate interpretation of data. Certain formulas such as total and average provided additional data to plan for future recommendations. Based on the popular quantities and variety of vegetables, I formatted the data into charts and graphs advised as to which vegetables produce the greatest satisfaction from customers with highest benefit to IACD. It is important to create a balance between good pricing quality and efficiency. Certain vegetables may require more labor but reduce profits. On the other hand, other vegetables may receive both high sales and profits.



Discussing my research findings with IACD garden chair, Franka Galainger and president, Janet Hoisington.

Surveys

Developing the survey questions

While the vegetable receipts proved useful, I needed to understand the customers' perspective, too. In order to do so, I conducted a short, seven question survey distributed to IACD top twenty five customers. The survey was designed to answer two general questions: why do you purchase from IACD, and what do you want from IACD. Questions ranged from reasoning behind past purchases to suggestions of future improvement. Questions or statements were arranged in various formats depending on the topic. Several statements entailed a "choose one" response in which customers circle *strongly disagree*, *disagree*, *not sure*, *agree* or *strongly agree*. These options provide more consistency and clarity among each customer response. Many of these questions pertained to improving the efficiency IACD's vegetable delivery service. If customers show interest in paying a delivery charge or picking up their vegetables, IACD will be able to use their time and resources more efficiently. An open response question asked of additional vegetables IACD could provide, allowing customers to share their thoughts. To understand IACD's market competition, the final question asks where else customers purchase their vegetables; such information provides IACD with future competition for IACD markets. With an insight from the customers, I will be able to better understand how to advise IACD on ways to improve their customer service in addition to efficiency.



During a two week time period, I recorded and analyzed data from over 50 of IACD's record books.

Current Buyers

To understand the customer's perspective, I developed brief, seven-question survey about the vegetable garden. All of the customers are employed by ICRISAT. Regular customers represent a wide range of occupations. Some have "desk jobs", working as senior staff in laboratories or offices while others work as skilled laborers for ICRISAT's Farm Engineering and Transport Services (FETS).

Each question was developed to address fundamental issues in vegetable selection, production and distribution. Customer response to these questions allows an adequate basis for further research and recommendation. Do customers want a larger variety of vegetables? Are they willing to pay a delivery charge for hand-delivered vegetables? Results from this survey provide a foundation for further study. With Surekha's assistance, I was able to call and conduct personal interviews with twenty three of IACD's top vegetable customers. Hearing their provided an opportunity to compare my opinions and research with the typical customer viewpoint. Results from the survey were recorded in an Excel document and graphed to provide a visual representation of customer feedback. Many customers freely offered useful suggestions to improve the functioning of IACD. When asked they purchase vegetables from IACD one person replied, "I want to support our IACD people. While his intentions may prove honorable, it leads to further inquiry: do people purchase vegetables solely to support a small non-profit organization on campus? Is IACD viewed as a charity case? While IACD is a non for profit organization, they still need to operate as a business. From a business standpoint, IACD requires more organization to increase their assets and investments and produce a consistent supply of vegetables. Upon further observation of the data, it appears that most customers support IACD for their personal benefits.

Potential Buyers

IACD provides an irregular supply of vegetables to 130 ICRISAT campus employees. While this number may seem large, most purchases remain small and infrequent. Currently ICRISAT employs 650 people. If 130 of these people are current customers, IACD could have 520 more customers. I comprised another survey for potential customers who live outside of the ICRISAT campus. In order to partake in the survey, each respondent must work on the ICRISAT campus live outside of the campus and have never purchased any vegetables from IACD. Regardless of whether potential customers buy from IACD, comprehending their reasoning for avoiding the purchasing of IACD vegetables proves vital. Their honest feedback provides helpful feedback to improve IACD's functioning and appeal to additional buyers.

Results & Discussion

Current Production

To intelligently understand a general breakdown of IACD's vegetable sales, proper documentation of their past records proves essential. By going through and digitizing their past receipts, I analyzed past vegetable records for two months for each of the three seasons: summer, monsoon, winter. While it was not possible to analyze all of the data within the 2011-2012 seasons, selecting two-month periods of each peak season presents an adequate depiction of IACD's total vegetable sales.

As shown in *Figure 1*, vegetable sales vary from season to season. Spinach, for example, receives continuous sales, but the season peak comes during the winter season December and January. A vegetable's optimum time of growth occurs during its peak season in which it produces greater and better quality yields (Stradley, 2010). With greater yields, and better quality vegetables, consumer interest and demand for the vegetables increases. In addition, greater vegetable yields may reduce the vegetable's price, making vegetables more affordable and accessible to many.

Some vegetable such as basella, drumstick and lettuce received few sales within each season and throughout the year. Several potential factors contribute to IACD's low vegetables sales. For starters, IACD gardeners regularly miss the planting dates, causing them to fall behind in their harvesting times and overall quantities. In addition, IACD's substantial organic practices prevent consistent yields, henceforth diminishing their chances for adequate vegetable sales. Inconsistent vegetable supply at low yields detracts from much of the consumer interest.

After going through over fifty receipt books to record vegetable sales, I used the sale data to find the most popular vegetables per month. Spinach sales topped the charts with the highest value of vegetable sales for the winter (*Figure 4b*) and summer (*Figure 4c*) seasons. Following spinach sales were high sales in brinjal, coriander and mint. Around half of the available vegetables received at least 1000 rupees in sales. Vegetables like cabbage, snake gourd and tomatoes received much less than 1000 rupees and had consistent fairly consistent, low sales. Drumstick, Indian beans and lettuce received the lowest sales with annual sales below 140 rupees.

To compare IACD's vegetable sales by type and season, a consistent reference point is necessary. The following graphs measure IACD's sales based on two factors: total return (in rupees), the average number of sales per vegetable and the average total number of sales per vegetable. For a general reference point, we can look at vegetable sales of 500 rupees and above for each of the two-month duration of each season. While

these graphs indicate the popularity of certain vegetables by season, it is important to remember additional contributing factors of IACD's vegetable popularity. Vegetables with no sales during certain seasons may indicate that IACD gardeners did not plant certain vegetables in that season. With this in mind, popular IACD vegetables represent a clear indicator of past customer's vegetable interest.

Figure 1a, 1b, and 1c graphs measure IACD's total vegetable income per vegetable during each season. *Figure 3a, 3b, and 3c* indicate the average rupee amount spent per vegetable during each peak season. All *Figure 1* and *Figure 3* sales are measured in rupees. *Figure 4* shows the total number of sales per vegetable within each peak season. Sales in *Figure 4* are shown from a strictly quantitative basis. As shown by the charts below, IACD sells many inexpensive vegetables in small quantities while their high value vegetables receive fewer sales in most cases.

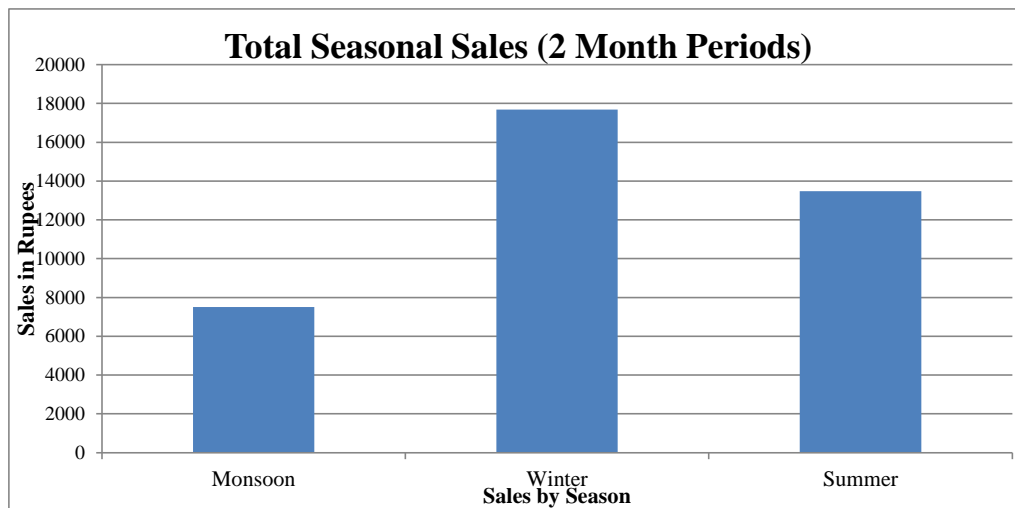


Figure 2:

As shown in *Figure 1*, IACD sells its largest vegetable quantities during the winter season. In fact, their sales during the winter season sales more than double sales during the monsoon season. IACD produces fewer vegetables during the monsoon season due to a rise in pests and crop destruction. In addition to pests, large amounts of rain at high temperatures allow weeds to grow at expedient rates, making weeding and maintenance of the garden exceedingly difficult. Such issues are less problematic during the winter season. Low temperatures and minimal precipitation during winter allow vegetable production to flourish for many vegetable variations. Drastically high temperatures through summer specifically appeal to vegetables which require less water and high levels of sunlight (Bradtke). Such vegetables remain fewer in number, however, they receive relatively high yields.

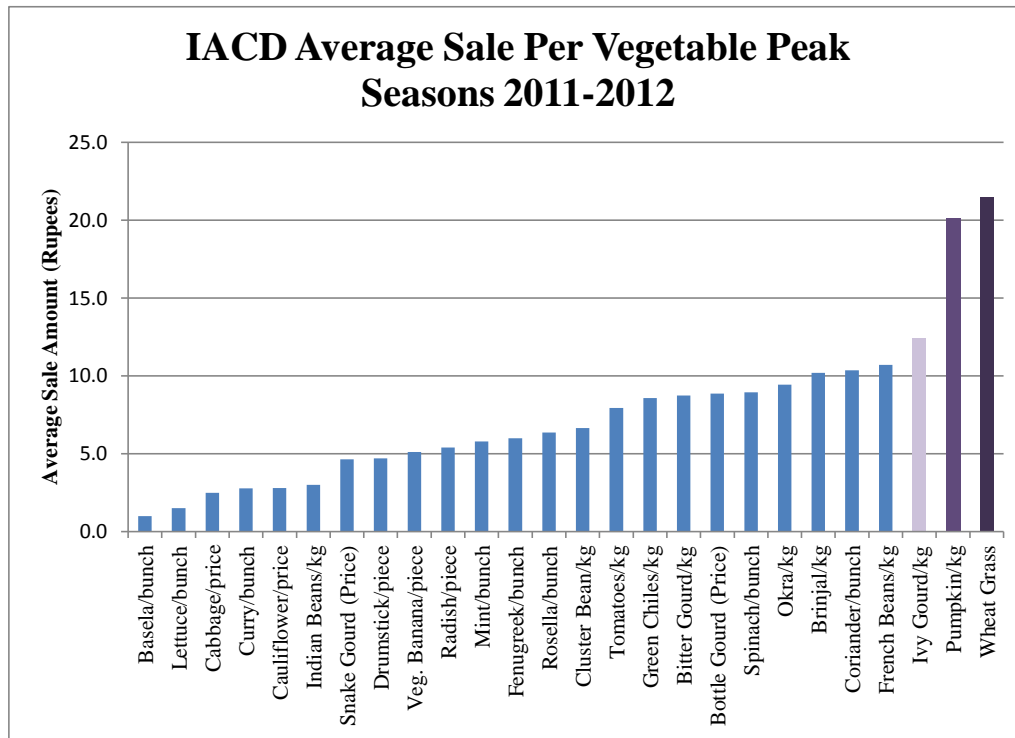


Figure 3a:

Figure 3a shows IACD's average sale per vegetable, or highest value crops, during two months of each peak seasons. The three top vegetables, ivy gourd, pumpkin and wheat grass, shown in shades of purple, represent IACD's highest average value per vegetable purchase. These vegetables provide IACD with the greatest profit. According to *Figure 3a*, most of IACD's average individual vegetable sales remain below ten rupees.

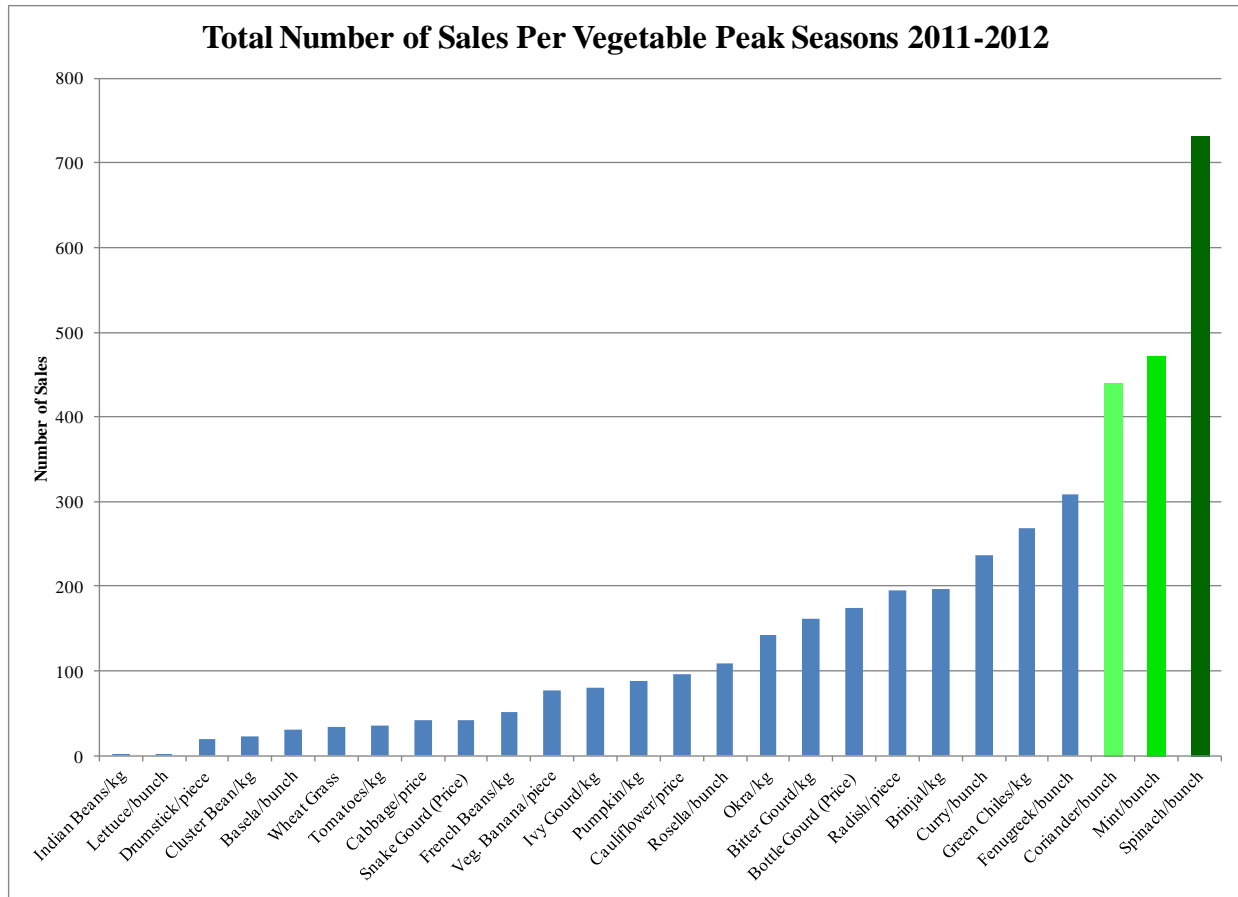


Figure 3b:

While *Figure 3a* highlights high value vegetable sales, *Figure 3b* shows high volume vegetable sales. The highest average quantity vegetable sales are shown in order with the top three vegetables shown in shades of green. As shown by the data, IACD’s highest average volume vegetable sales are spinach, mint and coriander—all of which are green leafy vegetables. When comparing *Figures 3a & 3b*, data shows the majority of IACD’s sale volume and value to remain very low. Most of IACD’s vegetable sales come from frequent, small orders of inexpensive vegetables.

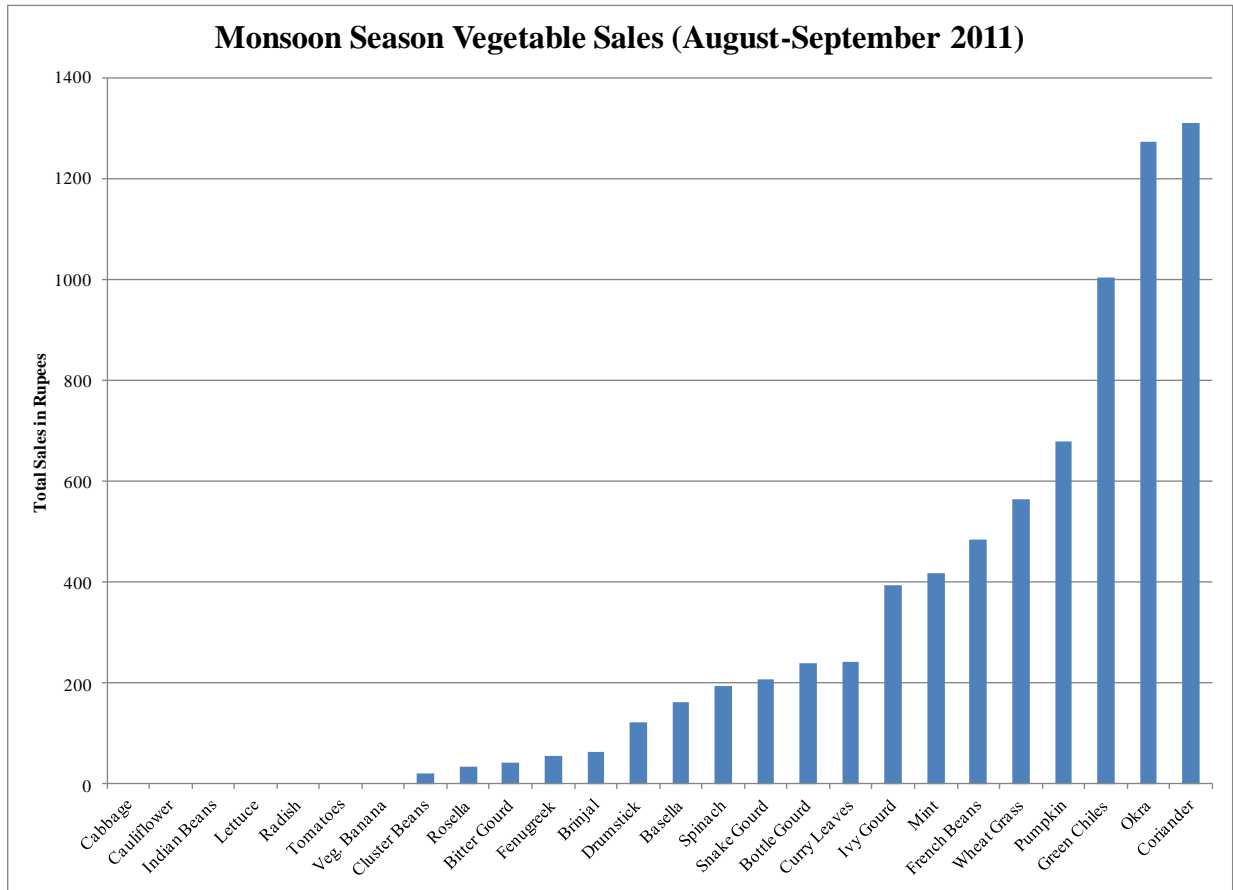


Figure 4a:

During the monsoon season, sales in coriander, french beans, green chiles, okra, pumpkin and wheat grass received total sales of 500 rupees or greater during this two month period. Other sales remained fairly low with over half below 300 rupees.

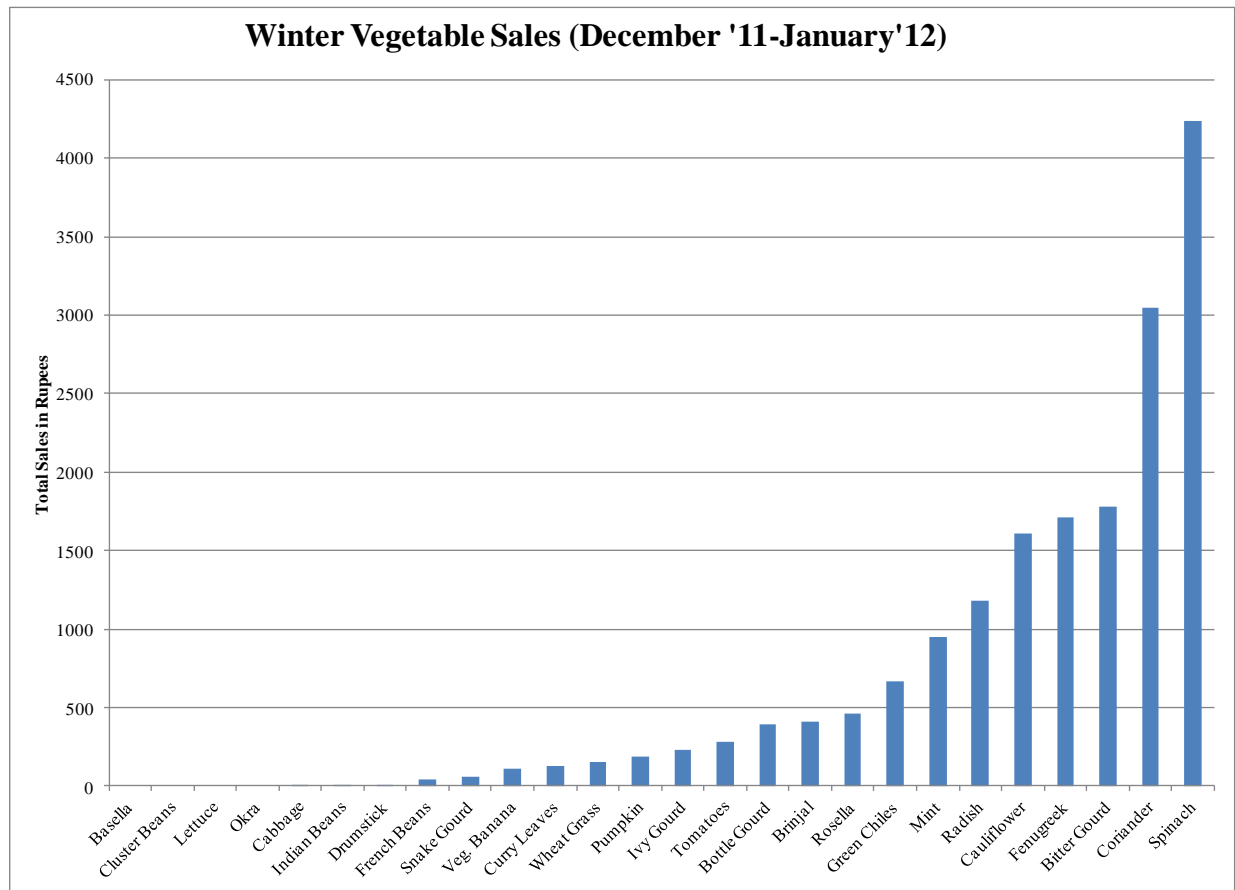
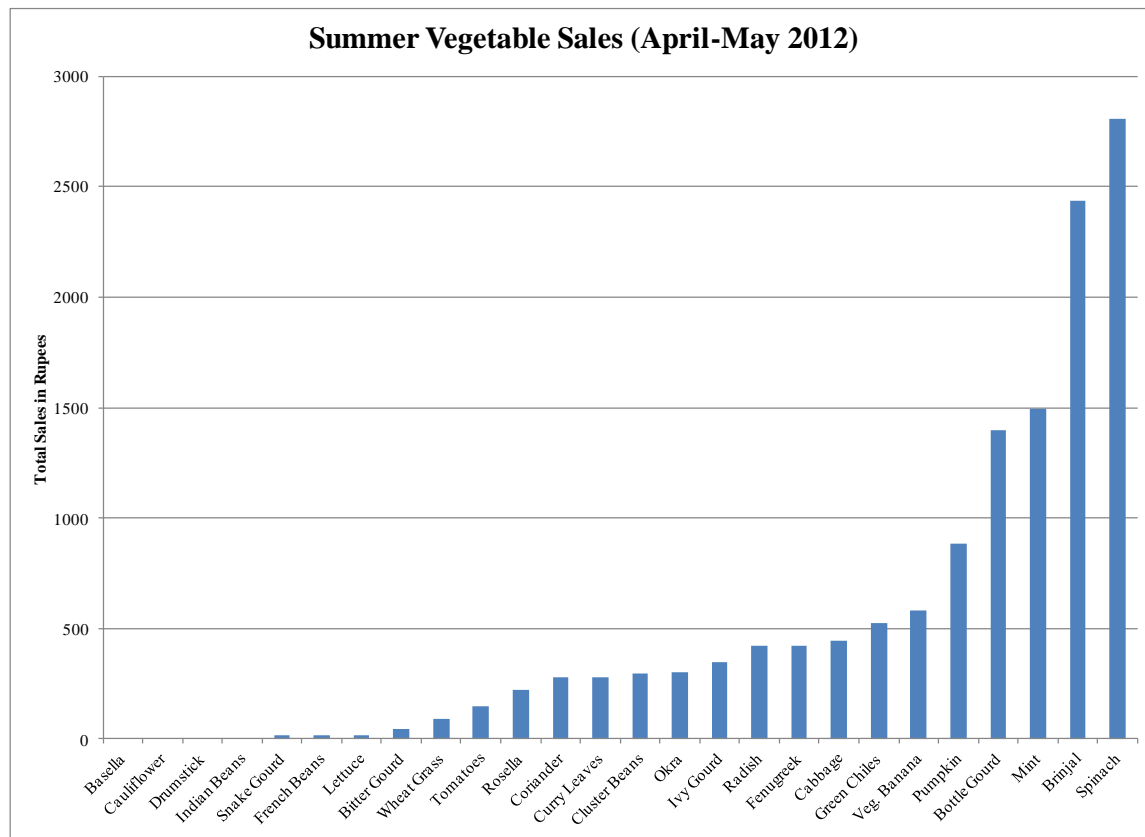


Figure 4b:

Like most of the local markets, IACD's sales in spinach, coriander, bitter gourd, fenugreek, cauliflower, radish, mint, and green chiles receive the greatest amount of sales. Vegetables such as basella, cluster beans, lettuce, indian beans and drumstick were not produced during this season.



Figure

4c:

Through the summer season, IACD received the majority of their income from sales in spinach, brinjal, mint, bottle gourd, pumpkin, vegetable banana and green chiles.

Surveys

Understanding the Customer Perspective

In order to understand IACD's vegetable garden from a range of perspectives, I designed two brief surveys aimed at IACD's current and potential customers. The survey questions address general aspects of IACD's vegetable garden ranging from delivery to quality. Further development of the survey and analysis of customers' remarks are listed below.

Results

Existing Customers

Potential Customers

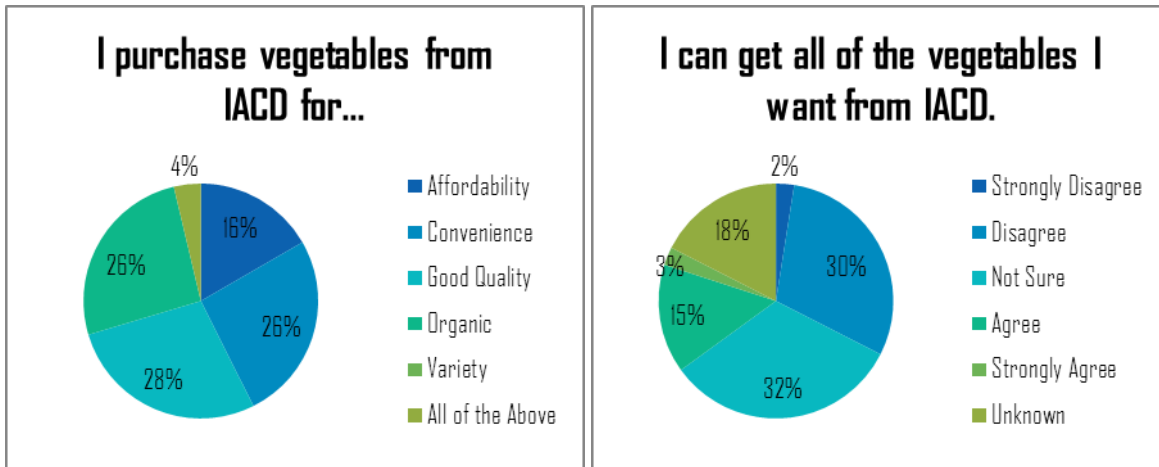


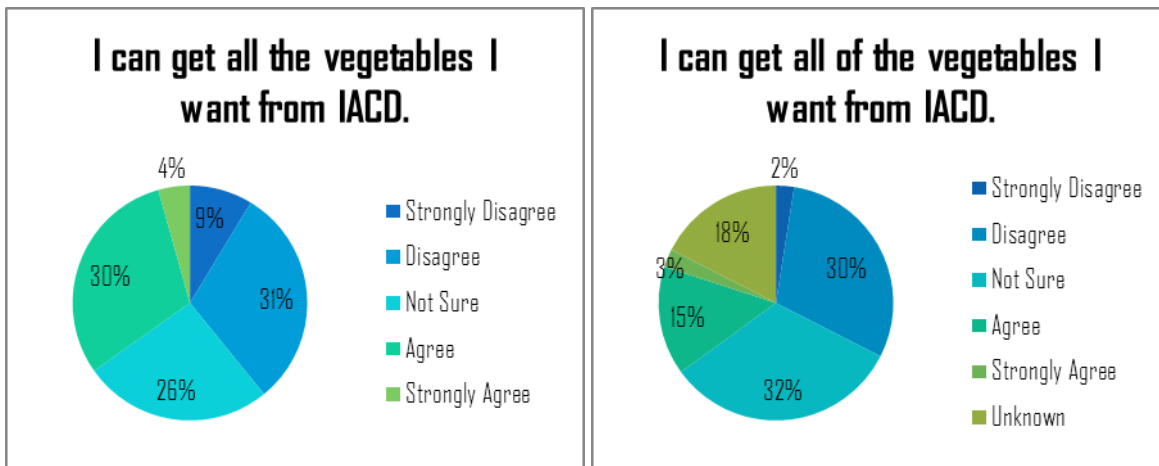
Figure 5a

Figure 5b

As shown in *Figure 5a*, most customers purchase vegetables from IACD for good quality (28%), organic (26%) and convenience (26%). The greatest number of potential customers replied ‘other’ in response to a reason they do not purchase vegetables from IACD. The most common comment for other respondents was lack of awareness and availability of IACD vegetables. Inconvenience followed as the second most popular response with 23% of votes.

Figure 6a (*Existing Customers*)

Figure 6b (*Potential Customers*)



Existing customer responses for *Figure 7a* varied significantly, however, *disagree* remained the most popular response. The majority of IACD’s potential vegetable customers are not sure or disagree with the statement: I can get all of the vegetables I want from IACD. Unknown stands as the third most-common answer for customers who do not know about IACD. Answer choices *unknown* and *not sure* bear close relation to each other.

Figure 7a (Existing)

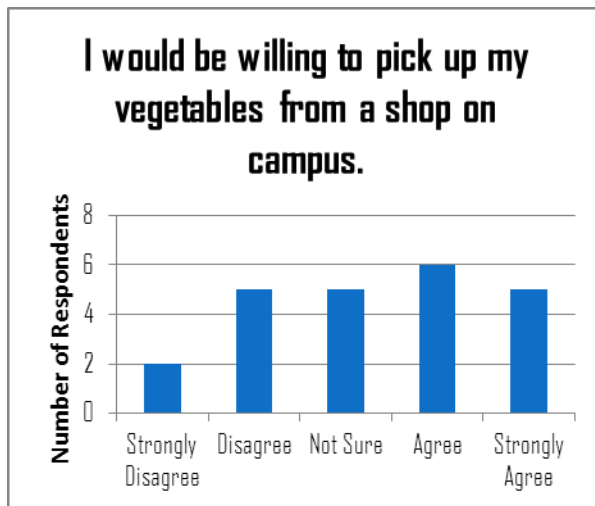
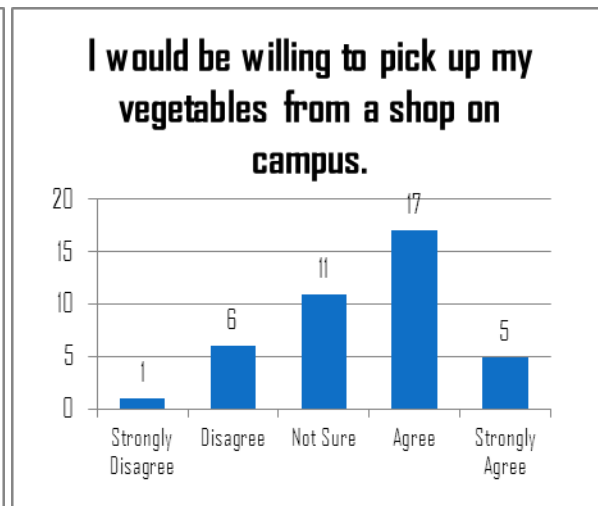


Figure 7b (Potential)



Potential customers seem open to picking up their vegetable from a shop on the ICRISAT campus. Out of forty respondents, twenty-two are willing to pick up their vegetables, compared with seven respondents who disagree with the statement. Eleven of the respondents remain unsure.

Figure 8a (Existing)

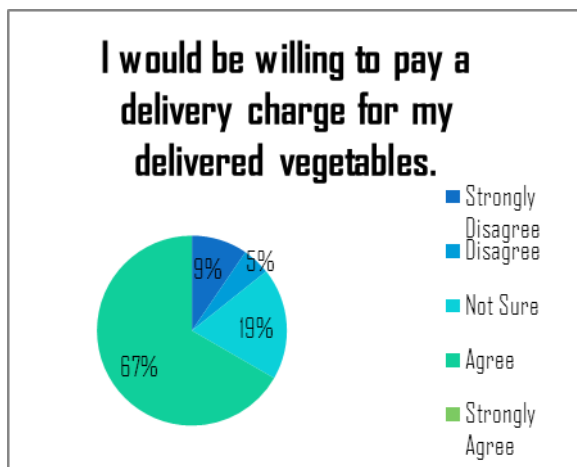
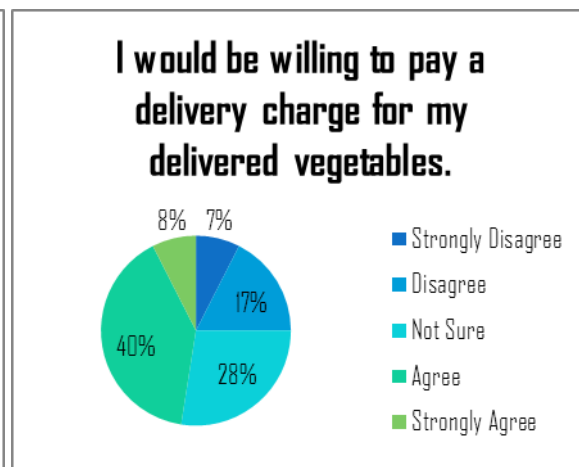


Figure 8b (Potential)



Data for Figure 8a and 8b remain fairly scattered. Agree is the most popular answer followed by the same number of votes in disagree, not sure and strongly agree. Overall, a greater number of customers seem willing to pay a delivery charge for their vegetables. Around half of potential customers would pay a delivery charge for delivered vegetables, while many more are uncertain. Those who responded strongly disagree or disagree to the statement represent the lowest portion of respondents.

Figure 9a (Existing)

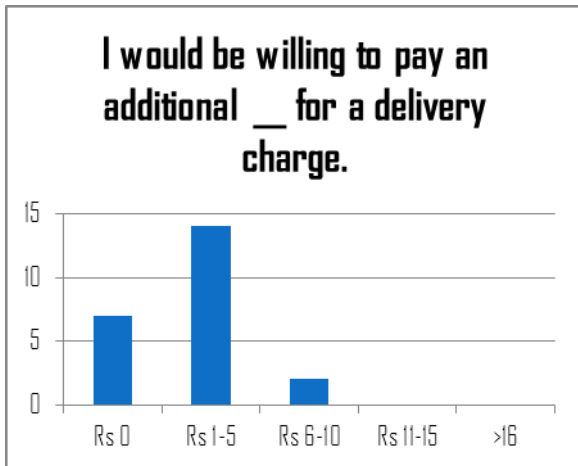
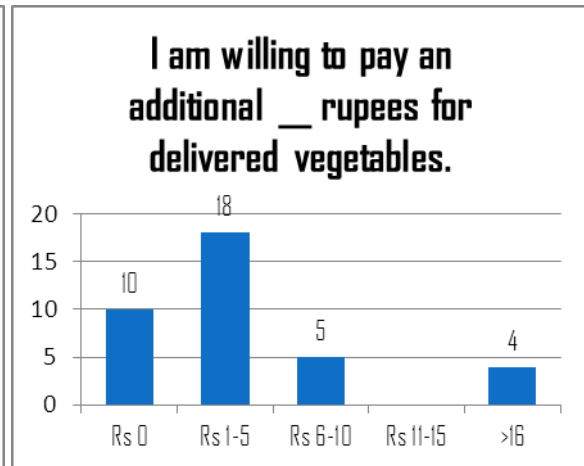


Figure 9b (Potential)



By and large, the greatest numbers of respondents feel a delivery charge within the range of one to five rupees proves reasonable. Those unwilling to pay a delivery charge accounted for the second greatest number of respondents.

Figure 10a (Existing)

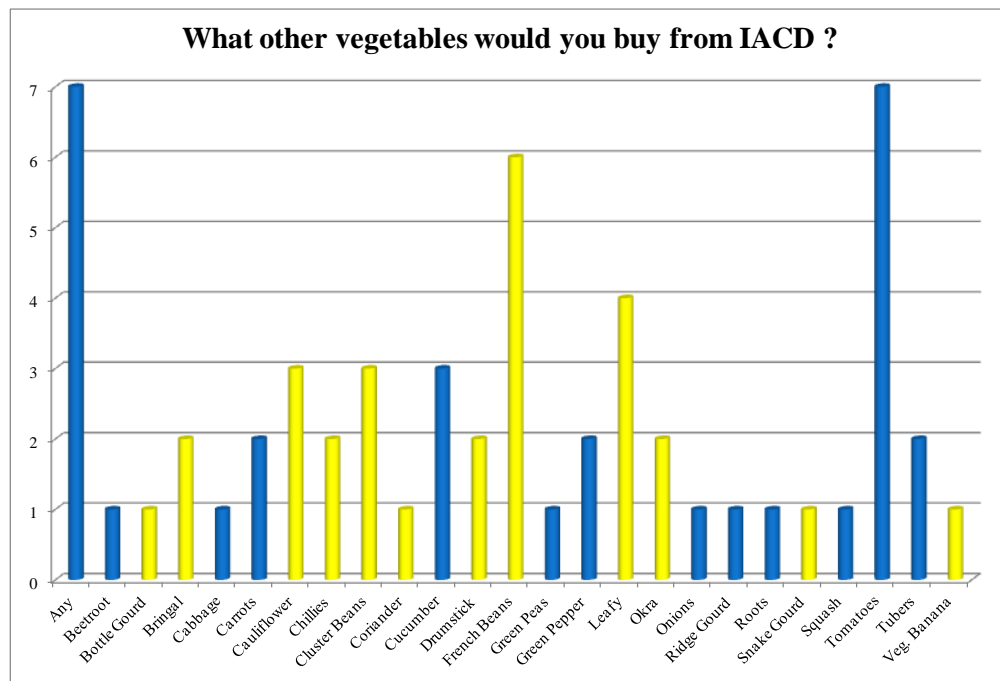
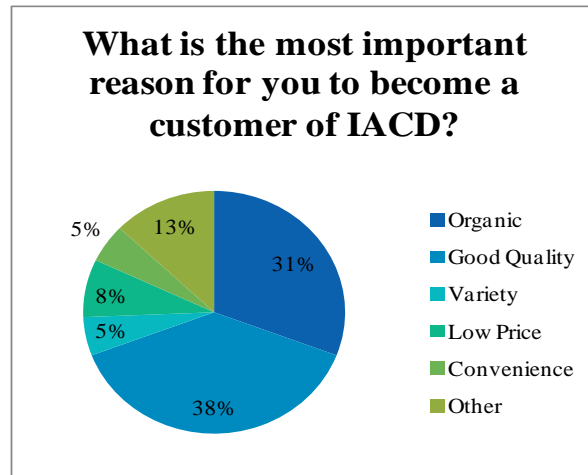


Figure 10b (Potential)



Question 6 asks customers for feedback regarding current and future interests from IACD’s vegetable garden. Survey questions differed for potential and existing customers. Existing customers prefer a larger variety of vegetables such as tomatoes and french beans. Many vegetables suggested by existing customers are grown inconsistently by IACD; these vegetables are highlighted in yellow. *Figure 10b*, potential customers’ top reasons to become customers at IACD are good quality followed by healthy, organic vegetables.

Figure 11a (Existing)

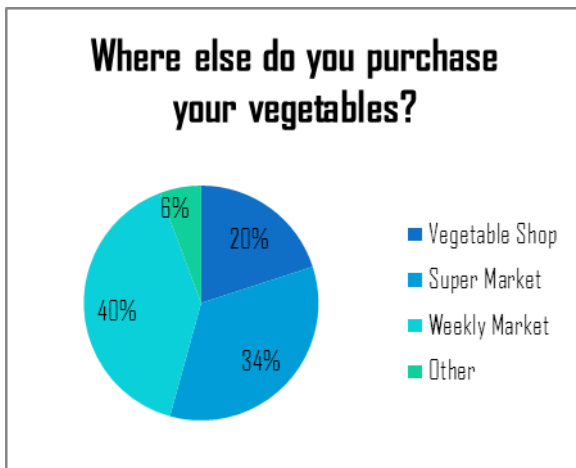
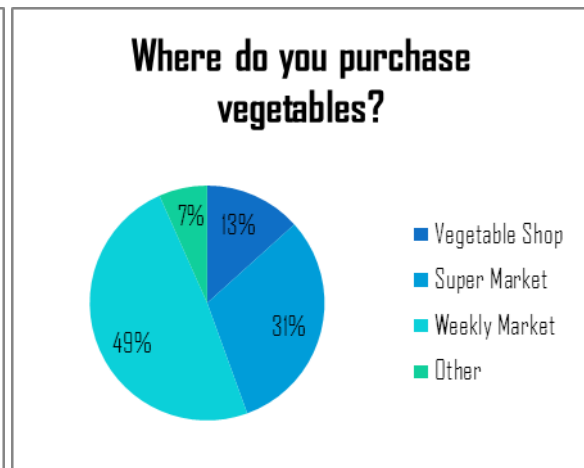


Figure 11b (Potential)



Current IACD customers tend to purchase their vegetables in a variety of places. The two most popular answers were weekly market (40%) and super market (34%). Similar to the results of current customers, the majority of potential customers purchase vegetables from a weekly market (49%) or the super market (31%).

Customer Feedback

IACD customers' feedback proved immensely helpful in analyzing data and comprising recommendations for IACD. In addition to donating their time to taking the survey, many provided honest opinions and helpful suggestions for the future IACD vegetable garden.

Current Customers

As referred to in *Figure 11a*, most customers, both existing and potential, would prefer to buy a larger variety of vegetables from IACD. One existing customer says: "IACD usually sells green leafy vegetables. I wish I could get the tubers, roots and other vegetables like tomatoes, chilies, cauliflower, French beans, cluster beans, green peas and so on." Another customer adds, "It is difficult for IACD to grow all the vegetables. It is better to concentrate on less labor intensive like tomato, potato, brinjal, and cluster beans." This strategy may provide IACD with opportunities to increase their efficiency and productivity.

IACD's regular customers shared various positive aspects to IACD. "Vegetables especially the leafy vegetables are fresh and free of pests" a frequent customer says. Many also suggested that IACD implement a delivery charge relative to the amount of produce each customer purchases.

Potential Customers

Potential customers of IACD generally *remain unaware* of the general or specific knowledge of the IACD vegetable garden. One potential customer states: "Give some happenings. We don't know about IACD's service." Another customer adds, "We are interested in buying, but we are never aware of when they [IACD] are selling or what they have. They sell to a select number of customers and no one else." While others may remain misinformed or disappointed with certain aspects of IACD's vegetable garden saying, "It is difficult to rely on IACD's vegetable source" and "It's [the vegetable supply] very random." All potential expressed the importance of consistency—in vegetable supply, quality and general information. In order to achieve such consistency, many suggested that IACD allow customers the option of picking up their vegetables as opposed to having them delivered—especially if IACD hopes to service more customers.

Discussion of Current and New Buyer results

Results from personal customer interviews and surveys provides key evidence that IACD's customer interest remains very high among many customers. The vast majority of current and potential customers are willing support IACD as they consider new ideas to improve their vegetable garden. Most customers are open to new vegetable delivery methods. In both the current and potential customer surveys, more than half of respondents would consider paying a delivery charge or picking up their vegetables from a local shop.

As expected, most respondents prefer to purchase a wider variety of vegetables from IACD. Some of the most popular suggestions include tomatoes, French beans and other leafy vegetables. Other customers recommend for IACD to take advantage of their optimal growing conditions on the ICRISAT campus by growing less common vegetable varieties such as lettuce and green peas. Such vegetables remain expensive and less common in other vegetable markets. These vegetables would readily appeal to international staff, and ensure consistent, reliable customer support.

The majority of current and potential customers remain willing to pay delivery charges on their delivered vegetables. While several customers may refuse to pay a delivery charge, many preferred to pick up their

vegetables at a central location. Both of these delivery options would allow IACD to reduce delivery costs and increase efficiency of the vegetable garden.

As previously shown *Figures 5a & 11a*, most of IACD's current and potential customers desire more varieties from the IACD garden. Vegetables that require less maintenance such as tomatoes, brinjal and cluster bean would provide consumers with a diverse range of vegetables and reduce IACD gardeners' harvesting time. In general, new customers and existing customers shared similar concerns and opinions regarding the IACD vegetable garden.

Conclusions and Recommendations

As IACD looks for further methods of improving their vegetable their garden these provide appear to be supported by this research data.

Option 1: Increase the price of the vegetables

Currently IACD sells their vegetables slightly below the market rate. Take spinach for example; IACD sells spinach for 1 rupee per bundle while current markets sell spinach at 1.25 rupees per bundle. IACD also grows 95 percent of their crops without pesticides and offers direct delivery ICRISAT customers' work place for free. If IACD wants to increase their production and reach more customers, increasing the price remains an important option.

Option 2: Strategically plan vegetable production

Currently IACD gardeners plant vegetables based on prior gardening knowledge, management recommendations and vegetable season. Due to management recommendations they plant 26 varieties of vegetables on small plots of land. Vegetables are grown inconsistently in small quantities, rarely satisfying the consumer demand. Among the IACD's many small vegetable orders, most are placed through the telephone and hand delivered on the same day.

While both potential and existing IACD customers prefer more variety among IACD vegetables, adding new varieties of vegetables requires additional work and training for the gardeners. However, if IACD focused on growing a small variety of seasonal vegetables, gardeners would spend less time and effort on growing each vegetable variety. This additional time could be used to increase production of a smaller group of vegetables.

Along with strategizing methods to increase IACD's production and efficiency, IACD should seek out advice from ICRISAT soil and vegetable scientists to allow the vegetables optimum growing conditions.

Option 3: Add a Delivery Charge

IACD hires one full-time, Bala Reddy, and two part-time gardeners, Lakshmi and Malesh, to plant, water, harvest, package and deliver vegetables to their customers. Lakshmi and Bala Reddy devote their mornings to planting and harvesting vegetables and in the afternoon, all three gardeners package and deliver the vegetables. This means that roughly half of their time is spent delivering vegetables for free! If IACD implemented a delivery charge for each customer's vegetables, they would earn more resources for their organization. Additional resources will allow IACD to save more assets to expand and improve their organization.

Option 4: Allow Customers to Pick Up their Vegetables

For those unwilling to pay a delivery fee, purchasing their vegetables at a campus shop is another option. Although IACD would not charge a delivery fee, time remains a valuable asset. If a nearby shop held vegetables for customers, time spent delivering vegetables would be minimized. As time is money, saving on delivery time allows more time for the gardeners to tend the garden, henceforth creating another possible opportunity for expansion of vegetable production.

Option 5: Either Or—Simply a Combination of Options 2 & 3

Considering customers varying opinions, providing both option two and three allows customers to choose the method most convenient for them. While both options are not quite as nice as a free, expedient and convenient vegetable delivery, IACD can continue to provide comparable service for only a small fee or less convenience.

Option 6: Transition from mostly organic to semi-organic

While IACD's mission to produce safe, organic vegetables proves noteworthy, their honorable efforts fail to prevent pests from feasting on their vegetable supply. Without proper equipment or gardener training, producing a consistent supply of vegetables proves unfeasible. As shown in *Figure 2*, the magnitude of pest damage varies depending on the season; pests prefer the cool, wet, temperatures of monsoon season to the dry, heat of summer.

If IACD transitioned from mostly organic to semi-organic, they would use, safe pesticides with minimal spraying during the early blooming stages of each vegetable. IACD would continue to produce safe vegetables for their customers, however, minimal pesticide use would allow for higher and more consistent yields. Currently AVRDC utilizes this procedure to optimize safe and healthy plant growth. Their vegetables have shown continuous growth with fewer weeds.



Brinjal is one of many vegetables affected by the high rain levels of monsoon season.

Suggestion: Strategically plant vegetables during the market's pricey seasons

Unlike the most farmers, IACD gardeners have access to ICRISAT's irrigation water. If IACD increased their production during the summer season, when market vegetables are expensive, they could significantly increase their sales.



IACD Gardeners use this balance scale to weigh their produce.

Further Questions Raised

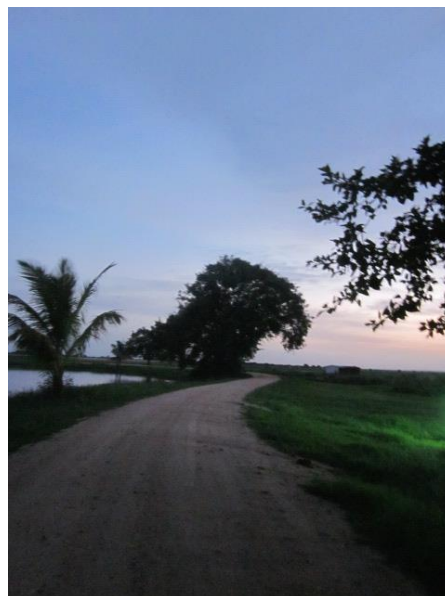
During my research I encountered several questions regarding IACD's organizational and staff situation. If desired, further inquiry upon digital record-keeping and upgrading to a digital balance scale could allow for a more effective, efficient garden business. As IACD continues to make changes in the gardening program, hiring another part-time or full-time gardener might be worth the consideration.

Final Thoughts

Upon my arrival in India, I experienced the rich, diverse culture first hand. Temples and sanctuaries for all religions line the streets; five-star hotels reside next to sectors of shacks; the millionaires walk alongside the homeless. As I observed cultural differences between India and America, I discovered our distinct similarities. One may not find such apparent class divides along the many American streetsides, however, the class divides remain present. While Christianity represents the dominant religion, America possesses citizens of all religions and upbringings. After a few weeks, I began to forget such differences and ultimately realized that we are one. Regardless of upbringing, ethnicity, or cultural background, we all learn, grow and love.



Over the course of this two month Borlaug-Ruan Internship, I learned about agriculture, food science and people in general. Staff members and interns at AVRDC, IACD and ICRISAT, challenged my thinking and believed in my ability. Their wisdom and encouragement allowed me to grow into the person I wish to become: one who accepts challenges, re-evaluates ideas and beliefs, accepts others and loves unconditionally. While, I am uncertain of my future profession, I know that I must interact with and help people. As Mother Theresa said, "If you can't feed a hundred people, then just feed one". With this mentality limitations become limitless and anything proves possible.



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Appendix

IACD Current Customer Survey

1. I purchase vegetables from IACD for (circle all that apply)

- Affordability
- Convenience
- Good Quality
- Organic
- Variety
- All of the Above
- Other (please elaborate):

2. I can get all of the vegetables I want from IACD.

Strongly Disagree Disagree Not Sure Agree Strongly Agree

3. I would be willing to pick up my vegetables from a shop on campus.

Strongly Disagree Disagree Not Sure Agree Strongly Agree

4. I would be willing to pay a delivery charge for my delivered vegetables.

Strongly Disagree Disagree Not Sure Agree Strongly Agree

5. I am willing to pay an additional ___ rupees for delivered vegetables (circle one).

0 1-5 6-10 11-15 >16

6. What other vegetables would you buy from IACD if you could?

7. Where else do you purchase vegetables (circle all that apply)?

Vegetable Shop Super Market Weekly Market Other

Potential Customer Survey

1. I do not purchase vegetables from IACD because of (circle all that apply)

Expense
Inconvenience
Poor Quality
Less Variety
All of the Above
Other (please elaborate):
What is IACD?

2. I can get all of the vegetables I want from IACD.

Strongly Disagree Disagree Not Sure Agree Strongly Agree Unknown

3. I would be willing to pick up my vegetables from a shop on campus.

Strongly Disagree Disagree Not Sure Agree Strongly Agree

4. I would be willing to pay a delivery charge for my delivered vegetables.

Strongly Disagree Disagree Not Sure Agree Strongly Agree

5. I am willing to pay an additional ___ rupees for delivered vegetables (circle one).

0 1-5 6-10 11-15 >16

6. What is the most important reason for you to become a customer of IACD? Choose one.

Organic Good Quality Variety Low Price Other:

7. Where do you purchase vegetables? Circle all that apply.

Vegetable Shop Super Market Weekly Market Other