





This is to certify that the

thesis entitled

CONSUMER MARKET RESEARCH ON MICHIGAN  
APPLES: CONSUMER PREFERENCES FROM  
VISUAL TESTS, TASTE TESTS, AND FOCUS  
GROUP DISCUSSIONS. presented by

Andrea C. Jeffers

has been accepted towards fulfillment  
of the requirements for

MS degree in Agricultural Economics

Major professor

Date May 19, 1998

**LIBRARY**  
**Michigan State**  
**University**

**PLACE IN RETURN BOX**  
 to remove this checkout from your record.  
**TO AVOID FINES** return on or before date due.

DATE DUE	DATE DUE	DATE DUE
<del>AUG 25 2002</del>		
<del>12 1 4 0 4</del> JAN 10 2005		
MAY 20 2008		

**CONSUMER MARKET RESEARCH ON MICHIGAN APPLES: CONSUMER  
PREFERENCES FROM VISUAL TESTS, TASTE TESTS, AND FOCUS GROUP  
DISCUSSIONS**

**By**

**Andrea Christine Jeffers**

**A THESIS**

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

**MASTER OF SCIENCE**

**Department of Agricultural Economics**

**1998**



## **ABSTRACT**

### **CONSUMER MARKET RESEARCH ON MICHIGAN APPLES: CONSUMER PREFERENCES FROM VISUAL TESTS, TASTE TESTS, AND FOCUS GROUP DISCUSSIONS**

By

Andrea Christine Jeffers

Research conducted at Michigan State University on consumer preferences for fresh apples (Ricks et al. 1995, Beggs 1996) indicates that attributes of crispness, color, and size of apples are important to consumers. A consumer market research project was conducted to build upon these findings and provide more detailed consumer information to the Michigan apple industry.

Visual tests, taste tests, and focus group discussions were conducted to investigate specific consumer preferences and purchase intentions for the attributes of apple crispness, color and size. The findings regarding these preferences were very similar to the findings of the earlier telephone survey (Beggs 1996).

For specific levels of crispness, consumers showed little difference in preference for medium vs. high pressure apples. For color, although there was little difference in purchase intention at higher percentages of color, at lower percentages it decreased significantly. Although size is of lesser importance to consumers, consumer participants indicated a preference for “large” to “medium” sized apples.

**To my family and Chris for their support and love when I thought I couldn't finish.**

## **ACKNOWLEDGMENTS**

Most importantly, I would like to thank Dr. Ricks for his support and encouragement throughout my degree program and especially during the research and writing process. In addition, I would like to thank Dr. Kirk Heinze for his support and help in the research design and direction of this project. Thanks also to Dr. Chris Peterson and Dr. Tom Pierson for their patience and interest in my work and academic endeavors. Many thanks to Dr. Randy Beaudry for post-harvest advice and storage space for my apples. Additionally, the completion of this thesis could not have been possible without the support of the Michigan Apple Committee, who provided a majority of the funding for the research project.

Special thanks to Dr. Jack Allen for reminding me that “I have a life,” and keeping me connected. Thanks to Jim and Curtis for navigation and assistance through “apple country.” Without the friendship of Jane, Mimi, George, Lorie, Patricia, Brian, Sonja, Julie, and Anwar, I could not have completed this project. Thanks for being there not only when I was laughing, but most importantly when I was crying. I will miss you.

## **TABLE OF CONTENTS**

<b>LIST OF TABLES</b>	<b>viii</b>
<b>LIST OF FIGURES</b>	<b>ix</b>
<b>Chapter 1: THE MICHIGAN APPLE INDUSTRY: COMPETING FOR MARKET SHARE</b>	<b>1</b>
1.1 Introduction	1
1.2 Purpose and Objectives	2
1.3 Background on the Research Project	3
1.3.1 Expansion of Consumer Research Projects	3
1.3.2 Expansion of Fresh Markets	4
1.3.3 “Production” vs. “Marketing”	4
1.4 Organization of the Thesis	6
<b>Chapter 2: STRATEGIC ANALYSIS OF THE MICHIGAN APPLE INDUSTRY IN RELATION TO CONSUMER MARKET RESEARCH</b>	<b>8</b>
2.1 Introduction	8
2.2 Importance and Organization of Apple Industry Strategic Planning	9
2.3 Strategic Analysis of the Michigan Apple Industry	11
2.4 Internal Elements of the Michigan Apple Industry	12
2.4.1 The Fresh Apple Marketing Value Chain	12
2.4.2 Production and Fresh Sales Trends of the Michigan Apple Industry	15
2.4.3 Varieties	18
2.4.4 Technological and Management Processes	18
2.4.5 Marketing Utilization of Michigan Apples	20
2.5 External Elements of the Michigan Apple Industry	22
2.5.1 Competitive Pressure	22
2.5.2 Consumer Preferences for Fresh Produce	32
2.5.3 Research Findings: Consumer Preferences for Fresh Apples	34
2.5.3.a A Study at the University of New Hampshire	35
2.5.3.b A Study at the University of Connecticut	35
2.5.3.c A Study at California Polytechnic State University	35
2.5.3.d A Study at the University of Maine	36
2.5.3.e A Study at Washington State University	37
2.5.3.f Previous Studies at Michigan State University	38
2.5.4 Synopsis of Research Findings	39
2.5.5 Trade Buyer Preferences for Fresh Apples	41
2.5.6 Governmental Actions and Policies Affecting the Fresh Apple Industry	43

2.6 Conclusion	44
<b>Chapter 3: RESEARCH METHODOLOGIES</b>	<b>45</b>
3.1 Introduction	45
3.2 Planning and Evolution of the Research Project	46
3.2.1 Initial Discussions with the Michigan Apple Committee (MAC) Staff	46
3.2.2 Development of the Research Project Plan Along with Industry Input	47
3.2.3 Use of a Market Research Firm for Certain Phases of the Project	48
3.2.4 Collaboration with Post-Harvest Research Expert	48
3.2.5 Procuring the Apples for the Research Sessions	48
3.2.6 Transportation of Apples to the Research Site	49
3.3 Methodologies Used in Previous Apple Research	50
3.4 The Research Question	52
3.5 Research Setting	52
3.6 Research Methodologies: Taste Tests, Visual Tests, and Focus Group Discussions	53
3.7 Advantages of Research Methodologies Used in this Project	57
3.8 Limitations of Research Methodologies Used in this Project	58
<b>Chapter 4: RELATIVE IMPORTANCE TO CONSUMERS OF APPLE CRISPNESS, COLOR, AND SIZE</b>	<b>59</b>
4.1 Introduction	59
4.2 Importance of Crispness	61
4.3 Importance of Color	61
4.4 Importance of Size	62
4.5 Importance of Separating “Pre-Purchase” and “Post-Purchase” Attributes	62
4.6 Summary	63
<b>Chapter 5: CRISPNESS PREFERENCES BASED ON TASTE TESTS</b>	<b>64</b>
5.1 Introduction	64
5.2 Crispness Preferences for Red Delicious	65
5.3 Crispness Preferences for Empire	68
5.4 Comparison of Empire and Red Delicious Regarding Crispness	71
<b>Chapter 6: COLOR PREFERENCES BASED ON VISUAL TESTS</b>	<b>72</b>
6.1 Introduction	72
6.2 Color Preferences for Red Delicious	73
6.3 Color Preferences for Empire	76

<b>Chapter 7: SIZE PREFERENCES BASED ON VISUAL TESTS</b>	<b>80</b>
7.1 Introduction	80
7.2 Size Perceptions and Preferences for Red Delicious	81
7.3 Size Perceptions and Preferences for Empire	86
7.4 Comparison of Empire and Red Delicious Regarding Size	91
<b>Chapter 8: CONSUMER PREFERENCES FOR BAGGED APPLES BASED ON VISUAL TEST</b>	<b>93</b>
8.1 Introduction	93
8.2 Purchase Intention for Bagged Apples	93
8.3 Focus Group Discussions on Bagged Apples vs. Tray Pack Apples	96
8.4 Overall Appeal of Bagged Apples	98
<b>Chapter 9: HIGHLIGHTS FROM THE FOCUS GROUP DISCUSSIONS</b>	<b>101</b>
9.1 Introduction	101
9.2 The Importance of Crispness to Apple Quality	101
9.3 Influencing Consumers to Buy a New Variety	102
9.4 Apples in the Retail Environment	103
9.5 Information for Consumers About Apples - - Needs and Desires	106
9.6 Variety Preferences	107
9.7 Purchases from Markets and Orchards	108
9.8 Dislikes Regarding Fresh Apples	108
<b>Chapter 10: SUMMARY</b>	<b>111</b>
10.1 Introduction	111
10.2 Review and Implication of Findings	111
10.3 Recommended Methodologies for Future Research	115
10.4 Implications for Future Research Efforts	116
10.5 Areas for Future Research	116
<b>APPENDICES</b>	<b>118</b>
APPENDIX A QUESTIONNAIRE	119
APPENDIX B TASTE TEST AND VISUAL TEST QUESTIONNAIRE	121
APPENDIX C FOCUS GROUP DISCUSSION QUESTIONS	123
<b>LIST OF REFERENCES</b>	<b>126</b>

## **LIST OF TABLES**

<b>Table 1 Important Pre-purchase Attributes</b>	<b>40</b>
<b>Table 2 Important Post-purchase Attributes</b>	<b>40</b>
<b>Table 3 Apples Used for Visual and Taste Tests</b>	<b>55</b>
<b>Table 4 Importance of Apple Characteristics</b>	<b>61</b>
<b>Table 5 Purchase Intentions Related to Crispness of Red Delicious Apples</b>	<b>67</b>
<b>Table 6 Purchase Intentions Related to Crispness of Empire Apples</b>	<b>68</b>
<b>Table 7 Purchase Intention for Color of Red Delicious Apples</b>	<b>73</b>
<b>Table 8 Overall Appeal for Color of Red Delicious Apples</b>	<b>76</b>
<b>Table 9 Purchase Intention for Color of Empire Apples</b>	<b>78</b>
<b>Table 10 Overall Appeal for Color of Empire Apples</b>	<b>79</b>
<b>Table 11 Perceptions for Size of Red Delicious Apples</b>	<b>81</b>
<b>Table 12 Purchase Intention Related to Size of Red Delicious Apples</b>	<b>84</b>
<b>Table 13 Overall Appeal Related to Size of Red Delicious Apples</b>	<b>86</b>
<b>Table 14 Perceptions of Size of Empire Apples</b>	<b>86</b>
<b>Table 15 Purchase Intention Related to Size of Empire Apples</b>	<b>90</b>
<b>Table 16 Overall Appeal Related to Size of Empire Apples</b>	<b>90</b>
<b>Table 17 Perceptions for 100 Size Apples Empire vs. Red Delicious</b>	<b>91</b>
<b>Table 18 Purchase Intention for Bagged Apples vs. Bulk Apples</b>	<b>94</b>
<b>Table 19 Overall Appeal for Bagged Apples vs. Bulk Apples</b>	<b>99</b>

## **LIST OF FIGURES**

<b>Figure 1 Production Concept vs. Marketing Concept</b>	<b>5</b>
<b>Figure 2 Michigan Apple Industry Strategic Planning Task Force</b>	<b>10</b>
<b>Figure 3 Michigan Apple Industry's Internal Environment</b>	<b>13</b>
<b>Figure 4 Organizational Structure of the Fresh Apple Marketing Value Chain</b>	<b>14</b>
<b>Figure 5 Michigan Apple Production 1960 - 1997</b>	<b>16</b>
<b>Figure 6 Michigan Fresh Apple Sales 1970 - 1997</b>	<b>17</b>
<b>Figure 7 Michigan Fresh Apple Sales 1960 - 1997</b>	<b>21</b>
<b>Figure 8 Michigan Apple Industry's External Environment</b>	<b>23</b>
<b>Figure 9 US Apple Production 1960 - 1996</b>	<b>25</b>
<b>Figure 10 Apple Production in Top Four Producing States 1960 - 1996</b>	<b>26</b>
<b>Figure 11 California Apple Production 1970 - 1996</b>	<b>28</b>
<b>Figure 12 New York Apple Production 1960 - 1996</b>	<b>29</b>
<b>Figure 13 Apple Production in MI, CA, and NY 1960 - 1996</b>	<b>30</b>
<b>Figure 14 Fresh Apple Sales in MI, CA, and NY 1970 - 1996</b>	<b>31</b>
<b>Figure 15 Relative Importance of Crispness, Color, and Size</b>	<b>60</b>
<b>Figure 16 Purchase Intention for Crispness of Red Delicious</b>	<b>66</b>
<b>Figure 17 Purchase Intention for Crispness of Empire</b>	<b>69</b>
<b>Figure 18 Purchase Intention for Color of Red Delicious</b>	<b>74</b>
<b>Figure 19 Purchase Intention for Color of Empire</b>	<b>77</b>
<b>Figure 20 Size Perception for Red Delicious</b>	<b>82</b>



<b>Figure 21 Purchase Intention for Size of Red Delicious</b>	<b>83</b>
<b>Figure 22 Size Perception for Empire</b>	<b>87</b>
<b>Figure 23 Purchase Intention for Size of Empire</b>	<b>89</b>

i

i

c

pr

inc

tha

app

## **Chapter 1**

### **THE MICHIGAN APPLE INDUSTRY -- COMPETING FOR MARKET SHARE**

**1.1 Introduction.** Consumer market research is an important element of the strategic planning efforts of the Michigan apple industry. As part of the long-run strategic planning efforts for the industry, the Michigan Apple Industry Strategic Planning Task Force identified the need to compete effectively with the western producing states of Washington and California, and New York state. To this end, the Task Force determined that strategic planning and marketing efforts must center around high performance in meeting changing consumers' needs, preferences, and desires. In partnership with the Michigan apple industry, a series of consumer market research studies conducted by Michigan State University's Department of Agricultural Economics focused on providing information about consumers' needs, preferences, and buying behaviors for fresh apples.

The success of the Michigan apple industry will depend on the ability of the industry to provide products that effectively meet consumers' preferences. Those industry participants that have high performance in meeting customer needs will likely continue to have a superior competitive market position and growing demand for their products. The research project summarized in this thesis provides the Michigan apple industry more detailed, up to date information about consumer preferences. It is intended that such information be used to improve operations at various levels of Michigan's fresh apple marketing system in order to gain strategic advantage in the fresh apple market.

The research project reported in this thesis continues Michigan State University's consumer market research efforts on apples. Primary research emphasis of the project included visual and taste tests of fresh apples in several metropolitan market areas. Additionally, consumer preferences for certain apple attributes, buying behaviors, and attitudes towards merchandising and marketing of apples were analyzed.

The remainder of this chapter discusses the purpose and objectives of this research project, the background of the research project and the initiatives by the apple industry that led to the development of this research project. Finally, the organization of the remaining chapters of the thesis will be outlined.

**1.2 Purpose and Objectives.** The overall objective of this research study is to add to information about consumer preferences and behavior regarding fresh apples. This project is a part of a continuing series of market research studies which are intended to add to the Michigan apple industry's information about consumer preferences for fresh apples. Some specific objectives of this research project are:

1. To identify specific consumer perceptions with regard to three product attributes: fruit condition, fruit color, and fruit size.
2. To determine consumer preferences and purchase intentions for apples based on fruit condition, fruit color, and fruit size.
3. To investigate other attributes of fresh apples that are important to consumers in their buying decisions.

These specific objectives are expected to contribute to the general overall goal of providing useful consumer market research information to the Michigan apple industry.

More specifically, the research summarized in this thesis is intended to add to the consumer market research component of the industry's strategic planning process by providing relevant information to growers, shippers, packers, and researchers. These segments of the industry will hopefully benefit from these on-going research efforts within a broad strategic planning context.

**1.3 Background on the Research Project.** Consumer market research has been given high priority by the Michigan apple industry, including the Michigan Apple Committee and the Michigan Apple Industry Strategic Planning Task Force. The Michigan Apple Industry Strategic Planning Task Force has facilitated development of certain overall strategies and problem solving for the apple industry in Michigan. The group consists of representatives from all parts of the apple marketing chain: growers, shippers, packers, processors, researchers, and organizational and promotional bodies.

This group has outlined several strategic priorities as being vital to an improvement in Michigan's competitive position. These priorities, which are quite relevant to this research project include, an expansion of fresh apple markets, and a strengthening of the industry's focus towards a "marketing orientation" rather than a "production orientation" and an expansion of consumer research efforts. The relevance of these priorities to this project will be further discussed in the next three sections.

**1.3.1 Expansion of Consumer Research Projects.** Detailed, up to date information about consumers' preferences and behavior is a crucial element of the strategic commitment of Michigan to improve competitiveness. By pinpointing the specific attributes of apples that are desired by consumers, consumer market research projects,

1

n

in

de

de

the

13

Ind.

com.

(199.

such as the one reported in this thesis, can help the Michigan apple industry to implement strategic changes and appropriate marketing strategies based on these preferences.

Prior work by Michigan State University in the area of consumer research for fresh apples included a set of focus groups and a telephone survey which investigated consumer preferences for fresh apples in general. Some findings from that research led to the design of the project reported in this thesis.

**1.3.2 Expansion of Fresh Markets.** Because a priority of the Michigan Apple Industry Strategic Planning Task Force is to expand fresh markets, this research specifically focuses on consumer preferences for fresh apples.

High quality fresh apples often return higher prices to growers than prices received for apples sold for the juicing or peeler processing markets. Thus, the fresh market, with its potential for relatively higher returns, deserves priority for consumer market research. It is hoped that consumer research results can help the industry, including growers, packers, and shippers, to improve their performance in providing the desired types and quality of fresh apples. This project has a goal of assisting in determining those consumer desires, and communicating them to the various segments of the apple industry.

**1.3.3 “Production” vs. “Marketing.”** One priority identified by the Michigan Apple Industry Strategic Planning Task Force has been to emphasize the concept and commitment to a “marketing “ approach rather than a “production” approach. Kotler (1994, 16-19) describes a “production” or selling concept as a marketing philosophy

where firms “sell what they make rather than make what the market wants.” A “marketing” concept philosophy “holds that the key to achieving organizational goals consists in determining the needs and wants of the target markets and delivering the desired satisfactions more effectively and efficiently than competitors.” **Figure 1** (an adaptation of Kotler’s model) illustrates how these philosophies differ relative to the apple industry in terms of organizational strategy.

<u>Starting Point</u>	<u>Focus</u>	<u>Means</u>	<u>Ends</u>
<b><i>Production Concept</i></b>			
Orchard	Apple Production	Low cost efficiencies. High yields.	Profit goals through volume. Production and cost efficiencies.
<b><i>Marketing Concept</i></b>			
Consumers Trade customers	Customer preferences	Coordination in supplying customers’ preferences.	Profit goals attained through high performance in marketing and effectively satisfying customers’ preferences.

**Figure 1: Production Concept vs. Marketing Concept**

The findings of this research project, detailed consumer preferences for fresh apples, can provide important information to all participants in the fresh apple marketing chain. In addition, these findings are intended to contribute to continuous improvement in industry performance and acceleration of an emphasis on a marketing orientation rather than a production approach.



S

M

M

M

P

P

i

v

tz

a

si

M

ap

fo

**1.4 Organization of the thesis.** In addition to this chapter, the rest of this thesis is divided into nine chapters. Chapter 2 discusses some broad perspectives on the Michigan apple industry in terms of key industry features and strategic directions. A large portion of chapter 2 is dedicated to an overview of various elements of the internal and external strategic environments of the Michigan apple industry that are of importance to consumer market research. Chapter 2 also contains a review of previous consumer market research relevant to the Michigan apple industry and other market research findings which are related to certain aspects of this project.

Chapter 3 explains the methodology and planning of the project. Planning of the project is described as well as methodologies used to measure consumer preferences and purchase intentions. Chapter 4 includes general overall findings of the research project , including the relative importance of crispness, color, and size to consumers.

Chapters 5, 6, and 7 present summaries of the project's results of the consumer visual and taste tests. Chapter 5 focuses on preferences for crispness as found from the taste tests and focus group discussions. Chapter 6 details consumers' color preferences as found from the visual tests and focus group discussions. Chapter 7 reviews consumers' size preferences as found from the visual tests and focus group discussions.

Chapter 8 reviews results of the visual test and discussion of bagged apples. These results include purchase intention and a comparison of research findings for bagged apples versus tray-pack apples. Chapter 9 reviews important findings from the consumer focus group phase of the project which may have strategic implications for the Michigan

apple industry. The final chapter of the thesis, Chapter 10, provides an overview of the research findings, and resulting important implications for the Michigan apple industry.

## **Chapter 2**

### **STRATEGIC ANALYSIS OF THE MICHIGAN APPLE INDUSTRY IN RELATION TO CONSUMER MARKET RESEARCH**

**2.1 Introduction.** This research project was developed as part of recent strategic planning efforts by the Michigan apple industry. A primary goal of this research project is to provide more detailed consumer market research information to the Michigan apple industry, specifically to help in the development of certain aspects of strategic plans for the industry.

Therefore, this chapter will include an analysis of some of the key elements that relate to the industry's strategic planning efforts. This will include highlights of some of the driving forces and important elements of the internal and external competitive environments which influence and impact the Michigan apple industry.

Analysis and understanding of these driving forces and competitive environments are crucial to sound strategic planning, and hence, to how the development of consumer research projects such as this fit into the industry's broad strategic planning goals. These driving forces affect the performance and future strategic decision-making of the Michigan apple industry. Consumer research findings, supported by a strong knowledge of the strategic directions of an industry, can assist an industry in securing an improved competitive position. Consumer research results may help to identify certain industry strengths, weaknesses, future opportunities and threats, or to modify certain aspects of previous strategic analysis.

P

r

a

re

inc

As

ma

pac

shan

effor

indus

enviro

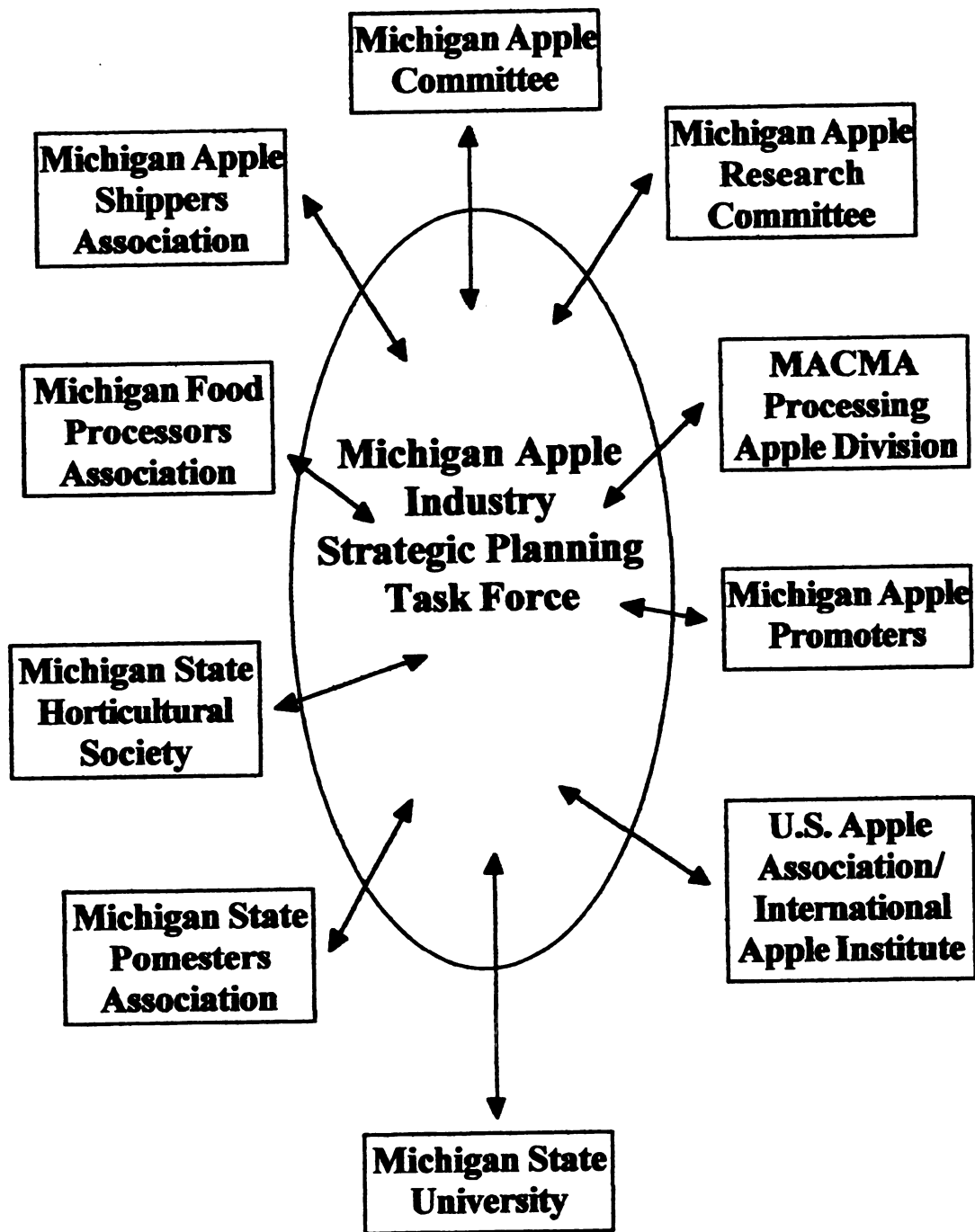
This chapter describes some key features of the Michigan apple industry, as well as a summary of the industry's strategic planning efforts. Secondly, it includes an analysis of important elements of the competitive environments of the industry. An extensive amount of this analysis is devoted to analysis of consumer preferences, a part of the industry's external environment, and an important element of this project.

**2.2 Importance and Organization for Apple Industry Strategic Planning.** In order for an industry to have top performance and to improve its competitive position, the industry should be aided by some level of strategic planning and coordination. Strategic planning is generally used at the firm level, and thus most of the established body of research and literature refer to strategic planning efforts at that micro, firm level. In addition, certain aspects of strategic planning can, and have been, undertaken by entire regional agricultural industries, such as the Michigan apple industry.

The early stages of the strategic planning initiative of the Michigan apple industry included the formation of the Michigan Apple Industry Strategic Planning Task Force. As evident in **Figure 2**, the Task Force brings together industry leaders who represent all major apple industry organizations in the state and all industry segments such as growers, packers, shippers, and processors. These industry leaders who serve on the Task Force share ideas and analyze emerging issues facing the Michigan apple industry.

A major industry need and a component of the industry's strategic planning efforts developed by the Task Force has been to determine how the Michigan apple industry can consistently and most effectively serve consumer needs in a changing market environment. Thus, continued research on consumer preferences for fresh apples, such as

## Michigan Apple Industry Strategic Planning Task Force



**Figure 2: Michigan Apple Industry Strategic Planning Task Force**

e

s

re

re

a v

ass

23

imp

indu

invo

Mich

previ

future

strengt

environ



was undertaken in this project, can contribute significantly to the industry's strategic planning process.

The Michigan Apple Committee, a key participant on the Task Force, is the industry's organization for growing consumer demand through advertising, promotion, and merchandising efforts. The Michigan Apple Committee was a key organization in the early development of the industry - university partnership approach to the overall strategic planning efforts, including the important component of consumer market research efforts. The Michigan Apple Committee, the Task Force, and other leaders requested that this thesis project be undertaken. The Michigan Apple Committee played a very important role in the development of this project. They also provided financial assistance for this work.

**2.3 Strategic Analysis of the Michigan Apple Industry.** As mentioned earlier, an important aspect of strategic planning that has been quite useful to the Michigan apple industry and to this project is situational and competitive analysis. Situational analysis involves a thorough examination of the internal and external environments facing the Michigan apple industry. Utilization of this type of analysis can clarify and update previous analysis of its strengths, weaknesses, opportunities and threats, and thus aid future strategic planning to capitalize on opportunities and diminish threats by utilizing strengths, and improving upon weaknesses.

Certain elements of the Michigan apple industry's internal and external environments, relative to the fresh apple market, have implications for future strategic

o

a

c

th

e

2.

ch

m

th

gr

thr

ser

the

desi

pack

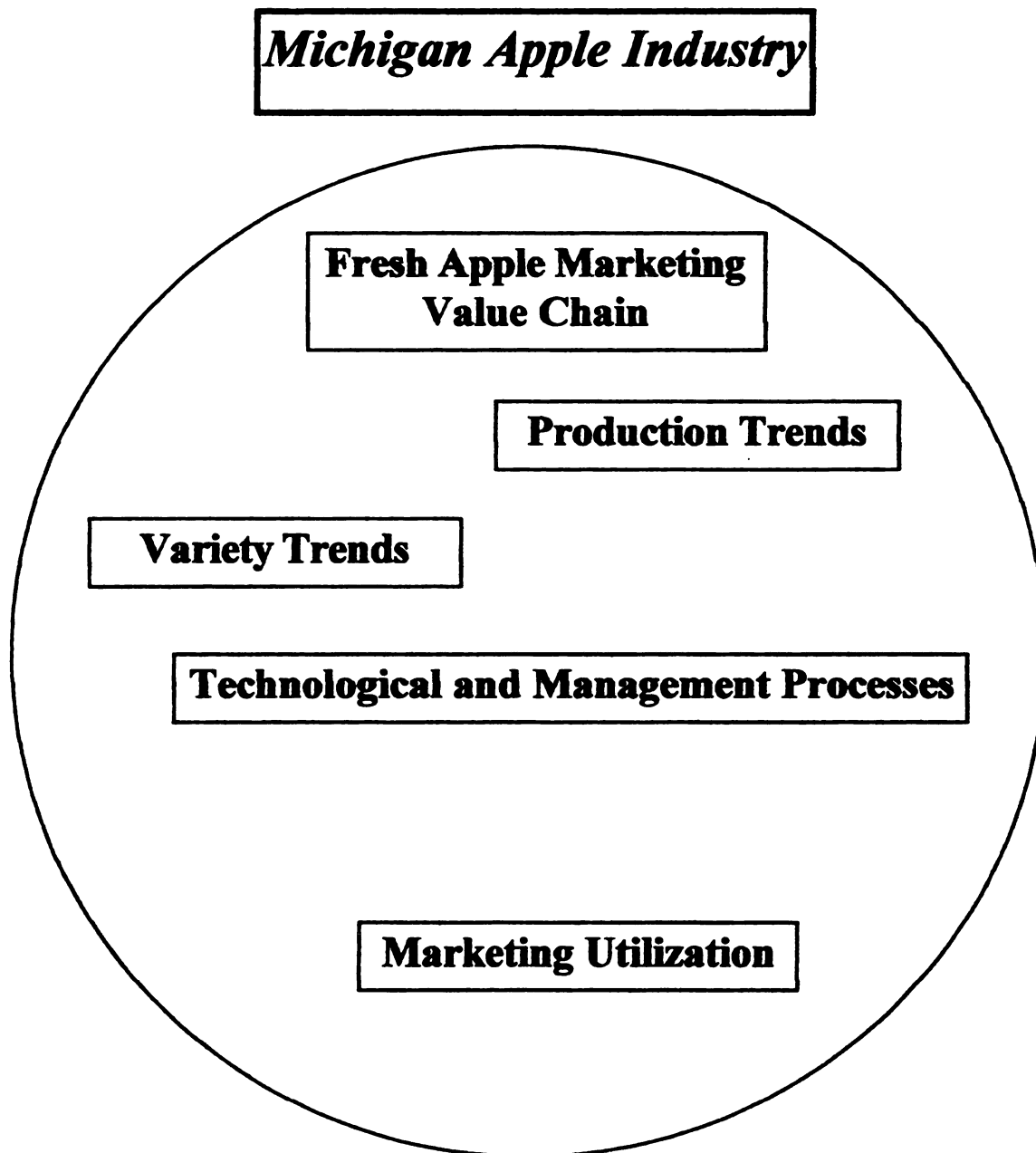
decisions and the design of this consumer research project. Analysis and description of each of these elements for the design of this research project follow in this chapter.

**2.4 Internal Elements of the Michigan Apple Industry.** Elements of the Michigan apple industry's internal environment (**Figure 3**) which were relevant to the development of this consumer research project, include; an understanding of the fresh apple marketing chain, apple production trends, variety trends, technological and management processes, and marketing utilization. An understanding of these elements helped to clarify the content of this project. In addition, findings of consumer market research projects such as the one described in this thesis may have implications for each of these elements. These elements are described and analyzed in the following sections.

**2.4.1 The Fresh Apple Marketing Value Chain.** Apples are marketed through several channels as they proceed from orchard to end-consumer. The vertical links along the marketing channels can be referred to as the "marketing value-chain" because each stage in the chain creates some added-value to the products. For instance, packers sort, clean, grade, and pack the apples for shipment. As **Figure 4** illustrates, apples proceed through three major channels before reaching consumers; grocery retailers (the largest), food service and export markets, both of which are smaller but expanding.

Knowledge of consumer preferences is very important to all firms and levels in the chain in order to provide desirable products to end consumers. Consumer needs and desires are communicated, to some degree, to the other end of the chain (growers and packers) by retailers, wholesalers, shippers, or brokers. Industry-based consumer

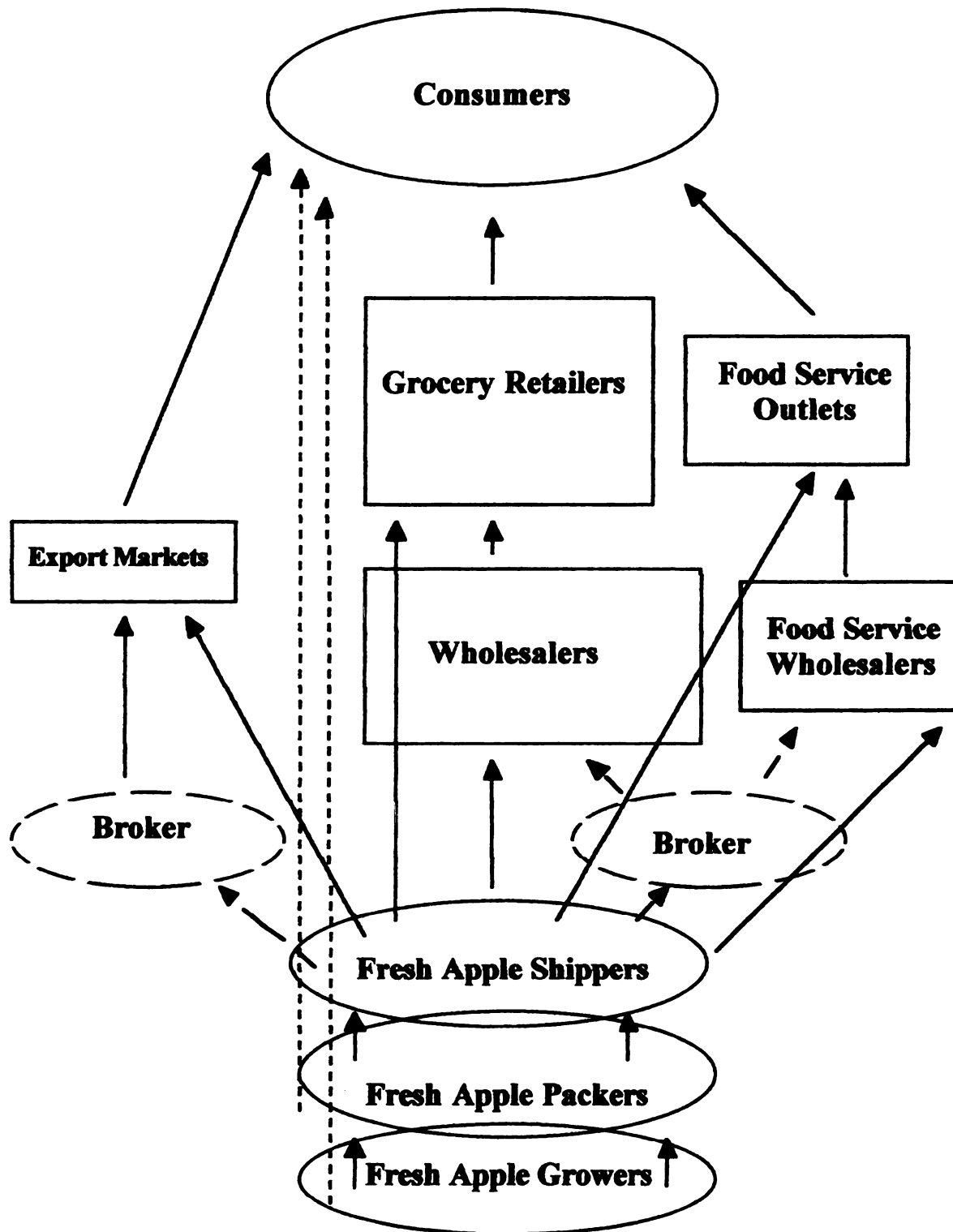
**Michigan Apple Industry's Internal Environment**  
**Relative to the Fresh Apple Market**



**Figure 3: Michigan Apple Industry's Internal Environment**



## Fresh Apple Marketing Value Chain



**Figure 4: Organizational Structure of the Fresh Apple Marketing Value Chain**

1

2

3

4

5

6

7

8

9

10

pro

of

199

proc

proj

infor

cons

research projects such as this one can add significantly to this information on consumer needs and preferences.

In the best scenario, market information about consumer preferences is transferred between each stage in the chain: trade buyers communicate consumer and trade customer needs to shippers, shippers communicate customer needs to packers, and packers communicate needs to growers. Consumer information from projects such as this can add to the needed information at various levels through the chain. Industry organizations like the Task Force and Michigan Apple Committee can also use this information in the development of marketing, advertising, and promotional programs.

**2.4.2 Production and Fresh Sales Trends of the Michigan Apple Industry.** Total apple production in Michigan has trended upward since the 1970's (**Figure 5**).

Michigan's average production increased from 16.3 million bushels in the early 1970's to a crop of 29 million bushels in 1995, and an estimated 1997 crop of 25 million bushels.

As **Figure 6** indicates, fresh apple sales in Michigan have increased as well as production on average since the mid 1970's. Michigan's fresh sales grew from an average of 5.7 million bushels in the early 1970's to an average of 9.5 million bushels in the early 1990's.

A continued increase in fresh sales has been identified in the strategic planning process as a priority for the Michigan apple industry. Consumer market research projects can help the industry to improve performance in fresh apple sales by providing information about specific product attributes of fresh apples which are desired by consumers. To growers and others in the industry, knowledge about what types of

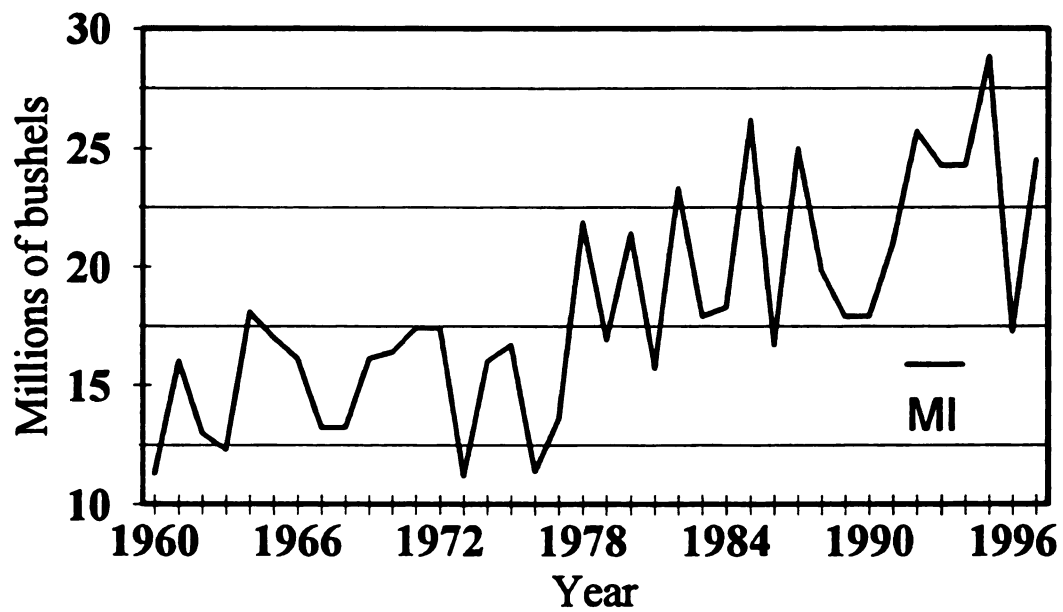




Fig

# Michigan Apple Production

1960 - 1997

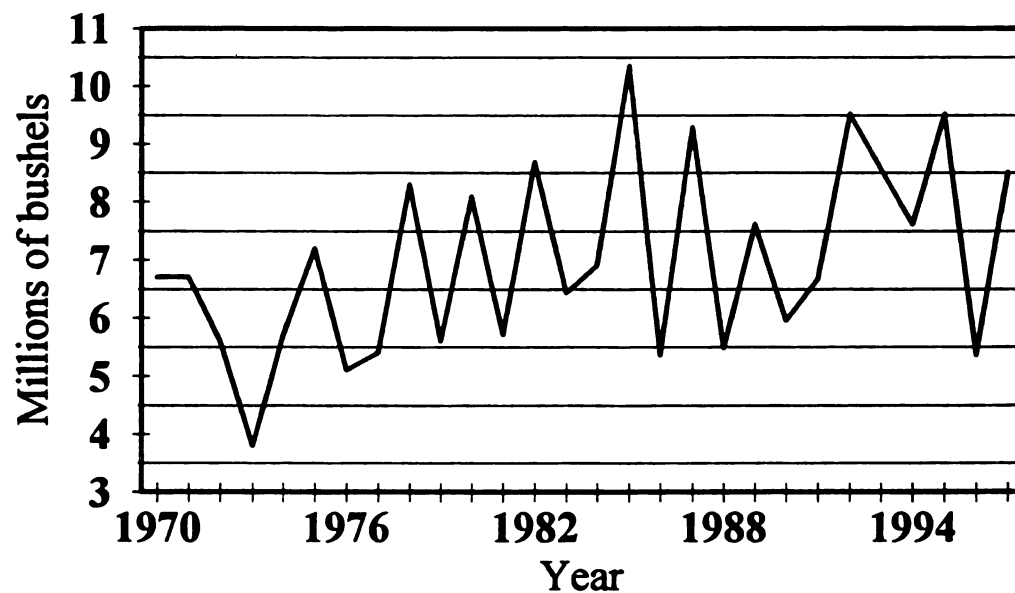


**Figure 5: Michigan Apple Production 1960-1997**



# Michigan Fresh Apple Sales

1970 - 1997



**Figure 6: Michigan Fresh Apple Sales 1970-1997**

apples consumers are most likely to buy can aid in providing those products, and thus boost performance in fresh sales.

**2.4.3 Varieties.** Although Michigan's total acres of Red Delicious have decreased over the last several years, Michigan apple growers devote the largest amount of total and bearing acres to this variety. Varieties with the largest increases in bearing acres from 1991 to 1994 were Empire (+590), Gala (+530), Golden Delicious (+390), Rome (+360), and Jonagold (+230).

Red Delicious was chosen for this project because it is the variety with the largest acreage and production and hence, has the potential to greatly impact Michigan's performance in the fresh apple market. Since Red Delicious provides the majority of the fresh apple crop in Michigan, specific consumer preferences for attributes of Red Delicious are of great importance to growers. Competing western states and New York also grow a large amount of Red Delicious. Thus to be competitive, Michigan must have top performance in the marketing and production of Red Delicious.

Empire was chosen because it is a variety with substantial potential to increase in production volume in Michigan and was planted primarily for the fresh market. As evident by the increase in acreage devoted to Empire, growers are making substantial investments in the Empire variety. Because of these investments in Empire by farmers, consumer preferences for Empire attributes will be very important over the next several years as the production of Empire increases.

**2.4.4 Technological and Management Processes.** Improved technological and management processes in several areas have allowed for improvements in harvesting, pest

management, sorting, and storage. Some of these improvements include; the development of information on “harvest windows” for each variety to insure top condition at harvest for improved storage and shelf life, IPM efforts to reduce pesticide use, improved controlled atmosphere storage technologies, and sorting equipment which use computers and electronic scanning to sort apples by color and size. Technology developments like these, described in detail in the following paragraphs, contribute to competitive success and help to provide higher quality apples.

Pest-management techniques such as IPM (integrated pest management) have been developed and are continuing to evolve in order to enable growers to reduce the amount of pesticides used while producing the high quality apples demanded by consumers and trade customers. These IPM techniques often involve scouting of orchards for pests and applying pesticides once pests meet a threshold level which may reduce crop quality.

Researchers at Michigan State University in post-harvest physiology and orchard management have completed numerous maturity studies which identified “harvest windows” for growers to accurately gauge optimum harvest time for top condition apples. These “windows” are calculated each year for many varieties of apples grown commercially in Michigan. With such improved harvest tools, growers have better information on ideal harvest times for optimum quality levels.

Uniformity of size and color of apples is very important to trade buyers. Advanced technology in sorting equipment allows for separation of apples based on size and color at the packing house. Such advancements create greater efficiencies and quality consistency in packing. Improvements in controlled atmosphere storage technology and

facilities allow for a larger amount of apples to be stored at reduced oxygen and high carbon dioxide levels, while maintaining top condition throughout a long storage and marketing season.

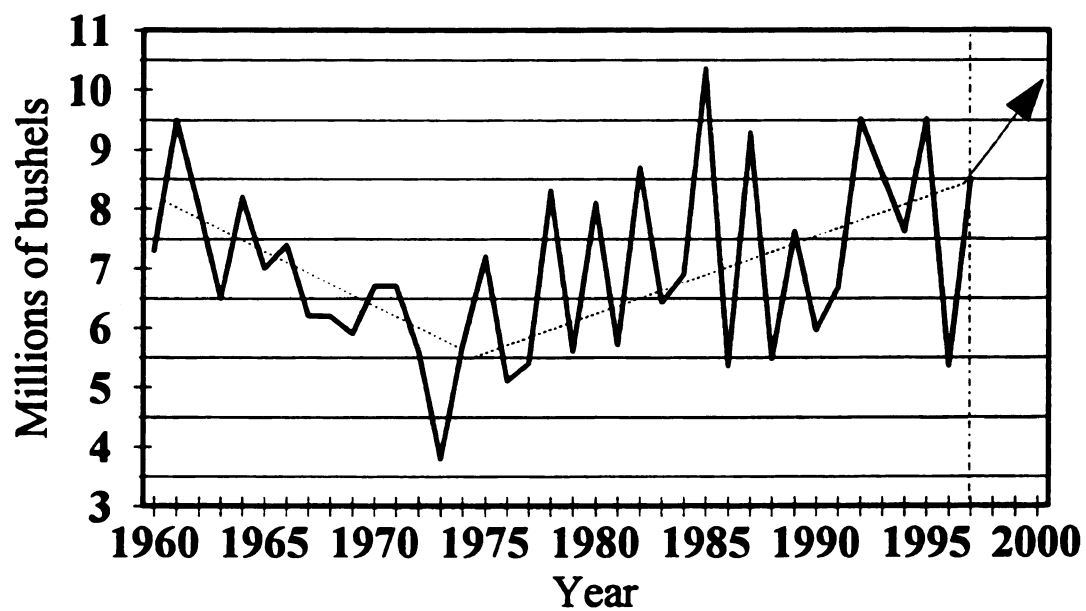
These technological advancements can be used to help produce and market high quality fresh apples, improving such quality characteristics as crispness, color, and size to meet consumer preferences. Knowledge of consumer preferences for attributes of fresh apples is very important in helping growers and others in the industry produce these desired attributes. Thus, increased knowledge of consumer preferences in combination with technological advancements may aid the Michigan apple industry in providing apples with attributes that consumers most desire, thus improving Michigan's performance in the fresh apple market.

**2.4.5 Marketing Utilization of Michigan Apples.** Michigan apples are used for fresh markets, canning, slicing, or juicing. Of these four, the largest is fresh with 35% of the Michigan crop sold as fresh. Ten percent are used for slicing, for instance, for sales to food manufacturer customers for pies. Twenty-four percent are used for canning, and 31% for juice.

A goal of the Michigan Apple Industry Strategic Planning Task Force is to increase Michigan's fresh sales volume substantially, with an increase in average fresh sales of 36% over 5 years. Figure 7 depicts the recent gradual growth trend of the sales of Michigan's fresh apples. After dropping steadily in the 1960's and early 1970's, Michigan began to increase fresh sales of apples in the mid 1970's. The dotted line in

# Michigan Fresh Apple Sales

1990 - 1997



**Figure 7: Michigan Fresh Apple Sales 1960-1997**



**Figure 7** depicts these trends. The arrow indicates the Michigan apple industry's aggressive goal of increased performance in fresh market sales through the year 2000.

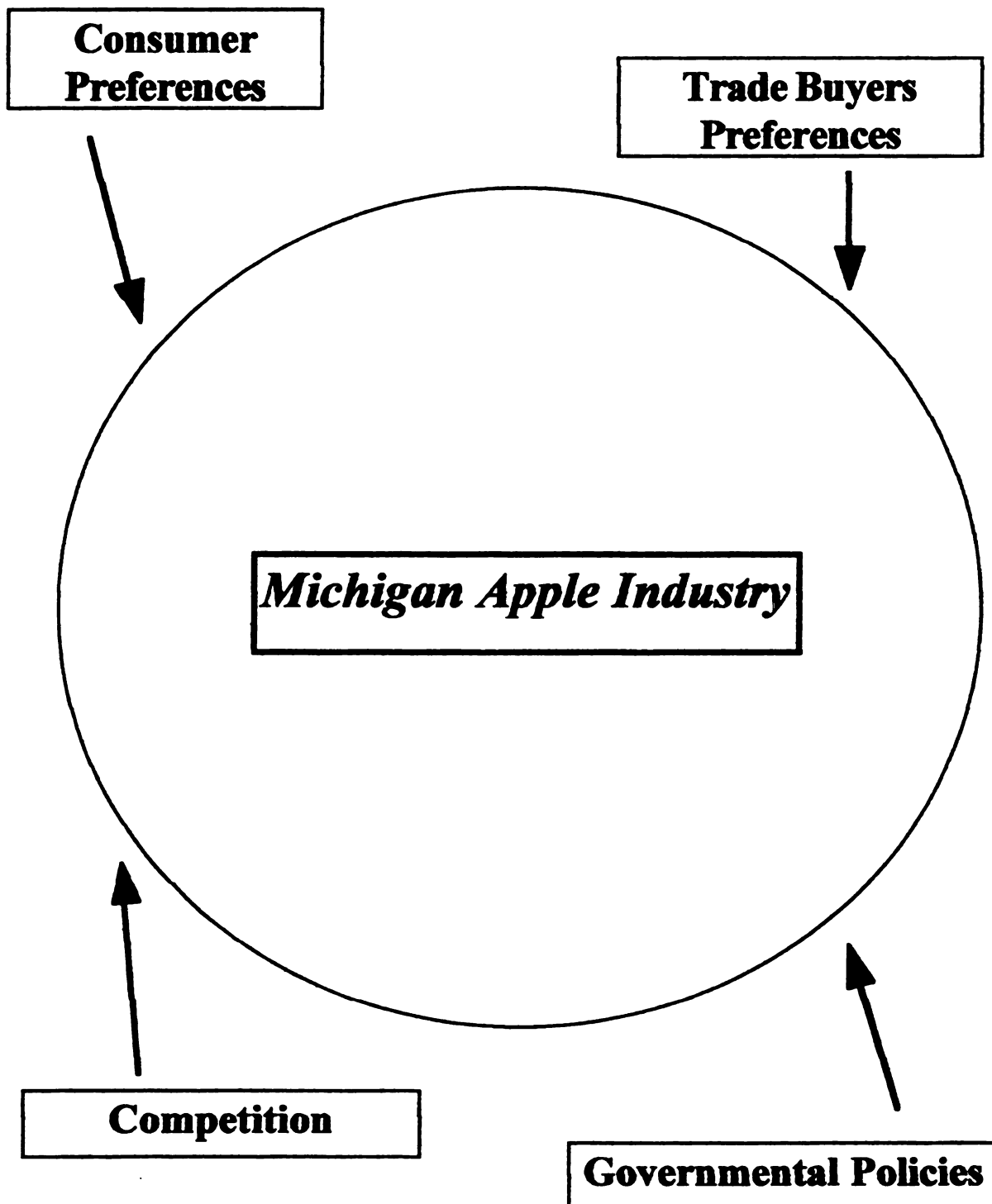
The Michigan apple industry is increasingly aware, in an overall sense, of the importance of **quality** of fresh market apples to consumers. Producers and others in the industry need information on what levels of quality parameters (condition, color, and size) are most desired by consumers. Such information can help the industry to plan strategies for developing the quality levels which are most desired by the industry's customers.

**2.5 External Elements of the Michigan Apple Industry.** Elements of the Michigan apple industry's external environment (**Figure 8**) which are relevant to this project include, among others, competitive pressures, consumer preferences for fresh apples, trade buyers preferences for fresh apples, and changing governmental policies. The behavior of each of these elements significantly impacts the performance of the Michigan apple industry. Analysis of these external elements follows in the next several sections.

**2.5.1 Competitive Pressure.** Although Michigan has long been a leading apple producing state, substantially increasing apple production in Washington and California has intensified the competitive atmosphere of apple markets. This competitive situation accentuates the need for consumer research projects which can help indicate weaknesses and strengths and thus influence industry performance.

Total apple production in the U.S. has increased over the last 40 years from an average of 137.2 million bushels in mid 1960's to an average of 250 million bushels in

**Michigan Apple Industry's External Environment**  
**Relative to the Fresh Apple Market**



**Figure 8: Michigan Apple Industry's External Environment**

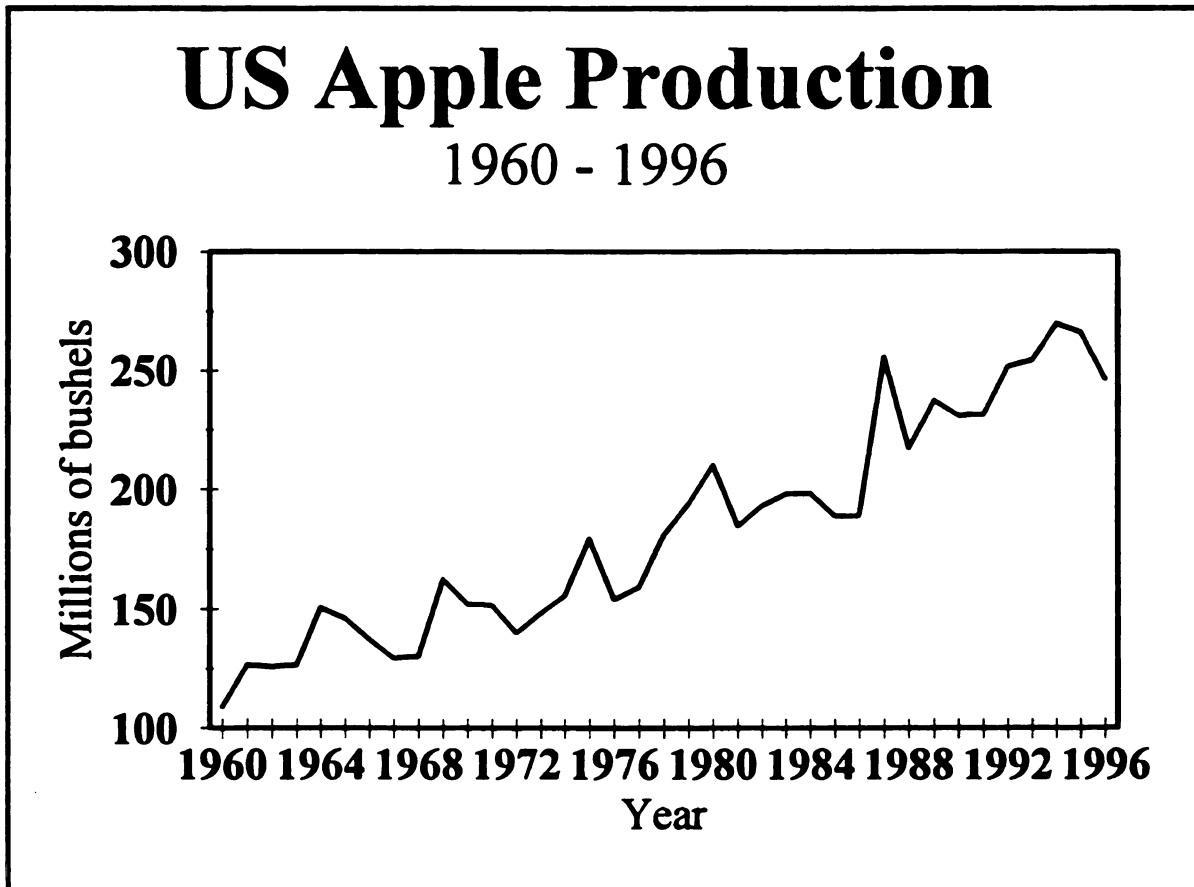
1990's, as indicated by **Figure 9**. This growth was gradual from the early 1960's through the early 1970's, and has increased substantially since the mid-1970's.

A majority of this increase in US production is due to the exceptional growth of Washington state's production. Washington's production grew from an average of 28 million bushels in the 1960's to an average of 119 million bushels the 1990's (**Figure 10**) due to a heavy expansion of apple growing acres in the 1980's. This average increase of 91 million bushels over thirty years represents a 325% increase in annual production. As evident in the graph, Washington's annual production has exceeded the combined annual productions of Michigan, New York, and California every year since the late 1980's

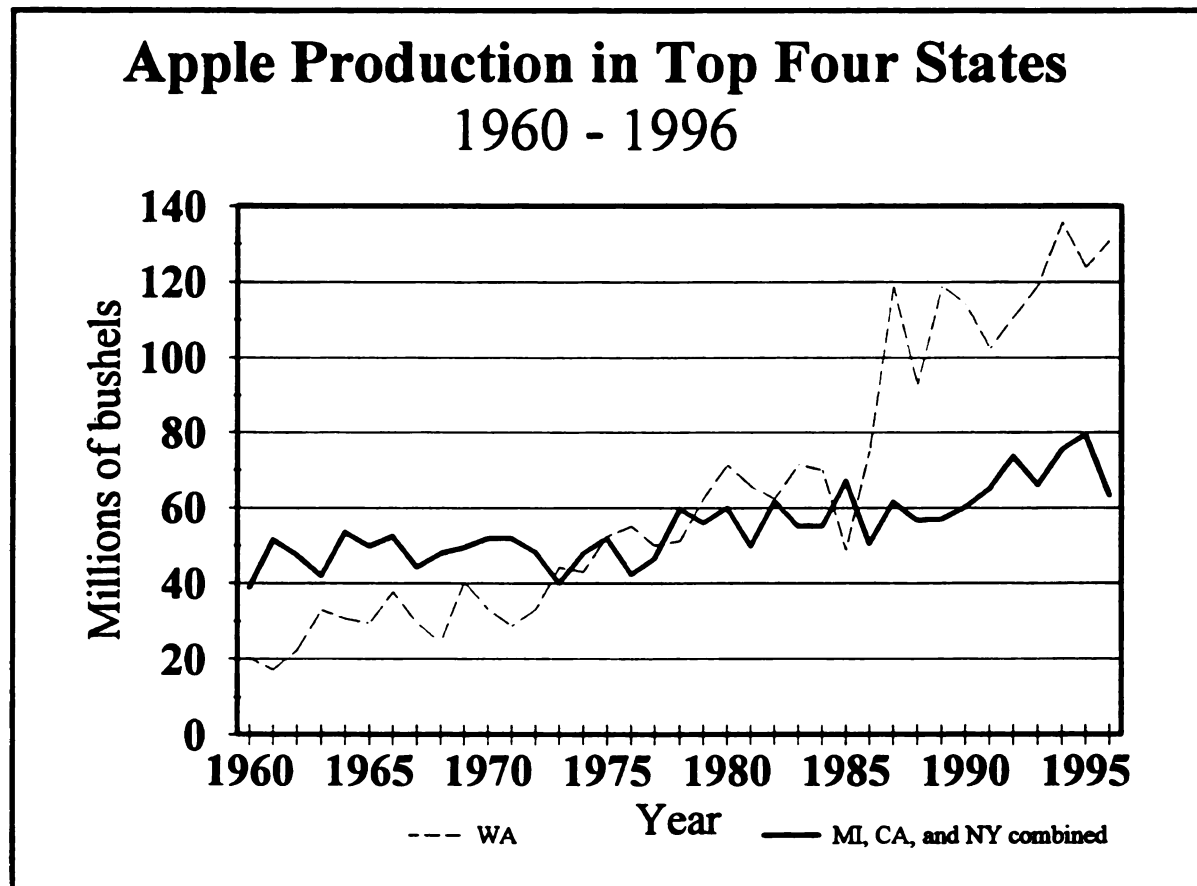
Michigan has also increased total annual apple production since the 1960's (**Figure 5**). Michigan increased from an average of 15 million bushels per year in the early 1960's to an average of 24 million bushels per year in the early 1990's, an increase of 9 million bushels, representing a 60% increase in production.

In addition, California has significantly increased production in recent years, from an average annual production of 11 million bushels in the early 1960's to an average of 21 million bushels per year in the early 1990's (**Figure 11**). This increase of 10 million bushels represents a 91% increase in production.

New York's increase has been quite gradual, fluctuating in annual production over the past twenty years (**Figure 12**). In the early 1960's, New York's annual production averaged 21 million , growing to 25 million in the early 1990's, an increase of 4 million bushels or a 19% average increase in production.



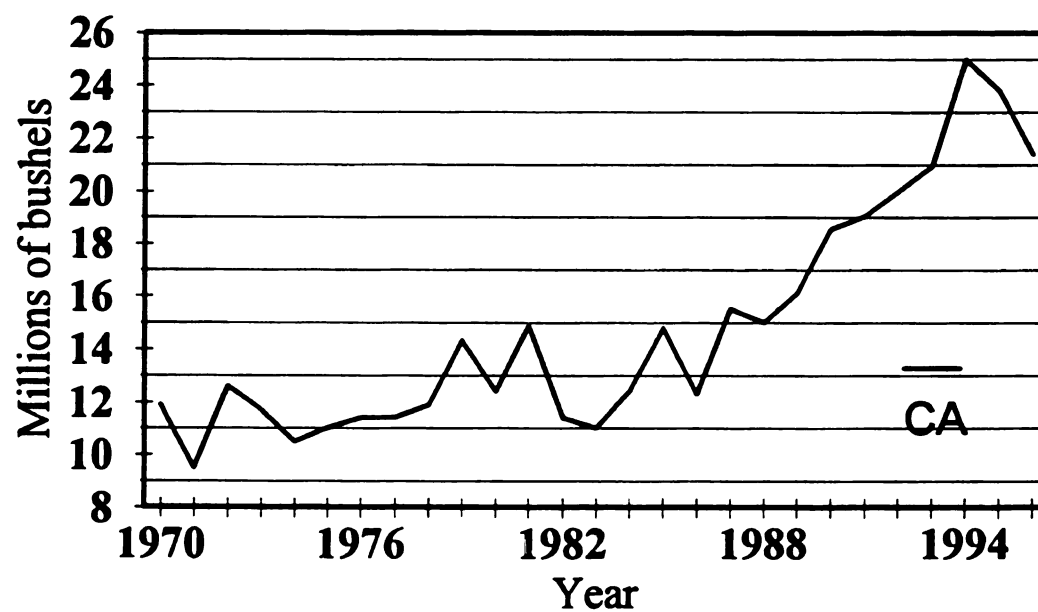
**Figure 9: US Apple Production 1960-1996**



**Figure 10: Apple Production in Top Four Producing States 1960-1996**

# California Apple Production

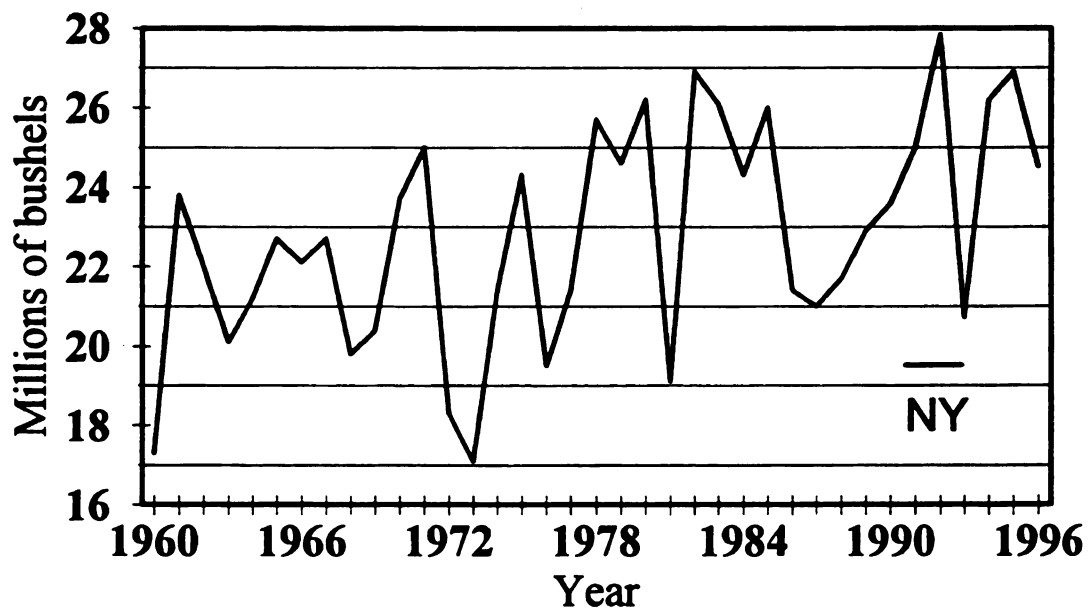
1970 - 1996



**Figure 11: California Apple Production 1970-1996**

# New York Apple Production

1960 - 1996



**Figure 12: New York Apple Production 1960-1996**

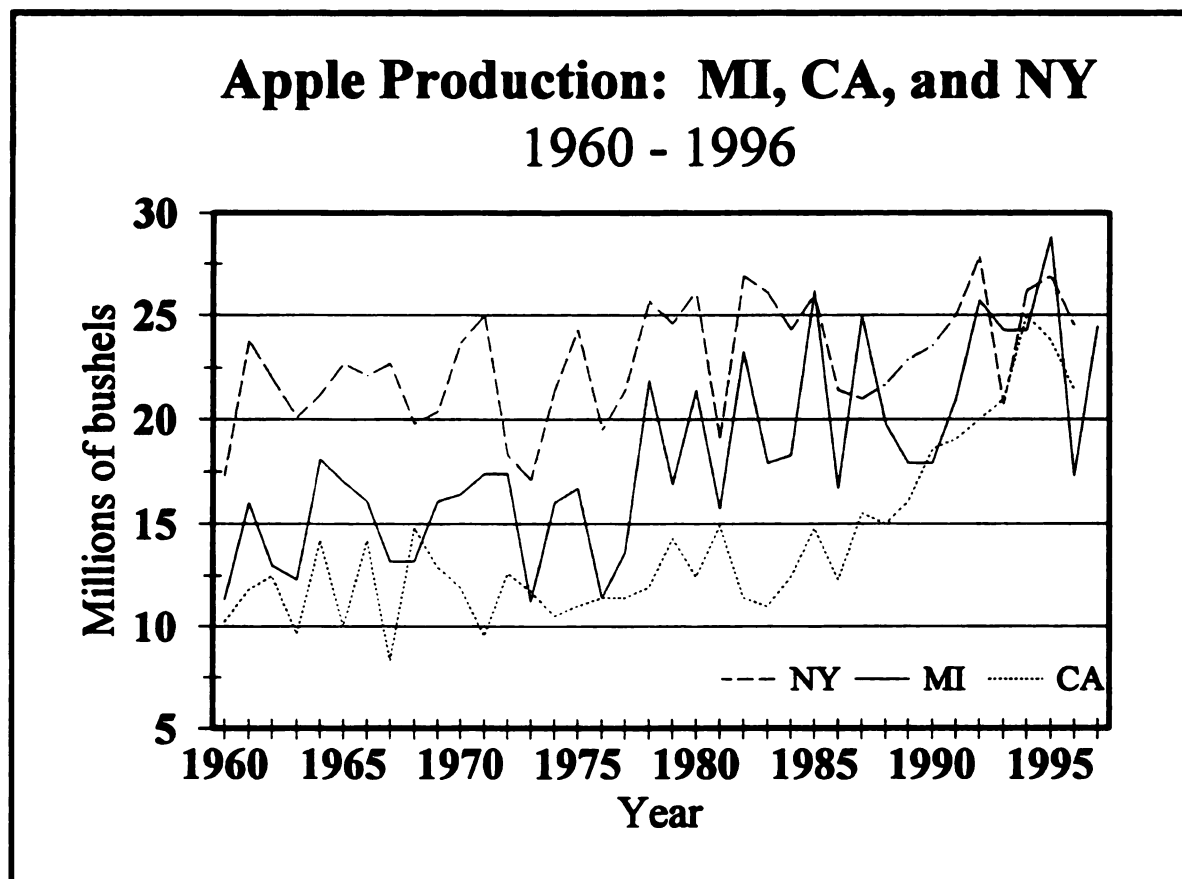
Presently the three states of Michigan, California, and New York are nearly equal, on average, in total apple production. Over the recent three-year period from 1994 - 1996, Michigan and California each averaged 23.4 million bushels per year. New York averaged 25.8 million bushels per year in the same period.

The similar level of apple production, as illustrated in **Figure 13**, is one indication of the competitive situation between the three states of Michigan, California, and New York. As indicated by the graph, in terms of total apple production, New York has lost competitive position to Michigan, most notably over the last ten years. In those same ten years, California has expanded production and apparent overall competitive position relative to Michigan and New York. Because of continued investment in new trees, California is likely to continue to expand production and improve its competitive position into the future.

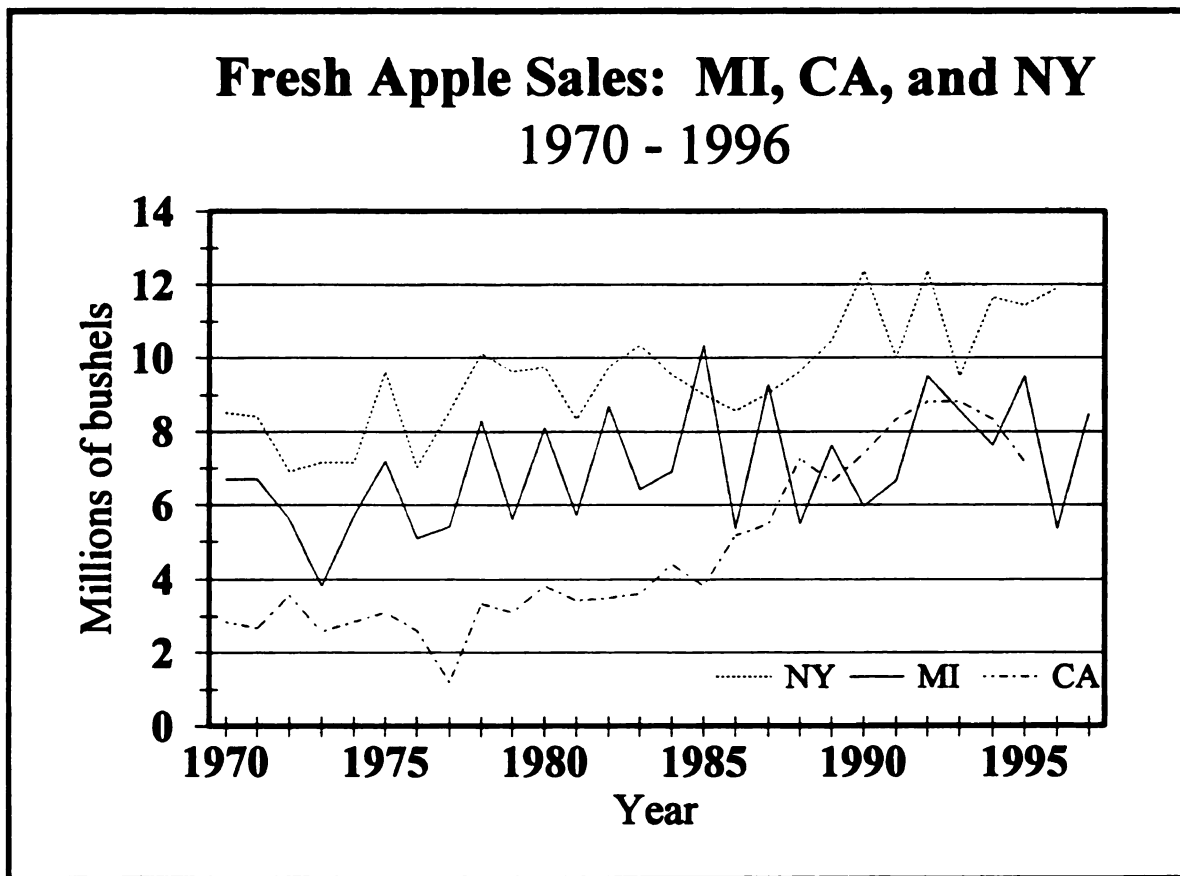
Fresh apple sales have increased in Michigan, New York, and California since the mid 1970's (**Figure 14**). In terms of sales of fresh apples, New York has slightly increased its competitive position, relative to Michigan over the last 20 years. New York increased fresh sales of apples by 58% from the mid 1970's to the early 1990's from an average of 7 million bushels to 11.2 million bushels. Over that same time period, Michigan increased fresh sales of apples by 51%, from 5.3 million bushels to 8 million bushels.

California's growth in fresh apples sales began in the late 1980's. Although California's fresh sales have fluctuated, it remains competitive in the fresh apple market. California sold an average of 8.13 million bushels of fresh apples per year in the early





**Figure 13: Apple Production in MI, CA, and NY 1970-1996**



**Figure 14: Fresh Apple Sales in MI, CA, and NY 1970-1996**

1990's, compared to its mid-1970's average of 2.2 million bushels. This increase represents a 273% increase in average annual sales over the last 20 years.

The threat of strong and increased competitiveness in the fresh apple market from Washington, and to a lesser degree from California and New York, accentuates the need for Michigan to aggressively continue strategic planning and implementation of well-targeted strategies in order to achieve growth in these markets. Vital to such competitive expansion of the fresh market is the marketing of apples with characteristics that meet consumers needs effectively versus the competition. The competitive marketing of such apples with these appropriate characteristics can be aided by market information about consumer preferences and vertical coordination by all stages of the fresh apple marketing channels to communicate and provide those preferences.

**2.5.2 Consumer Preferences for Fresh Produce.** Consumer preferences continue to be of great importance to all levels of the fresh apple marketing value chain. Consumers are demanding more fresh fruits and vegetables, more variety, and higher quality products than ever before. In addition, consumers tend to have less time to search for specific attributes. Considering this increase in demand for freshness, variety, quality and convenience by consumers, those industries which provide desired attributes to consumers, and communicate that value effectively to consumers will more likely have top performance in terms of consumer responses. Thus, identification of desired consumer preferences is one crucial element to competitive success. The following sections focus on reviewing some of these changing consumer preferences and reviewing previous consumer market research results.

In The Packer's "Fresh Trends 1996" survey (Vance Publishing 1997), consumers were asked, on an unaided basis, to identify the three most important characteristics they look for when selecting fresh produce. The top three responses were freshness and ripeness, quality and appearance, and price. Eighty-four percent of surveyed consumers reported looking at the **freshness and ripeness** of an item, while 71% noted **quality and appearance**. Forty-six percent of surveyed consumers indicated they look at price when selecting produce. A mere 7% of the consumers indicated **size** was an important factor.

When consumers were asked a similar questions in "Fresh Trends" 1992 survey (Vance Publishing 1993), 97% of consumers rated **appearance** as being "extremely important" or "very important" to the produce buying decision. Interestingly, **price** was found to be the number one reason consumers may decide not to buy a particular produce item. Numerous other studies have indicated the importance of **quality** of fresh produce to consumers.

In the "Fresh Trends" 1993 survey (Vance Publishing 1994), consumers were asked about their most common complaints regarding purchasing fresh fruits and vegetables. Quality was again an issue, with 34% of the surveyed consumers saying that quality was a problem. Of these consumers, the top three quality complaints regarding quality were that "[produce is] underripe or overripe," "shelf life is too short," and "produce is not fresh enough."

Because different questions were asked each year in the "Fresh Trends" survey regarding quality, these results cannot be *directly* compared. Yet several things are evident

from these survey results. Over the past decade, quality and price continue to be of concern to consumers. These findings reinforce the importance of **quality, appearance, and freshness or condition** of fresh produce to consumers.

The analysis of previous consumer research studies which investigated specific attributes of quality and appearance, relative to fresh apples, was an important part of this project. An overview of the findings from these studies follows in the next section.

**2.5.3 Research Findings: Consumer Preferences for Fresh Apples.** Although there has been some research in the area of determining consumer preferences for fresh apples, a majority of this previous research focused on the determination of general overall preferences for fresh apples. For instance, the telephone survey conducted at Michigan State University sought to determine what characteristics of apples were most important to consumers. The project reported in this thesis attempts to investigate beyond such overall preference findings to identify *specific* levels of preference by consumers for individual attributes of **condition, color, and size**. These three attributes were found to be of relative importance in previous research efforts, which are described in the remainder of this section. The benefits and limitations of specific methodologies are reviewed in Chapter 3.

**2.5.3.a A Study at The University of New Hampshire.** A study of consumer preferences of fresh apples by Manolo (1989) at the University of New Hampshire found **flavor** to be “very important” to 96% of respondents, followed by **crispness** (89%), **color** (61%), **size** (38%), and **price** (26%). These findings are similar to the findings of the telephone survey conducted earlier at Michigan State University. (Ricks et

al. 1995) In that survey, crispness, color, and size were found to be “very important” to high percentages of surveyed consumers. Manolo’s use of conjoint analysis in the University of New Hampshire study allowed for a measurement of relative importance of each attribute. Results indicated that **crispness** is the critical attribute to consumers, almost twice as important as either **size** or **color**. Price was found to be of least importance.

**2.5.3.b A Study at The University of Connecticut.** A study in the early 1980’s at the University of Connecticut (Leonard and Wadsworth 1989) investigated consumer preferences for apples. Consumers were asked to rank attributes in order of importance. The study found **appearance** to be the most important factor to consumers, with 76.5 % of consumers ranking it as “very important.” Almost as many, 72% ranked **texture** as “very important.” Price and **state/country of origin** were of least importance to consumers. Consumer were asked to rank several apples with various attribute levels of price, percentage of color, size, existence of wax, and bruising. This test revealed an overall preference for low price, a high percentage of red color, large size, wax and unbruised apples.

**2.5.3.c A Study at California Polytechnic State University.** A study conducted by Ahern and Provost (1991) investigated consumer preferences for Empire apples. Consumers evaluated “early-harvest” and “normal harvest” Empire apples. This was done because the difference in harvest times results in apples with different levels of sugar, color, and crispness. Although “early-harvest” apples were less red than “normal-harvest” apples, it was hypothesized that the superior texture (higher crispness level) of

“early-harvest” might be preferred by consumers despite the fact that “early-harvest” apples have less sugar or red color than “normal-harvest” Empires.

Overall, 59% of consumers surveyed preferred the “normal-harvest” apples, while 40% preferred the “early-harvest” apples. One percent were indifferent. This indicates that although the “early-harvest” apples were slightly crisper, consumers preferred the redder color and higher sugar level of the “normal-harvest” apples.

In this study, consumer taste test respondents were first asked about general preferences for apples, and the relationship of certain attributes to quality. A large number of consumers, 88.3%, reported they “strongly agree” or “agree” that **texture** of an apple is related to **quality**. Far less, 50.2% “strongly agreed” or “agreed” that **color** was related to **quality**. These results are again similar to the telephone survey conducted by Michigan State University where apple crispness was found to be considerably more important to consumers than color or size.

Seventy-three percent of consumers ranked **flavor** as the “most important” aspect in apples they purchased. Although only 9.4% ranked **texture** as “most important,” 44.6% ranked it as “second most important.” Seven percent of consumers ranked **color** as “most important,” while 24% said it was “second most important.” **Size** and **price** were of significantly less importance.

**2.5.3.d A Study at The University of Maine.** A study at the University of Maine (Criner et al. 1995) investigated consumer preferences for McIntosh, Red Delicious and Empire apples. Taste tests and visual tests were used to compare Empire versus Red Delicious, Empire versus McIntosh, and McIntosh versus Red Delicious.

Although the results of the taste tests indicated that consumers preferred Empire to McIntosh and McIntosh to Red Delicious, little explanation was given as to what attributes consumers preferred with each variety. In the tests for visual preference, McIntosh was preferred over Red Delicious, 78% to 22%. No statistically significant differences were found between the other pairs of varieties. These results indicate that some attributes of the McIntosh variety were preferred over the attributes of the Red Delicious variety.

**2.5.3.e A Study at Washington State University.** Researchers at Washington State University (McCracken et al. 1993) investigated the differences in the sensory quality of 11 apple varieties and used sensory analysis to determine the consumer attitudes towards each variety. This research was in response to changing consumer preferences toward different varieties of apples. Results indicate that **price and color** of apples were the most important pre-purchase attributes of apples, with **texture and flavor** most affecting post-purchase evaluation.

An important element of the Washington State study was the separation in testing of pre-purchase and post-purchase attributes. This separation provides useful results in some respects to various groups in the apple marketing chain. For instance, although crispness may be an “important” attribute to consumers, it is unlikely that consumers can ascertain the crispness or flavor of an apple before they buy it, yet appearance can clearly influence purchase. Pre-purchase attributes are important because they can stimulate initial purchases. Post-purchase attributes of apples are likely to have significant implications for subsequent or repeat purchases of apples.



Therefore, consumer research needs to investigate and define both the importance of pre-purchase and post-purchase attributes. In addition, market research results need to give implications for various market stages of the marketing value chain in terms of providing desired pre-purchase and post-purchase attributes, as both are important to competitive success.

**2.5.3.f Previous Studies at Michigan State University.** Research completed by Ricks et al. (1995) and Beggs (1996) provides part of the foundation from which this thesis project was developed. Beggs extensively investigated consumer preferences for fresh apples through focus groups and a telephone survey. Research results were helpful in providing the Michigan apple industry with consumer preferences information from which to formulate specific strategic plans. A number of strategies and industry action plans are being implemented which are based in part on these research results.

Previous research included focus groups and an extensive telephone survey of consumers in three major metropolitan markets for Michigan apples, Detroit, Chicago, and Kansas City. Important findings of this research are detailed in Consumer Perceptions and Attitudes Related to Michigan Apples (1995) and Consumer Perceptions for Fresh Market Apples (1996).

The results of this telephone survey show that very high percentages (80-92%) of the surveyed consumers in all three cities said that the three factors of (1) flavor, (2) unbruised and unblemished, and (3) crispness were very important factors in making their apple purchase decisions (Ricks et al. 1995, 2). Factors of color, variety and price were

ranked considerably lower by consumers in all three cities than were the factors of flavor, crispness, and unblemished apples.

Consumers who were surveyed in the Kansas City market were asked detailed questions about preferences for apple color and size. Forty-five percent of Kansas City consumers said they prefer apples which are all red, but 33% of consumers said color didn't matter, indicating an openness to less traditionally colored of apples, such as Gala, and Fuji. In terms of size, 78% of Kansas City consumers said they prefer "medium" size apples, and only 22% indicated that they prefer large apples. Therefore, although trade buyers often prefer "large" apples, consumers in this study were more likely to prefer a "medium" sized apple.

These findings were instrumental to the design of the consumer research project described in this thesis. In the telephone survey, consumers indicated a preference for certain types of apples, such as "medium" size. The research conducted in this thesis attempts to investigate what size apple consumers perceive as "medium," and what specific levels of color and crispness are most preferred.

**2.5.4 Synopsis of Research Findings.** There are numerous similarities in the previously reviewed findings of consumer preferences for fresh apples among US consumers. In general, the aspects of **flavor, texture crispness, and appearance** of apples are very important to consumers. Consumers indicate that **price, size and origin** of apples tend to be of less importance.

A limitation of a majority of this earlier research is that the parameters of attributes such as **quality** are not clearly defined, and thus the results are difficult to

implement into strategic planning by growers or industry. These findings do not demonstrate specifically what about quality or appearance is important to consumers.

The study at Washington State University has some helpful implications for continuing research efforts. This research team realized that consumers are affected by both pre-purchase and post-purchase attributes of apples. A useful way to review the findings of previous consumer market research efforts regarding fresh apples is to separate them in terms of pre-purchase and post-purchase attributes. This analysis is found in **Table 1** and **Table 2**.

**Table 1: Important pre-purchase attributes:**

<b>Attribute</b>	<b>Study</b>
• Appearance	• The University of Connecticut
• Price	• Washington State University
• Color	• Washington State University
• Unbruised and unblemished	• Michigan State University

**Table 2: Important post-purchase attributes:**

<b>Attribute</b>	<b>Study</b>
• Crispness	• Michigan State University
• Flavor	• Michigan State University
• Flavor	• University of New Hampshire
• Crispness	• University of New Hampshire
• Texture	• The University of Connecticut
• Flavor	• California Polytechnic State University
• Texture	• Washington State University
• Flavor	• Washington state University

As evident from **Table 2**, post-purchase attributes were more often found to be an important attribute to consumers. Thus it may be the “after purchase experience” has the most impact on the consumers, and most likely guides future purchases. Pre-purchase attributes were mentioned less in the previous consumer market research

studies, but the majority of those mentioned included aspects of appearance including color and the absence of bruises and blemishes. Size was rarely mentioned as being important by consumers.

An important finding is that, although aspects of flavor and texture/crispness/condition seem to be the overall most important attribute to consumers, the appearance of an apples is likely to influence purchases as well. Continued consumer research efforts, including the taste tests and visual tests of this project should investigate what specific levels of pre-purchase attributes, such as color, are most preferred. In addition, this research should investigate what levels of post-purchase attributes such as crispness and condition are most preferred as these attribute impact future sales.

**2.5.5 Trade Buyer Preferences for Fresh Apples.** Trade buyers are very powerful in the fresh apple marketing value chain because of their key position for access to consumers, that is, their “gatekeeper” position related to consumers. Large retail-wholesale firms are especially important because of the large volume of apples that they buy.

Trade buyers’ interpretations of consumer preferences are often communicated, at least to some varying degree, through the fresh apple marketing chain by the types of apples that trade buyers purchase. Previous consumer research, discussed earlier in this chapter suggests that actual consumer preferences for fresh apples may differ from trade buyers perceptions’ of those consumer preferences. Because of this potential discrepancy, additional consumer research may be useful in order for the Michigan apple industry to strategically orient marketing efforts and achieve top performance.

Although consumer research results indicate consumers' primary preference for the crispness of apples, a recent study of **trade buyers**, funded by the Michigan Apple Committee, indicated that these buyers believe other factors such as appearance of apples, in-store displays, and the variety of apple are the most important factors in the consumer buying decisions.

Findings from the study provide more detail as to the attributes of apples which are important to buyers. **Quality** was found to be the most influential factor of purchase. **Quality** was indicated by the trade respondents as being more important than **deep color, taste, crispness, price, and appearance**. More specifically, the three most important factors regarding buyers' purchasing of apples were **condition of apples upon receipt, color of apples, and perceived freshness of the apples**.

When asked about which factors have the most influence on consumers when deciding which types of apples to purchase, produce buyers rated "**the outward appearance of the apples**" as the most influential, or important, factor to consumers, followed by "**in-store displays**," and "**the variety of apples available**." Again, this study did little to define what exactly about the appearance of the apples, the in-store displays, or varieties of apples were important to consumers.

The study indicates that trade buyers have differing perceptions about what is important to consumers compared to what was shown by previous consumer research studies. Consumer research results detailed earlier overwhelmingly indicate that post-purchase attributes of apples, such as crispness, flavor, and texture are most important to consumers and affect future purchasing decisions.

Although trade buyers generally express the importance of high percent of color and large size when buying apples, little research exists about the specific levels of crispness, color, size that are preferred by consumers. This thesis project will provide more detailed information on these aspects. The results can also serve, in some respects, as a comparison to trade buyers' perceptions' of consumer tastes.

#### **2.5.6 Governmental Actions and Policies Affecting the Fresh Apple Industry.**

Changes in policy and regulation by domestic and foreign governing bodies could have severe impacts on the production and marketing activities of the Michigan apple industry.

The continued threats of increased regulation of pest control methods and removal of the availability of crucial pesticide tools are significant in their potential to severely impact the industry. Such removal of existing pest control methods and tools would severely reduce the quality level of Michigan apples in contrast to the very high quality demanded by consumers and the trade. This reduction in quality would be due to insect and disease damage.

Consumer research results can assist the Michigan apple industry in preparing for changes in consumer attitudes towards pesticides. For instance, if consumer research reveals that consumers are not as concerned about the appearance of fresh apples in regard to pest damage, but more concerned about food safety and pesticide residues, alternative efforts to reduce the use of chemical controls can be developed before governmental action requires compliance. In addition, consumer research projects could measure the amount of damage, if any, that would be acceptable to consumers.

**2.6 Conclusion.** The internal and external environments of Michigan's fresh apple market provide a useful framework from which to develop consumer research. These elements of the competitive environment must be understood for consumer research projects to be well designed. Consumers are an integral part of the external environment, and actions by the internal forces of the industry affect consumers through the market.

Consumer research projects undertaken by the Michigan apple industry continue to be important to the long term understanding of consumer preferences, and thus to the long-term success of the industry. For these consumer projects to be most helpful to the industry, they must be undertaken with a solid understanding of the Michigan apple industry, and the competitive environment in which it functions. The purpose of this chapter was to briefly review some elements of both the internal and external environments of the Michigan apple industry and explain how those environments affected and influenced the design of this thesis.

## **Chapter 3**

### **RESEARCH METHODOLOGIES**

**3.1 Introduction.** Consumer market research resulting in the determination of clearly defined attributes of fresh apples that are preferred by consumers may help the Michigan apple industry improve its performance in meeting consumer preferences. Such consumer market research may aid growers, packers, shippers, distributors, and retailers in modifying strategies and quickly adapting to changing consumer needs by changing production, marketing, storage, or transportation processes. This thesis focuses on research of this nature.

Working in close collaboration with the Michigan apple industry was crucial to the overall success of this research project. The unique collaboration between Michigan State University, the Michigan Apple Committee, and Michigan apple industry leaders aided in the design of the project as well as helping to assure the relevance of the research questions, focus, and results.

The project involved the use of a number of types of methodologies. This combination of methodologies was chosen in order to provide the most useful results for the apple industry. This blending of several methodologies along with the on-going coordination with the Michigan apple industry during the project produced consumer market information which is hoped to be useful and applicable to industry strategies.

In the first section of this chapter, I will review the steps involved in the development and planning of this research project. Secondly, I will briefly review



methodologies used in previous consumer market research projects. Finally, I will review in detail the methodologies used to collect the information for this project regarding consumer preferences for fresh apples.

**3.2 Planning and Evolution of the Research Project.** This research project involved extensive communication and coordination between the Michigan State University research team and members of the Michigan apple industry. This section details some of the major steps involved in developing and completing this project.

**3.2.1 Initial Discussions with the Michigan Apple Committee (MAC) Staff.** This research project evolved out of discussions with the Michigan Apple Committee staff regarding changing industry needs and their desire to build onto results from a series of previous consumer market research projects conducted by Michigan State University, one of which was a telephone survey (Ricks et al. 1995). MAC staff members and their advertising agency executives, and other apple industry leaders expressed the need for further consumer market research on specific quality characteristics of apples which would enrich these earlier research findings.

Specifically, in these discussions, the issues of crispness, size, and color were designated as most important for this research project. Although the earlier research findings indicated that these attributes were important to consumers, the exact levels of these attributes most preferred by consumers needed further investigation. It was proposed during several meetings with the MAC and other industry leaders that a research project be developed to investigate specific consumer preferences for these attributes of crispness, color, and size.

### **3.2.2 Development of the Research Project Plan Along with Industry Input. A**

research plan for the project was developed based on the industry's needs and priorities. The plans for the project were then reviewed and discussed with the MAC staff. These discussions included their suggestions of most useful categories for crispness, fruit size, and color to be studied. The industry also suggested the specific varieties to be studied. A plan outlining the research project was presented to the Board of the Michigan Apple Committee after the initial discussions with the staff. The research plan included conducting focus group sessions in two metropolitan areas, and conducting taste and visual tests within each consumer focus group. The plan included a set of proposed questions for the focus groups and the various levels of crispness, color, size of apples that would be tested in the visual and taste tests. After review, the Board had some relevant suggestions to increase the usefulness of the project. They indicated their support of the project plan.

Due to the potential strategic implications of the findings of the proposed research project, it was discussed with the Michigan Apple Industry Strategic Planning Task Force, which represents all segments of the Michigan apple industry. This was done to build broad industry support and integrate this research with overall industry strategies for market growth and increased competitiveness.

The proposal was presented at a Task Force meeting. The Task Force provided input, specific suggestions, and gave overall support of the project for its potential to contribute to needed industry strategies.

Two shipper members of the Task Force generously agreed to provide apples for the project. They provided important assistance in obtaining the different qualities of apples needed for the taste and visual tests.

**3.2.3 Use of a Market Research Firm for Certain Phases of the Project.** In order to efficiently recruit consumer participants for the project, outsourcing for this recruitment of participants was suggested. Several market research firms in the Lansing area were contacted and evaluated. Based on cost and previous work experience, a market research firm in East Lansing was selected. Several meetings were conducted with them to discuss the screening questions related to participant selection and desired demographic make-up of each group. In addition, the firm agreed to confirm each consumers' agreement to participate before the scheduled test session. The firm also sent a questionnaire to recruited consumers which they were instructed to bring to the test session.

**3.2.4 Collaboration with Post-Harvest Research Expert.** A professor in the Department of Post-Harvest Physiology, Dr. Randy Beaudry, was consulted in order to gain needed technical information about apple condition aspects. This included information on how to store the apples before the tests, how to adjust the temperature of the apples in order to have three different condition levels of apples for tasting, and how to measure the condition of the apples using a pressure tester. Dr. Beaudry generously provided one of his pressure testers for use throughout the duration of the study. In addition, he provided storage room in two coolers for the apples used in this project.

**3.2.5 Procuring the Apples for the Research Sessions.** The apples were picked up from the apple packer several weeks before the research sessions. The apples were

separated by color and size by the packer and labeled by the packer (i.e. 80% color, 72 CT. etc.) in accordance with the research project requirements.

The apples were then transported back to MSU and placed in coolers in the Department of Horticulture. The boxes of apples were labeled with various numbers or letters that were used as codes during the visual and taste tests (see Table 3). Each day, the apples labeled 1, 2, 3, 1T, 2T, 3T (apples that were evaluated in the taste tests based on crispness level) were measured to record condition levels. Some of these apples were removed from cold storage to room temperature in order to reduce condition level. The lowest pressure apples, 1 and 1T, were removed first, and the medium pressure apples, 2 and 2T, were removed approximately 5 days before the tests session in which those apples were used.

**3.2.6 Transportation of Apples to the Research Site.** On the day of research sessions (two sessions were held per day), the apples were transported to the research site. In addition, the apple pressure tester, gold stickers, pens, surveys, tape recording equipment, additional research materials, and a notebook were taken to the site.

For the apples that were used in the taste tests, each apple was measured with the apple pressure tester. A gold sticker was placed over the intrusion made by the device. If the apple's condition level fell within the 8-11 pounds pressure (PP) level, it was placed in the 1T basket. If the apple's condition level fell within the 12 - 15 PP level, it was placed in the 2T basket. Finally, if the apple's condition level fell within the 16 - 18 PP level, it was placed in the 3T basket.

The apples which were used for the visual test, and had been sorted by the packer based on color and size, were placed in separate baskets on long tables.

**3.3 Methodologies Used in Previous Apple Research.** Several studies, reviewed in Chapter 2, investigated consumer preferences for apples using highly technical analytical methods.

In the University of New Hampshire study, Manalo (1990) used conjoint analysis to assess the importance to consumers of certain apple attributes. A basic principle underlying conjoint analysis is that a product, in this case an apple, is composed of attributes, and that each of these attributes may have two or more levels (e.g. for size, small, medium, and large) (Manolo 1990, 118). In conjoint analysis theory, consumers' preferences for products are assessed by estimating the importance of those product attributes to consumers. In Manolo's survey, consumers were presented with eighteen cards, each card describing an apple of certain attribute levels. (e.g. small, green, crisp, tart, \$0.99/LB) Then the consumers were asked to rank those eighteen attribute alternatives from highest to lowest preference. This ranking data was then analyzed with OLS regression to ascertain the overall importance of each of the attributes (size, color, crispness, flavor, and price) to surveyed consumers.

This type of conjoint analysis methodology has the advantage of providing detailed information about the relative importance of each of these attributes. For instance, conjoint analysis can determine whether or not a consumer would sacrifice apple size for apple flavor or vice versa.

Although this type of methodology could have useful implications for the Michigan apple industry because it ranks the relative importance of each apple attribute, the results can be a bit misleading. Primarily, the methodology of conjoint analysis is unrealistic. Consumers are asked to rank written descriptions of various apples without seeing the actual fruit. In addition, the terms of the descriptions are ambiguous. A “small” apple to one consumers may be “large” to another consumer. For research to have meaningful results, which can truly help provide an informational background for producers in strategic marketing efforts, it is necessary for research methodology to clearly define, for example, what a “small,” “crisp,” or “red” apple represents.

A study at the University of Connecticut (Leonard and Wadsworth 1989) investigated consumer preferences for apples in the late 1980’s. Consumers were asked about the importance of certain apple characteristics, and asked to rank eight apples, each with a different set of attributes. Although investigators used a methodology similar to conjoint analysis, consumers were shown actual apples with a given set of attributes, then asked to rank the apples in order of preference. Each apples was only labeled with variety, price, and state of origin.

The interviewers were strictly interested in which apple was most preferred, and the order of preference, thus consumers were not asked about how they perceived each apple in terms of size, crispness, or color. In other words, consumers were not asked to define each apple as “small” “medium”, or “large”, rather , the apples were already labeled such by the interviewers. The limitation is that size, color, and crispness are defined and assigned by the interviewers. For instance, the interviewer categorized a 100 size Red

Delicious as “large” and a 125 size as “small” without any knowledge of what the surveyed consumers perceived the size of the apple to be.

**3.4 The Research Question.** This research project attempts to add to previous research findings by determining specific consumer preferences for fresh apples. This research will provide findings which may be utilized by the Michigan apple industry to improve strategic marketing and production efforts.

Previous consumer research indicates that although appearance is important to consumers, crispness is also very important in the buying decision, and may affect the future purchase of certain varieties more so than other attributes of the apple. This thesis research involved ascertaining and defining specific preference threshold levels for apple condition, color, and size.

**3.5 Research Setting.** This research project included taste tests and visual tests of two varieties of fresh apples, Red Delicious and Empire. Consumer participants were asked to taste and evaluate apples of various pre-measured pressure, color, and size levels. Thus, the research methodology was designed to pinpoint which pressure levels, color levels, and sizes are most desired by consumers at the point of consumption.

A research setting similar, in some respects, to a focus group was used to conduct the taste and visual evaluations of the apples. In addition, the group was used as a focus group to facilitate discussion by consumers of the importance of apple attributes and apple buying behaviors.

Kruger (1994) refers to a focus group as a special type of group in terms of purpose, size, composition, and procedures. A focus groups generally consists of 7 to 10

participants who are selected because they have certain characteristics in common that relate to the topic of the focus group. Participants are encouraged to discuss their attitudes, purchase behaviors, and opinions, but are not forced to reach a consensus on topics. Further, the focus group is repeated several times with different people. Careful analysis of the discussions provides clues and insights as to how a product, service, or opportunity is perceived. (Kruger 1994, 6)

Focus group interviews are widely accepted within marketing research because they produce believable results at a reasonable cost (Kruger 1994, 8). In addition, focus groups place people in natural, real-life situations as opposed to the controlled experimental situations typical of quantitative studies (Kruger 1994, 34).

This focus group research methodology was used to provide a forum from which to conduct the taste and visual tests. In addition, the focus groups were used to investigate in more detail what aspects of the quality of an apple are important to consumers and other aspects related to consumers' apple preferences and buying behaviors.

### **3.6 Research Methodologies: Taste Tests, Visual Tests, and Focus Group**

**Discussions.** In total, testing was completed with 16 different groups of consumers in the spring and fall of 1996. Each group consisted of taste tests and visual tests. Each group concluded with a focus group discussion. A total of 127 participants completed the tests and discussions, 65 consumers evaluated Red Delicious apples, and 62 consumers evaluated Empire apples.



Participants were recruited through a marketing research firm. These participants were chosen according to several criteria: Each participant was the primary purchaser of groceries in the household; had purchased apples in the last month; and represented an annual household income of over \$20,000. Eight focus groups were completed in metropolitan Detroit with Red Delicious apples, and eight were completed in metropolitan Chicago with Empire apples.

Before attending the focus group, each participant completed a short questionnaire inquiring about the importance to them of an apple's crispness, size, and color in their apple buying decisions. This questionnaire was collected at the beginning of each focus group. The questionnaire can be found in Appendix A.

### Visual Tests

For both Red Delicious and Empire, consumer participants visually examined apples of various crispness levels, color levels, and sizes. The apples were placed in baskets on tables. The baskets were labeled with only a letter, which identified it to the researcher as containing apples with a specific attributes. For example, Red Delicious basket "A" contained apples that were 72 size, 15 pounds pressure, and 80% color (Table 3).

**Table 3: Apples used for Visual and Taste Tests**

<b>Red Delicious</b>	<b>Empire</b>
<b>A - 72 CT / 15 PP / 80% Color</b>	<b>A - 100 CT / 15 PP / 80% Color</b>
<b>B - 100 CT / 15 PP / 80% Color</b>	<b>B - 125 CT / 15 PP / 80% Color</b>
<b>C - 125 CT / 15 PP / 80% Color</b>	<b>C - 148 CT / 15 PP / 80% Color</b>
<b>D - BAGS (2.5" minimum)</b>	<b>D - BAGS (2.5" minimum)</b>
<b>1 - 8 - 11 PP / 125 CT / 80% Color</b>	<b>1 - 8 - 11 PP / 125 CT / 80% Color</b>
<b>2 - 12 - 15 PP / 125 CT / 80% Color</b>	<b>2 - 12 - 15 PP / 125 CT / 80% Color</b>
<b>3 - 16 - 18 PP / 125 CT / 80% Color</b>	<b>3 - 16 - 18 PP / 125 CT / 80% Color</b>
<b>M - 90% Color / 15 PP / 125 CT</b>	<b>M - 80% Color / 15 PP / 125 CT</b>
<b>N - 80% Color / 15 PP / 125 CT</b>	<b>N - 60% Color / 15 PP / 125 CT</b>
<b>O - 60% Color / 15 PP / 125 CT</b>	<b>O - 40% Color / 15 PP / 125 CT</b>
<b>1T - 8 - 11 PP / 100 CT / 80% Color</b>	<b>1T - 8 - 11 PP / 100 CT / 80% Color</b>
<b>2T - 12 - 15 PP / 125 CT / 80% Color</b>	<b>2T - 12 - 15 PP / 125 CT / 80% Color</b>
<b>3T - 16 - 18 PP / 125 CT / 80% Color</b>	<b>3T - 16 - 18 PP / 125 CT / 80% Color</b>

As evident in **Table 3**, consumers evaluated three different crispness levels of apples, **1, 2, and 3**. Consumers evaluated three different color levels of apples in samples lettered, **M, N, and O**. Although the color levels differed, the size and pressure levels were equal for the various colors, as a control. Similarly, consumers evaluated three different size levels of apples in samples **A, B, and C**, though these were all equal in color and pressure level.

Consumers were asked to indicate purchase intention for each basket of apples, choosing from “definitely would buy” to “definitely would not buy” on a five point scale. Additionally, consumers were asked to rate each basket of apples on crispness, choosing from “extremely crisp” to “extremely soft” on a five point scale. Consumers were likewise asked to rank each basket of apples on color, size, and “goodness” of the apples

on a five point, bi-polar scale. A sample of this questionnaire can be found in Appendix B.

### Taste Test

In the taste test part of the session, consumers tasted three apples of different levels of crispness or fruit condition. Each participant chose an apple out of the basket which contained that level of crispness. The consumers did not know the level of crispness or pressure before tasting the apple, since the apples were only labeled with a code letter. As shown in Table 1, the apples used for this taste test were labeled 1T, 2T, and 3T.

As with the visual tests, the apples were rated by the consumers on their purchase intentions. The consumers ranked the apples from “definitely would buy” to “definitely would not buy” on a five point scale.

### Focus Group Discussion

After the taste and visual tests were completed, consumers also participated in a focus group discussion. In this phase, participants discussed the apples they had evaluated, and talked about how and where they typically purchase apples, how they select the apples they choose to purchase, and what apple merchandising tools are most preferred. A list of the questions asked in the focus group can be found in Appendix C.

Conversation in the focus groups centered around questions asked by the discussion leader. In addition, interesting and relevant issues which emerged in the focus group setting were pursued further. Often times, conversation would continue on a

certain topic when the leader would probe for more detailed answers on especially interesting aspects brought out by the consumer participants.

This focus group setting allowed for a better understanding of why the consumers perceive, react, and behave as they do. Although the discussions varied somewhat between each group, over the series of consumer focus groups, certain trends and key words begin to emerge. These trends will be discussed later in this thesis in Chapter 9.

**3.7 Advantages of Research Methodologies Used in this Project.** Although quite extensive, the planning and coordination of various research methodologies resulted in research which made use of a combination of research methodologies. This combination had several beneficial outcomes.

- These methodologies provide data on purchase intentions of consumers for different quality attributes that can be helpful to the Michigan apple industry in planning future strategies.
- This set of methodologies allows for participants to evaluate actual apples versus evaluating written or verbalized descriptions of apples, as were used in other studies, making the tests very realistic.
- These methodologies provide a way to categorize consumer perceptions of size, color, condition, and overall appeal of apples.
- These methodologies provide meaningful results which can be applied to future marketing and strategic plans by giving a more specific portrait of the consumers' preferences and behavior in regard to apple purchases.

### **3.8 Limitations of Research Methodologies Used in this Project.**

- Because of a focus group setting, a small sample of consumers was surveyed. In a focus group setting, it is difficult for large numbers of consumers to have a discussion. A larger number of consumers for the visual and taste tests would provide more reliable results, but would be more expensive.
- The measurement of purchase intentions and preferences by a questionnaire assumes that there is a definite relationship between what a person says and what a person does. Although a person may say they “would buy” a certain apple, this doesn’t guarantee that they will actually buy such an apple.
- Unlike conjoint analysis, these methodologies do not allow for the relative comparison of the importance of attributes.

## Chapter 4

### RELATIVE IMPORTANCE TO CONSUMERS OF APPLE CRISPNESS, COLOR, AND SIZE

**4.1 Introduction.** Before the taste and visual test study began, consumer participants were asked to rate the relative importance to them of the three apple characteristics which were evaluated: crispness, color and size. They were asked about this information through a one-page questionnaire which was mailed to them after they agreed to take part in the study (see Appendix A). This completed questionnaire was brought to the visual and taste test session. The results of this questionnaire are reviewed in this chapter.

As shown in **Figure 15**, 63% of the consumer participants indicated that **crispness** is “extremely important,” to them in their apple purchase decisions. A considerably lower percentage, 25%, stated that **color** is “extremely important.” Only 8% indicated **size** as being “extremely important” in their apple purchase decision-making process.

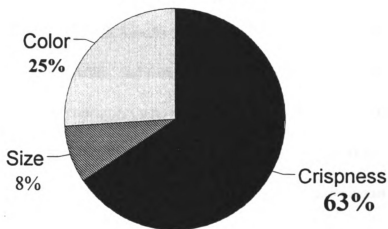
These findings are similar to the relative rating results of the earlier telephone survey.<sup>1</sup>

---

<sup>1</sup> In that study (Ricks et al. 1995), **crispness** ranked considerably higher than either **color**, or **size** in terms of importance to consumers’ apple purchase decisions.

### **Importance of Apple Characteristics**

Percentage of consumer participants who ranked characteristic as  
"Extremely Important"



**Figure 15: Relative Importance of Crispness, Color, and Size**

**Table 4: Importance of Apple Characteristics - Taste & Visual Tests**

	<u>Crispness</u> (% of consumers)	<u>Color</u> (% of consumers)	<u>Size</u> (% of consumers)
<b>"Extremely Important"</b>	<b>63%</b>	<b>25%</b>	<b>8%</b>
<b>"Somewhat Important"</b>	<b>35%</b>	<b>55%</b>	<b>55%</b>
<b><i>Combined</i></b>	<b>98%</b>	<b>80%</b>	<b>63%</b>
<b>"Indifferent"</b>	<b>2%</b>	<b>13%</b>	<b>27%</b>
<b>"Somewhat Unimportant"</b>	<b>0%</b>	<b>7%</b>	<b>9%</b>
<b>"Extremely Unimportant"</b>	<b>0%</b>	<b>0%</b>	<b>1%</b>
<b><i>Combined</i></b>	<b>0%</b>	<b>7%</b>	<b>10%</b>

**4.2 Importance of Crispness.** Results of the latest project regarding the relative importance of crispness, color, and size, are summarized in **Table 4**. As shown, in addition to the 63% of consumers who said that crispness is extremely important to them, an additional 35% of consumer participants said that *crispness* is "somewhat important." Thus, a combined total of 98% of the consumer participants said that the *crispness* characteristic was either "extremely" or "somewhat important."

These results are similar to the findings of the earlier telephone survey (Ricks et al. 1995) where 95% of surveyed consumers indicated that crispness was either "very important" or "somewhat important" to the buying decision.

**4.3 Importance of Color.** Although a relatively low 25% of the consumer participants said that *color* was "extremely important," another 55% of the consumers said that *color* is "somewhat important." Thus, a total of 80% of consumers said that *color* is either "extremely" or "somewhat important."

Again, these findings are similar to the earlier consumer market research conducted at Michigan State University (Ricks et al. 1995). In that telephone survey, 76% of



a

d

pu

consumers said that color was either “very important” or “somewhat important” to the buying decision.

**4.4 Importance of Size.** While only 9% of the consumers said that *size* is extremely important, a majority, 55%, said that *size* is “somewhat important.” Thus, nearly two-thirds, 63%, of the consumers, said that *size* is either “extremely” or “somewhat important” to their apple purchase decision.

When relating these findings to the telephone survey, these results are similar to those found by Ricks et al (1995). In the telephone survey, 64% of surveyed consumers said that size was either “very important” or “extremely important.”

These results document that, as found in the previous telephone survey and in other previous research findings reviewed in Chapter 2, consumers overwhelmingly emphasize the importance of crispness in their overall evaluation of quality for fresh apples. This is one reason why crispness, or fruit condition, was chosen as a characteristic to emphasize in this consumer market research project.

#### **4.5 Importance of Separating “Pre-Purchase” and “Post-Purchase” Attributes.**

Although it is a very important quality characteristic, the crispness of an apple is a “post-purchase” attribute. That is, it is an attribute that is mainly able to be evaluated by the consumer *after* the apples are purchased and eaten. Most consumers cannot accurately distinguish an apple’s condition visually in a pre-purchase setting. This was documented in the visual test phase of this project.

Because consumers cannot judge the crispness of apples accurately before they purchase and taste them, other pre-purchase attributes such as overall appearance, color,

and size are important. Yet, if a consumer experiences superior quality in the “post-purchase” attribute of crispness, that experience, according to consumers, is likely to influence the consumer to purchase similar apples again. Many consumers who took part in this research project indicated this behavior pattern in the focus group discussions. For example, some mentioned a preference for Granny Smith because of its “consistency in crispness” in regard to repeated purchases.

**4.6 Summary.** As the Michigan State telephone survey suggested, although crispness is stated by consumers to be the most important attribute to consumers, color and size are also somewhat important in buying decisions at store level. The initial findings from this thesis assist in confirming the findings of the telephone survey, and providing the grounds for further investigation and discussion of what specific levels of crispness, color and size of apples are most preferred by consumers.

## **Chapter 5**

### **CRISPNESS PREFERENCES BASED ON TASTE TESTS**

**5.1 Introduction.** As discussed in the previous section, this project, as well as previous research at Michigan State University, document the importance of apple crispness to consumers. Further, the Michigan apple industry is also interested in knowing more about the specific levels of crispness that are required or most preferred by consumers. Such knowledge can be helpful in developing strategies to improve the performance of the industry, including all levels of the vertical marketing chain for fresh apples between growers and consumers.

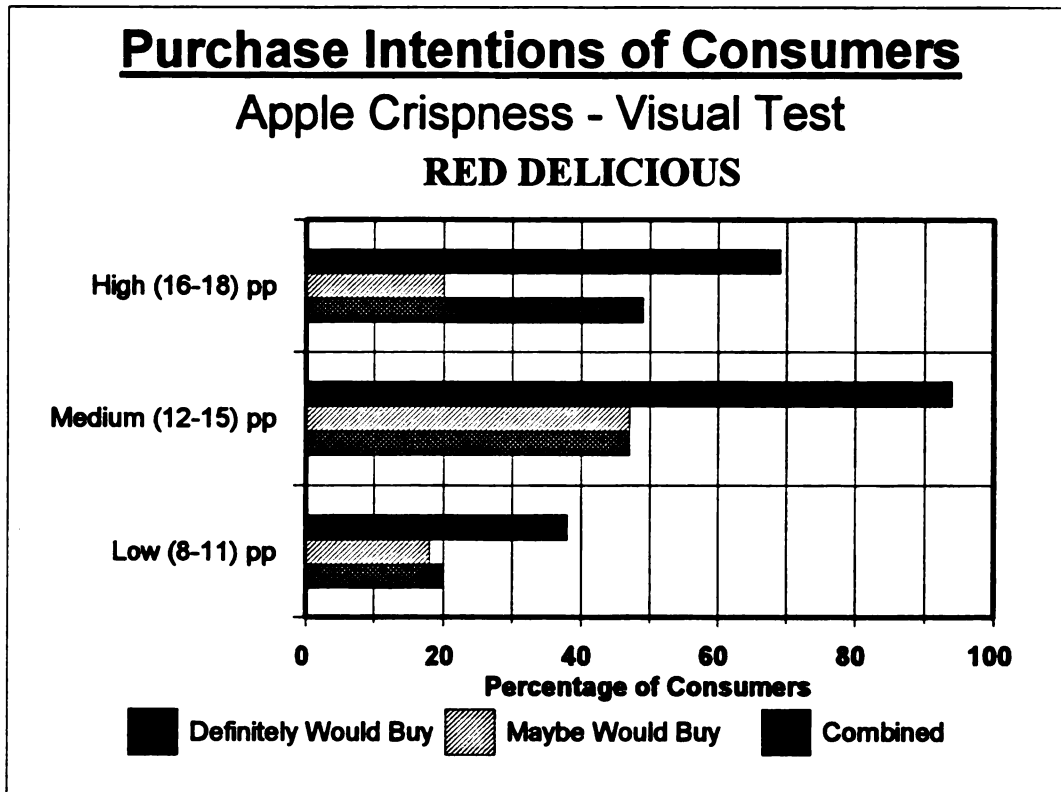
Consumers who participated in this project evaluated, via taste tests, the crispness of two varieties of fresh apples. Consumers rated three different crispness levels of Red Delicious apples. These were: Low (8-11 pounds pressure), Medium (12 - 15 pounds pressure), and High (16-18 pounds pressure). These levels of crispness or fruit condition were based upon recommendations of apple industry leaders. Consumers also rated the same three different crispness levels of Empire apples. The results from these taste tests are reviewed in this chapter.

The indicated consumer preferences for crispness are those condition levels, as measured by pressure tests, at which consumers say they prefer to eat the apples. The industry, including growers, storage operators, packers, shippers and retailers need to manage production and marketing in ways that as closely as possible, provide fresh apples that are within the preferred range at the time of consumer purchase. This goal of

meeting consumer preferences is, however, complicated and difficult to achieve at all levels of the apple production and marketing value chain. It requires efficient technical management and coordination as the apples are harvested, stored, packed, etc. in order to achieve consistency and high quality in regard to the condition or crispness attribute. The consumer preferences, as outlined in this report, indicate the needed target levels to strive for in this process.

**5.2 Crispness Preferences for Red Delicious.** In the taste tests for apple crispness, the consumers who participated in this project expressed a high purchase intent for at least the medium pressure (12 - 15 PP) Red Delicious apples. About the same percentage of consumers said they “definitely would buy” the higher pressure apples (16 - 18 PP) as well.

As shown in **Table 5** and **Figure 16**, 94% of consumers said that they either “definitely would buy” or “maybe would buy” the medium pressure (12-15 PP) Red Delicious apples. This very high percentage of consumers who indicated that 12 - 15 PP for Red Delicious is adequate to meet their expectations for crispness seems especially significant. This indicates that Red Delicious of 12 - 15 PP at purchase are sufficient to meet the desires of most consumers.



**Figure 16: Purchase Intention for Crispness of Red Delicious**

**Table 5: Purchase Intentions Related to Crispness of Red Delicious Apples**

	<u>Low Pressure</u> (% of consumers)	<u>Medium Pressure</u> (% of consumers)	<u>High Pressure</u> (% of consumers)
<b>"Definitely Would Buy"</b>	<b>20%</b>	<b>47%</b>	<b>49%</b>
<b>"Maybe Would Buy"</b>	<b>18%</b>	<b>47%</b>	<b>20%</b>
<b><i>Combined</i></b>	<b>38%</b>	<b>94%</b>	<b>69%</b>
<b>"Indifferent"</b>	<b>18%</b>	<b>2%</b>	<b>13%</b>
<b>"Maybe Would Not Buy"</b>	<b>24%</b>	<b>4%</b>	<b>13%</b>
<b>"Definitely Would Not"</b>	<b>20%</b>	<b>0%</b>	<b>5%</b>
<b><i>Combined</i></b>	<b>44%</b>	<b>4%</b>	<b>18%</b>

As Table 5 shows, the consumer participants indicated they are much less willing to purchase the low pressure apples (8 - 11 PP) than the 12-15 PP apples. Forty-four percent of consumers said they either "definitely would not buy" or "maybe would not buy" these lower pressure (8 - 11 PP) apples. This can be compared to the 4% who said that they "maybe would not buy" the medium pressure (12 - 15 PP) apples. This indicates a substantial threshold level or breakpoint for consumer preferences on condition.

For the high pressure (16 - 18 PP) Red Delicious, 49% of the consumer participants said they "definitely would buy" while another 20% of consumer participants said they "maybe would buy" these apples. This combined percentage, 69%, can be compared to the 94% who said they either "definitely would buy" or "maybe would buy" the medium pressure Red Delicious. The somewhat lower purchase intentions for the high pressure Red Delicious is interesting. In discussions following the

1

2

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  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107  
108  
109  
110  
111  
112  
113  
114  
115  
116  
117  
118  
119  
120  
121  
122  
123  
124  
125  
126  
127  
128  
129  
130  
131  
132  
133  
134  
135  
136  
137  
138  
139  
140  
141  
142  
143  
144  
145  
146  
147  
148  
149  
150  
151  
152  
153  
154  
155  
156  
157  
158  
159  
160  
161  
162  
163  
164  
165  
166  
167  
168  
169  
170  
171  
172  
173  
174  
175  
176  
177  
178  
179  
180  
181  
182  
183  
184  
185  
186  
187  
188  
189  
190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200  
201  
202  
203  
204  
205  
206  
207  
208  
209  
210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222  
223  
224  
225  
226  
227  
228  
229  
230  
231  
232  
233  
234  
235  
236  
237  
238  
239  
240  
241  
242  
243  
244  
245  
246  
247  
248  
249  
250  
251  
252  
253  
254  
255  
256  
257  
258  
259  
260  
261  
262  
263  
264  
265  
266  
267  
268  
269  
270  
271  
272  
273  
274  
275  
276  
277  
278  
279  
280  
281  
282  
283  
284  
285  
286  
287  
288  
289  
290  
291  
292  
293  
294  
295  
296  
297  
298  
299  
300  
301  
302  
303  
304  
305  
306  
307  
308  
309  
310  
311  
312  
313  
314  
315  
316  
317  
318  
319  
320  
321  
322  
323  
324  
325  
326  
327  
328  
329  
330  
331  
332  
333  
334  
335  
336  
337  
338  
339  
340  
341  
342  
343  
344  
345  
346  
347  
348  
349  
350  
351  
352  
353  
354  
355  
356  
357  
358  
359  
360  
361  
362  
363  
364  
365  
366  
367  
368  
369  
370  
371  
372  
373  
374  
375  
376  
377  
378  
379  
380  
381  
382  
383  
384  
385  
386  
387  
388  
389  
390  
391  
392  
393  
394  
395  
396  
397  
398  
399  
400  
401  
402  
403  
404  
405  
406  
407  
408  
409  
410  
411  
412  
413  
414  
415  
416  
417  
418  
419  
420  
421  
422  
423  
424  
425  
426  
427  
428  
429  
430  
431  
432  
433  
434  
435  
436  
437  
438  
439  
440  
441  
442  
443  
444  
445  
446  
447  
448  
449  
450  
451  
452  
453  
454  
455  
456  
457  
458  
459  
460  
461  
462  
463  
464  
465  
466  
467  
468  
469  
470  
471  
472  
473  
474  
475  
476  
477  
478  
479  
480  
481  
482  
483  
484  
485  
486  
487  
488  
489  
490  
491  
492  
493  
494  
495  
496  
497  
498  
499  
500  
501  
502  
503  
504  
505  
506  
507  
508  
509  
510  
511  
512  
513  
514  
515  
516  
517  
518  
519  
520  
521  
522  
523  
524  
525  
526  
527  
528  
529  
530  
531  
532  
533  
534  
535  
536  
537  
538  
539  
540  
541  
542  
543  
544  
545  
546  
547  
548  
549  
550  
551  
552  
553  
554  
555  
556  
557  
558  
559  
560  
561  
562  
563  
564  
565  
566  
567  
568  
569  
570  
571  
572  
573  
574  
575  
576  
577  
578  
579  
580  
581  
582  
583  
584  
585  
586  
587  
588  
589  
590  
591  
592  
593  
594  
595  
596  
597  
598  
599  
600  
601  
602  
603  
604  
605  
606  
607  
608  
609  
610  
611  
612  
613  
614  
615  
616  
617  
618  
619  
620  
621  
622  
623  
624  
625  
626  
627  
628  
629  
630  
631  
632  
633  
634  
635  
636  
637  
638  
639  
640  
641  
642  
643  
644  
645  
646  
647  
648  
649  
650  
651  
652  
653  
654  
655  
656  
657  
658  
659  
660  
661  
662  
663  
664  
665  
666  
667  
668  
669  
670  
671  
672  
673  
674  
675  
676  
677  
678  
679  
680  
681  
682  
683  
684  
685  
686  
687  
688  
689  
690  
691  
692  
693  
694  
695  
696  
697  
698  
699  
700  
701  
702  
703  
704  
705  
706  
707  
708  
709  
710  
711  
712  
713  
714  
715  
716  
717  
718  
719  
720  
721  
722  
723  
724  
725  
726  
727  
728  
729  
730  
731  
732  
733  
734  
735  
736  
737  
738  
739  
740  
741  
742  
743  
744  
745  
746  
747  
748  
749  
750  
751  
752  
753  
754  
755  
756  
757  
758  
759  
760  
761  
762  
763  
764  
765  
766  
767  
768  
769  
770  
771  
772  
773  
774  
775  
776  
777  
778  
779  
780  
781  
782  
783  
784  
785  
786  
787  
788  
789  
790  
791  
792  
793  
794  
795  
796  
797  
798  
799  
800  
801  
802  
803  
804  
805  
806  
807  
808  
809  
810  
811  
812  
813  
814  
815  
816  
817  
818  
819  
820  
821  
822  
823  
824  
825  
826  
827  
828  
829  
830  
831  
832  
833  
834  
835  
836  
837  
838  
839  
840  
841  
842  
843  
844  
845  
846  
847  
848  
849  
850  
851  
852  
853  
854  
855  
856  
857  
858  
859  
860  
861  
862  
863  
864  
865  
866  
867  
868  
869  
870  
871  
872  
873  
874  
875  
876  
877  
878  
879  
880  
881  
882  
883  
884  
885  
886  
887  
888  
889  
890  
891  
892  
893  
894  
895  
896  
897  
898  
899  
900  
901  
902  
903  
904  
905  
906  
907  
908  
909  
910  
911  
912  
913  
914  
915  
916  
917  
918  
919  
920  
921  
922  
923  
924  
925  
926  
927  
928  
929  
930  
931  
932  
933  
934  
935  
936  
937  
938  
939  
940  
941  
942  
943  
944  
945  
946  
947  
948  
949  
950  
951  
952  
953  
954  
955  
956  
957  
958  
959  
960  
961  
962  
963  
964  
965  
966  
967  
968  
969  
970  
971  
972  
973  
974  
975  
976  
977  
978  
979  
980  
981  
982  
983  
984  
985  
986  
987  
988  
989  
990  
991  
992  
993  
994  
995  
996  
997  
998  
999  
1000



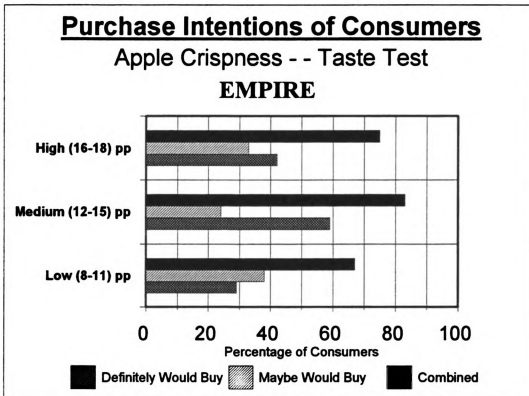
taste tests, some consumer participants indicated they thought the high pressure apple tasted immature, and some said the high pressure Red Delicious had “a tough, bitter skin.”

These results indicate that the Michigan apple industry needs to strive to provide apples of medium to high pressure at the time of consumer purchase. The consumer participants indicated that the low pressure apples are not likely to stimulate a repeat purchase. By contrast, the better condition apples of at least 12 -15 pounds pressure will likely induce consumers to make repeat purchases of apples based on this crispness level.

**5.3 Crispness Preferences for Empire.** The taste tests for Empire showed that the greatest percentage of the consumer preferred the Empires with at least the medium pressure of 12 - 15 pounds pressure. As shown in **Table 6** and **Figure 17**, 59% of the consumers said that they “definitely would buy” the medium pressure Empires. Another 24% said that they “maybe would buy” the Empires of this pressure. Thus a combined 83% of the consumer participants said that they either “definitely would buy,” or “maybe would buy” the Empires of medium pressure.

**Table 6: Purchase Intentions Related to Crispness of Empire Apples**

	<u>Low Pressure</u> (% of consumers)	<u>Medium Pressure</u> (% of consumers)	<u>High Pressure</u> (% of consumers)
<b>“Definitely Would Buy”</b>	<b>29%</b>	<b>59%</b>	<b>42%</b>
<b>“Maybe Would Buy”</b>	<b>38%</b>	<b>24%</b>	<b>33%</b>
<b><i>Combined</i></b>	<b>67%</b>	<b>83%</b>	<b>75%</b>
<b>“Indifferent”</b>	<b>6%</b>	<b>7%</b>	<b>10%</b>
<b>“Maybe Would Not Buy”</b>	<b>15%</b>	<b>6%</b>	<b>13%</b>
<b>“Definitely Would Not</b>	<b>12%</b>	<b>4%</b>	<b>2%</b>
<b><i>Combined</i></b>	<b>27%</b>	<b>10%</b>	<b>15%</b>



**Figure 17: Purchase Intention for Crispness of Empire**

The consumer responses to the lower pressure Empire (8 - 11 PP) showed that only 29% said that they “definitely would buy” these low pressure apples. This can be compared to the 59% who said that they “definitely would buy” the medium pressure (12 - 15 PP) Empire. On the other hand, 38% of the consumers said that they “maybe would buy” the lower pressure Empire. Thus, 67%, of the consumer participants said they either “definitely would buy” or “maybe would buy” these lower pressure Empires. Twenty-seven percent of the consumers indicated that they either “definitely would not buy” or “maybe would not buy” the low pressure Empires.

Comparing the consumer responses of the medium pressure Empire (12 - 15 PP) to the lower pressure (8 - 11 PP) seems to indicate that the greatest consumer satisfaction would be attained if the industry can deliver Empires at the 12 - 15 PP level of condition. On the other hand, there seems to be an acceptance by a significant percentage, 67%, of the consumer participants for the lower pressure Empire.

Comparing the consumer responses to the medium pressure Empire (12 - 15 PP) to the higher pressure apple (16 - 18 PP) provided some interesting results. That is, while 75% of the consumers said they either “definitely . . .” or “maybe would buy” the higher pressure Empire, a somewhat higher number of consumers, 83%, said they either “definitely . . .” or “maybe would buy” the medium pressure Empire. The difference was especially noticeable for the “definitely would buy” category with 59% of the consumer indicating this for the medium pressure Empire, and 42% saying they “definitely would buy” the Empires of higher pressure.

Perhaps these results were related to some of the consumers' perceptions that the taste or maturity levels of the higher pressure Empires were not quite as good. On the other hand, the combined difference was not great, with the combined responses of "definitely . . ." and "maybe would buy" at 83% for the medium pressure Empire and 75% for the higher pressure Empires.

**5.4 Comparison of Empire and Red Delicious Regarding Crispness.** The acceptance of the lower condition for the Empire by some consumers is especially noteworthy when compared to the consumers' responses to the lower pressure Red Delicious. That is, while 67% of the consumers said that they either "definitely would buy" or "maybe would buy" Empires of 8 - 12 pounds pressure (see Table 6), only 38% of consumers said they either "definitely would buy" or "maybe would buy" Red Delicious apples at this level of condition. In addition, 44% of consumers said they either "definitely would *not* buy" or "maybe would *not* buy" these lower pressure Red Delicious, while only 27% said they either "definitely would *not* buy" or "maybe would *not* buy" the lower pressure Empires. This indicates an acceptance by some consumers for a somewhat lower level of condition for Empire than for Red Delicious.

6.1 In

chara

on co

react

consi

some

provi

most

numb

and p

reacti

appea

Red D

were 8

based u

were re

accepted

chapter.

## **Chapter 6**

### **COLOR PREFERENCES BASED ON VISUAL TESTS**

**6.1 Introduction.** Fruit color is, as discussed in an earlier section of this report, a quality characteristic of importance to consumers and trade customers. Although earlier research on consumer preferences, such as from the telephone survey as well as focus group reactions from this project, indicate that the color of fresh apples is less important to consumers than crispness; a majority of consumers have indicated that color is at least somewhat important to them. Thus one important objective of this project was to provide information on the extent of color that is acceptable or preferred by consumers.

One objective of the visual tests was to identify what color (percentage red) was most preferred by consumers. This aspect seems to be especially relevant in light of a number of new varieties, some of which are not highly colored but seem to be accepted, and purchased, by consumers.

For the visual test phase of this project, consumers were asked about their reactions to the level of fruit color, their purchase intentions for each color, and the overall appeal to them for each level of color. Consumers rated three different color levels for Red Delicious, 90% red, 80% red, and 60% red color. For Empire, color levels tested were 80% red, 60% red, and 40% red. These levels of color for the two varieties were based upon the recommendations of industry leaders, who believed that these color ranges were realistically what could be produced by Michigan growers, and what is generally accepted by trade buyers. The results of these visual tests for color are reviewed in this chapter.

**6.2 Color Preferences for Red Delicious.** Results of the visual tests for Red Delicious showed that about the same percentage of consumer participants, 25 - 28%, said they “definitely would buy” either the 80% color or the 90% color apples (Figure 18 and Table 7). A substantial percentage, 53%, of the consumer participants said that they “maybe would buy” the 90% color Red Delicious compared to 42% of the consumer participants who said that they “maybe would buy” the 80% colored apples. Combining these two categories, 81% of the consumers said they either “definitely would buy” or “maybe would buy” the 90% color while 67% said they either “definitely would buy “ or “maybe would buy” the 80% color apples.

**Table 7: Purchase Intention for Color of Red Delicious Apples**

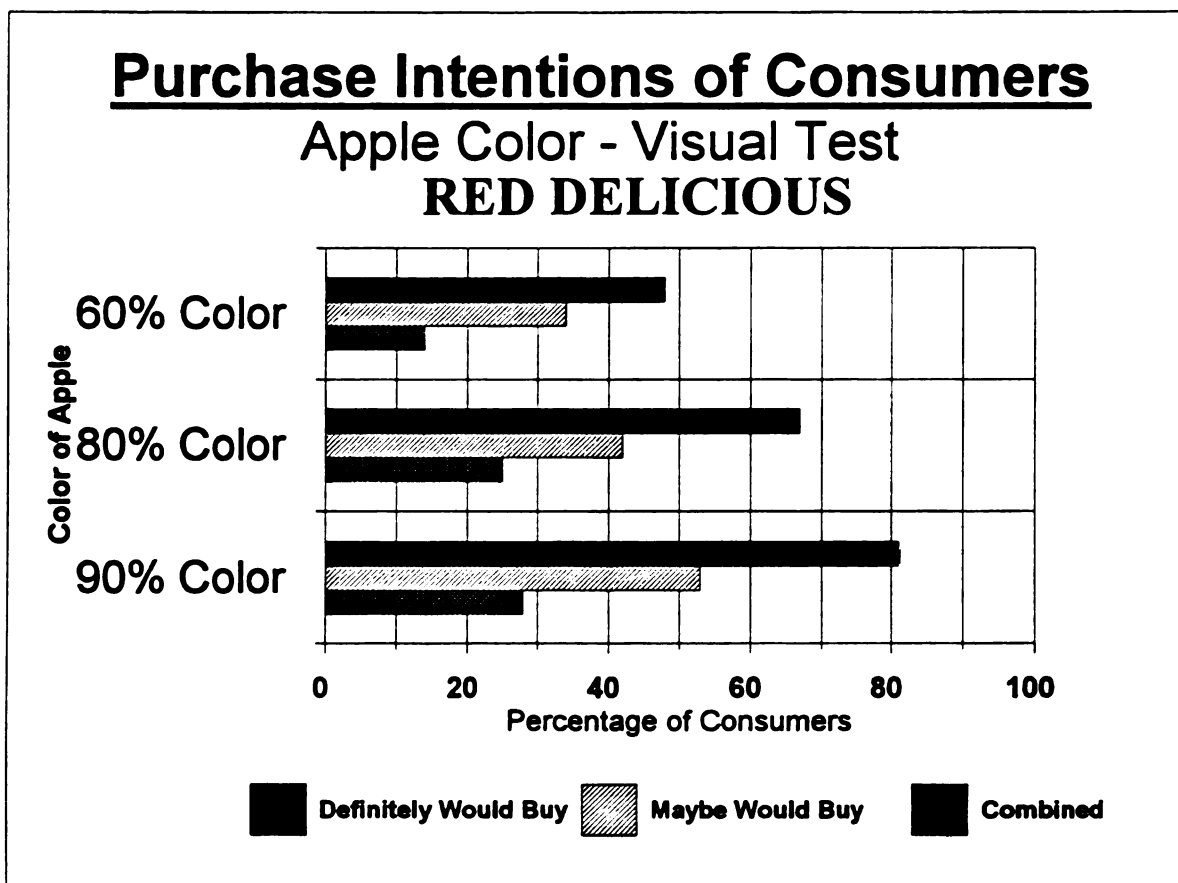
	<b><u>90% Color</u></b> (% of consumers)	<b><u>80% Color</u></b> (% of consumers)	<b><u>60% Color</u></b> (% of consumers)
<b>“Definitely Would Buy”</b>	<b>28%</b>	<b>25%</b>	<b>14%</b>
<b>“Maybe Would Buy”</b>	<b><u>53%</u></b>	<b><u>42%</u></b>	<b><u>34%</u></b>
<b><i>Combined</i></b>	<b>81%</b>	<b>67%</b>	<b>48%</b>
<b>“Indifferent”</b>	<b>13%</b>	<b>14%</b>	<b>22%</b>
<b>“Maybe Would Not Buy”</b>	<b>6%</b>	<b>13%</b>	<b>16%</b>
<b>“Definitely Would Not</b>	<b><u>0%</u></b>	<b><u>6%</u></b>	<b><u>14%</u></b>
<b><i>Combined</i></b>	<b>6%</b>	<b>19%</b>	<b>30%</b>

The relatively small difference in the percentage of consumers who indicated a preference for 90% color apples versus 80% color apples is very interesting. The similarity in the percentage of consumers who said they would buy either the 80% color or 90% color is surprising in view of the traditionally strong trade preference for very high colored Red Delicious apples. That is, these results indicate that though trade buyers often insist on buying Red Delicious apples with 90% or better red color, many

Color of Apple  
(C)

Figure





**Figure 18: Purchase Intention for Color of Red Delicious**

consumers are accepting of somewhat less red color. Two-thirds of consumers said they “definitely would buy” or “maybe would buy” 80% color Red Delicious apples. Thus it seems that for these consumers, 80% color is adequate.

A bigger division in preference was noticed between the 80% and 60% color Red Delicious than between the 80% and 90% colored Red Delicious. That is, only 48% of the consumers said that they either “definitely would buy” or “maybe would buy” the 60% color Red Delicious compared to the 67% who either “definitely would buy” or “maybe would buy” the 80% colored apples (Figure 18 and Table 7). This suggests that 60% color for Red Delicious falls below a decision threshold and is less than adequate for many consumers.

Along with their purchase intentions, consumers were asked about which of the different colored apples had high overall appeal, or “goodness” to them. This measure of goodness is viewed as an additional measure of consumer satisfaction with the product. The results for this question showed similar reactions to the purchase intention findings for the 90% color and 80% colored Red Delicious. That is, as Table 8 describes, although 64% of consumers thought the 90% color Red Delicious was either “extremely good,” or “somewhat good,” 55% of consumers thought the same of the 80% color apple. An equal amount, 36%, of consumers were “indifferent” to both the 90% and 80% color Red Delicious.

**Table 8: Overall Appeal for Color of Red Delicious Apples**

	<b>90% Color</b> (% of consumers)	<b>80% Color</b> (% of consumers)	<b>60% Color</b> (% of consumers)
<b>“Extremely Good”</b>	<b>12%</b>	<b>10%</b>	<b>8%</b>
<b>“Somewhat Good”</b>	<b>52%</b>	<b>45%</b>	<b>25%</b>
<b>Combined</b>	<b>64%</b>	<b>55%</b>	<b>33%</b>
<b>“Indifferent”</b>	<b>36%</b>	<b>36%</b>	<b>52%</b>
<b>“Somewhat Bad”</b>	<b>0%</b>	<b>9%</b>	<b>15%</b>
<b>“Extremely Bad”</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>
<b>Combined</b>	<b>0%</b>	<b>9%</b>	<b>15%</b>

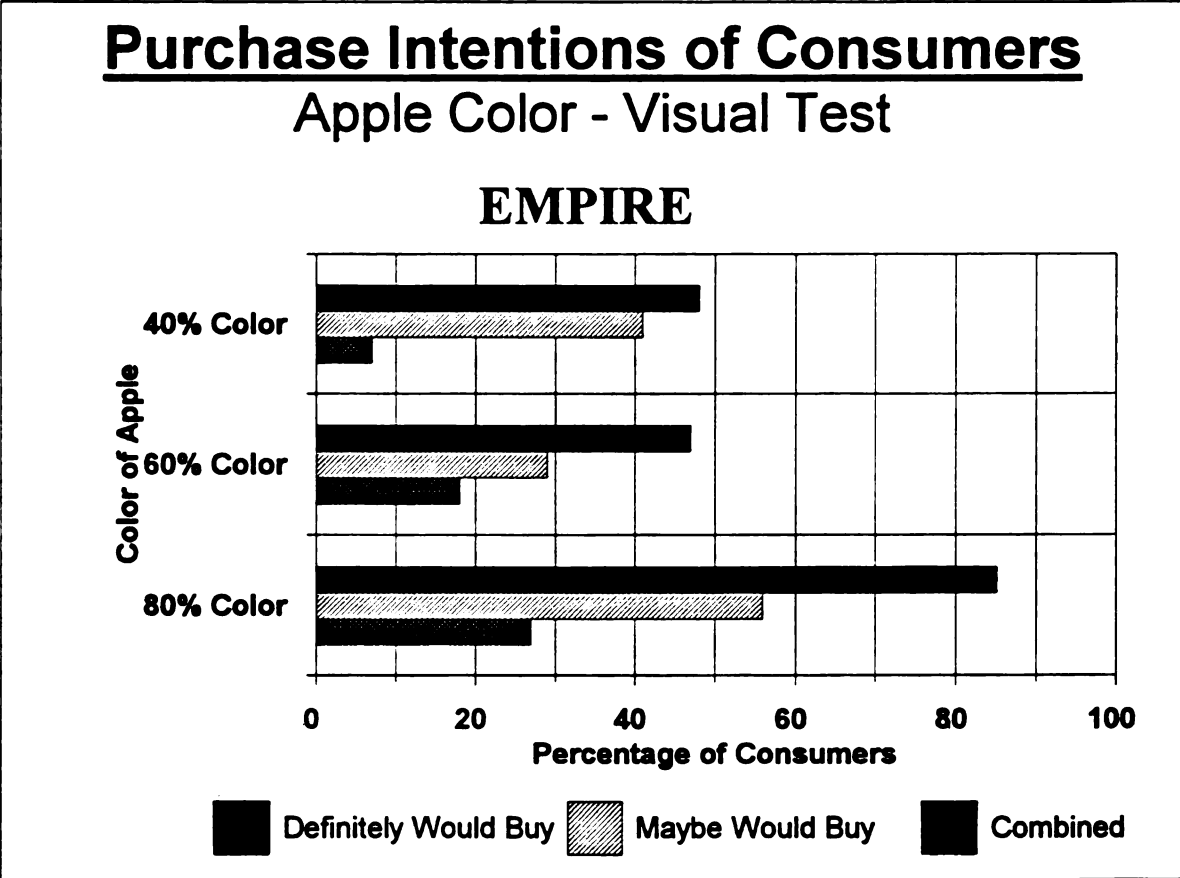
These data indicate that despite the emphasis frequently given to very high color by trade buyers, only a small percentage of consumers are more likely to purchase 90% colored apples over 80% colored apples. In fact, in discussions following the visual tests, consumers commented that some Red Delicious apples in grocery stores are “too red,” or look “too perfect” for their preferences.

**6.3 Color Preferences for Empire.** Results of the visual tests for color on Empire showed that the 80% color Empire received much higher rating by consumers than the 60% or the 40% color apples.<sup>2</sup> This was the case both in terms of indicated consumer purchase intentions and overall appeal ratings of the apples to consumers.

As shown in **Figure 19** and **Table 9**, a very high percentage of the consumer participants, 85%, indicated they “definitely would buy” or “maybe would buy” the 80% color Empire. By contrast, only 47% of consumers said the same for the 60% color, and 48% said so for the 40% color apple. This indicates that although most consumer participants were willing to buy an 80% color Empire, a substantially lower percentage

---

<sup>2</sup> These levels of the color range, which were lower than those tested with Red Delicious, were suggested by industry leaders because Empire tends to be less completely colored than Red Delicious.



**Figure 19: Purchase Intention for Color of Empire**

were willing to buy the 60% or 40% colored Empire. On the other hand, the results also show that almost as many consumers will buy 40% color Empire as the 60% colored apples of this variety.

As indicated by **Table 9**, only 1% of consumers participants said they “maybe would not buy” the 80% color Empire. By contrast, 24 - 28% of the consumer participants were negative toward the 60% and 40% color Empires in terms of purchase intent.

**Table 9: Purchase Intention for Color of Empire Apples**

	<b>80% Color</b> (% of consumers)	<b>60% Color</b> (% of consumers)	<b>40% Color</b> (% of consumers)
<b>“Definitely Would Buy”</b>	<b>27%</b>	<b>18%</b>	<b>7%</b>
<b>“Maybe Would Buy”</b>	<b>56%</b>	<b>29%</b>	<b>41%</b>
<b><i>Combined</i></b>	<b>85%</b>	<b>47%</b>	<b>48%</b>
<b>“Indifferent”</b>	<b>16%</b>	<b>29%</b>	<b>24%</b>
<b>“Maybe Would Not Buy”</b>	<b>1%</b>	<b>21%</b>	<b>18%</b>
<b>“Definitely Would Not</b>	<b>0%</b>	<b>3%</b>	<b>10%</b>
<b><i>Combined</i></b>	<b>1%</b>	<b>24%</b>	<b>28%</b>

As shown in **Table 10**, when consumers were asked about the overall appeal, or “goodness” of the apples with different levels of color, there was an overwhelming preference for the 80% color Empire. That is, 69% of the consumers thought the 80% color Empire was either an “extremely good,” or a “somewhat good” Empire. Far fewer of the consumer participants, 37%, thought so for the 60% color. An even smaller amount, of consumers, 28%, said the 40% color Empire was either an “extremely good” or a “somewhat good” apple. None of the consumers rated the 80% color Empire negatively

in terms of overall appeal, while 12% of consumers rated the 40% color Empire as “somewhat bad” (Table 10).

**Table 10: Overall Appeal for Color of Empire Apples**

	<b><u>80% Color</u></b> (% of consumers)	<b><u>60% Color</u></b> (% of consumers)	<b><u>40% Color</u></b> (% of consumers)
<b>“Extremely Good”</b>	<b>12%</b>	<b>2%</b>	<b>1%</b>
<b>“Somewhat Good”</b>	<b><u>57%</u></b>	<b><u>35%</u></b>	<b><u>27%</u></b>
<b><i>Combined</i></b>	<b>69%</b>	<b>37%</b>	<b>28%</b>
<b>“Indifferent”</b>	<b>31%</b>	<b>60%</b>	<b>60%</b>
<b>“Somewhat Bad”</b>	<b>0%</b>	<b>3%</b>	<b>12%</b>
<b>“Extremely Bad”</b>	<b><u>0%</u></b>	<b><u>0%</u></b>	<b><u>0%</u></b>
<b><i>Combined</i></b>	<b>0%</b>	<b>3%</b>	<b>12%</b>

These results indicate that color, as a “pre-purchase” attribute, may stimulate initial purchases of Empire by many consumers. These data indicate that for many consumers, a relatively high level of red color in Empire could significantly influence the decision to purchase Empire apples.

## **Chapter 7**

### **SIZE PREFERENCES BASED ON VISUAL TESTS**

**7.1 Introduction.** Results from earlier consumer market research projects, which were completed in close cooperation with the Michigan Apple Committee, indicate that a substantial percent of consumers prefer “medium” apples. In the earlier telephone survey (Ricks et al. 1995), when surveyed consumers were asked, “Do you prefer medium or large sized apples?,” 78% said they prefer “medium” size fruit. Because of these earlier research findings, an objective of the research project summarized in this thesis is to provide further information on what size of apples fits consumers’ perceptions, and hence their preferences for a “medium” apple.

Hopefully, this information on consumer preferences for size, including “medium” size apples, can be useful to marketing efforts of the Michigan apple industry. Perhaps with the consumer market research findings, the Michigan apple industry can influence more trade customers to purchase and merchandise more medium sized apples than in the past for fresh sales from Michigan. This could expand demand for Michigan apples, improving overall industry performance and providing consumers with desired attributes.

Consumer participants in the visual tests rated three different sizes of Red Delicious apples. Likewise, consumers rated three different sizes of Empire apples. The results from these visual tests for size are reviewed in this chapter.

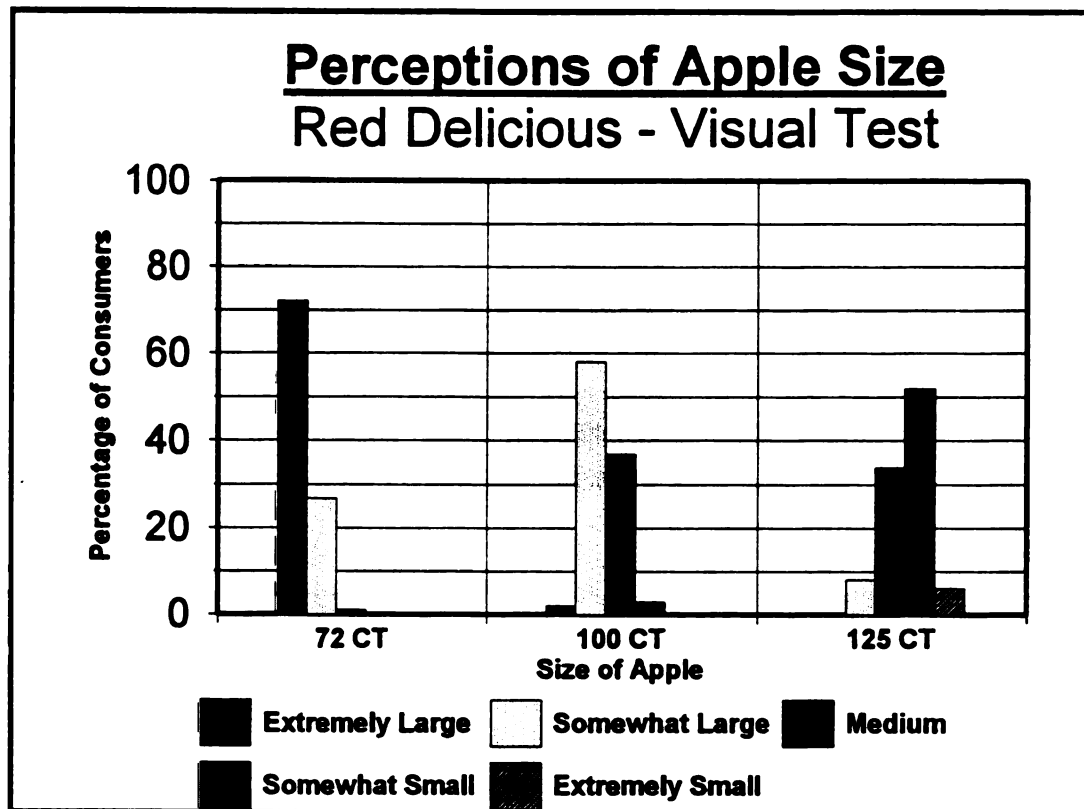
**7.2 Size Perceptions and Preferences for Red Delicious.** Consumers were asked to categorize the three different sizes (72, 100, and 125) of Red Delicious. The results show that 72% of the consumers rated the 72 size Red Delicious as “extremely large,” while almost all the rest of the consumers, 27%, considered it to be “somewhat large” (Table 11 and Figure 20). For the 100 size Red Delicious, 58% of the consumer participants said this size is “somewhat large,” with 37% rating it as a “medium” apple. A majority of consumers (52%) rated the 125 size as “somewhat small,” while 34% ranked this as “medium” in size. Thus, these results indicate that most consumers consider Red Delicious that are somewhere between 100 and 125 CT as “medium” size apples.

**Table 11: Perceptions for Size of Red Delicious Apples**

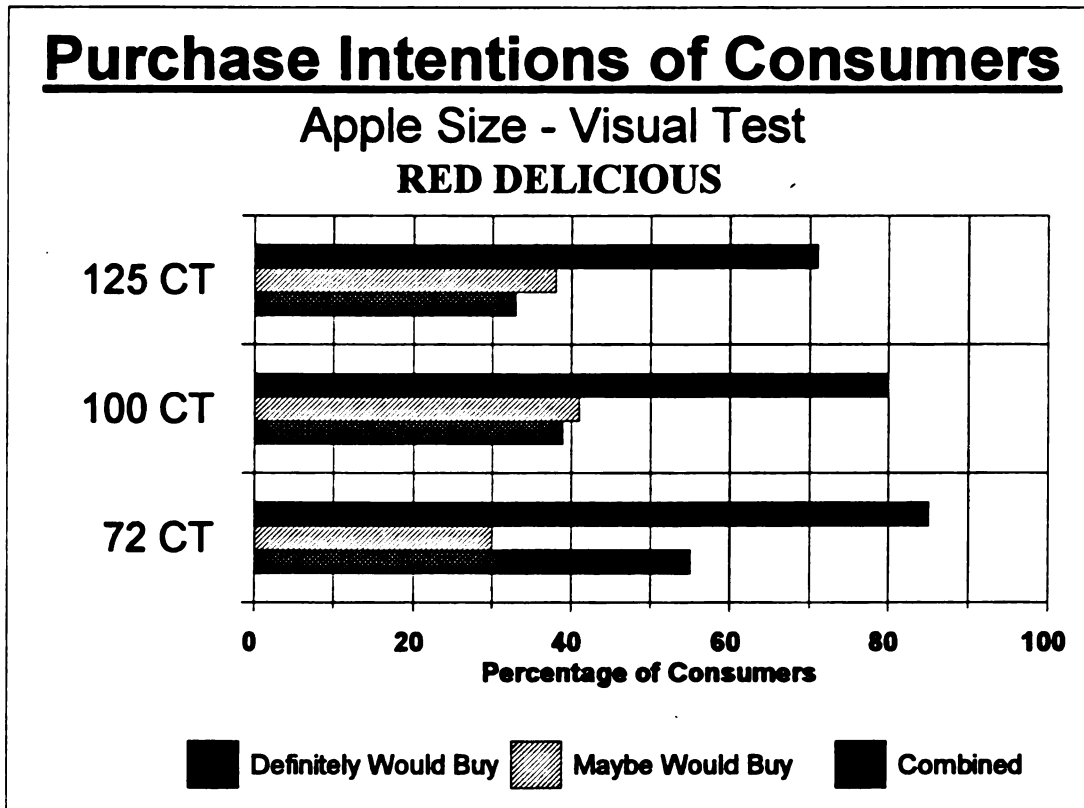
	<u>72 CT</u> (% of consumers)	<u>100 CT</u> (% of consumers)	<u>125 CT</u> (% of consumers)
<b>“Extremely Large”</b>	<b>72%</b>	<b>2%</b>	<b>0%</b>
<b>“Somewhat Large”</b>	<b>27%</b>	<b>58%</b>	<b>8%</b>
<b>“Medium”</b>	<b>1%</b>	<b>37%</b>	<b>34%</b>
<b>“Somewhat Small”</b>	<b>0%</b>	<b>3%</b>	<b>52%</b>
<b>“Extremely Small”</b>	<b>0%</b>	<b>0%</b>	<b>6%</b>

The research findings on consumers’ purchase intentions for the different sizes seem to be of particular importance. As shown in Table 12 and Figure 21, while 85% of the consumers said that they either “definitely” or “maybe would buy” the 72 size, almost as many, 80%, said that they either “definitely” or “maybe would buy” the 100 size. In addition, 71% of the consumers said that they either “definitely or “maybe would buy” the 125 size.





**Figure 20: Size Perception for Red Delicious**



**Figure 21: Purchase Intention for Size of Red Delicious**

**Table 12: Purchase Intention Related to Size of Red Delicious Apples**

	<u>72 CT</u> (% of consumers)	<u>100 CT</u> (% of consumers)	<u>125 CT</u> (% of consumers)
<b>"Definitely Would Buy"</b>	<b>55%</b>	<b>39%</b>	<b>33%</b>
<b>"Maybe Would Buy"</b>	<b>30%</b>	<b>41%</b>	<b>38%</b>
<b><i>Combined</i></b>	<b>85%</b>	<b>80%</b>	<b>71%</b>
<b>"Indifferent"</b>	<b>6%</b>	<b>11%</b>	<b>19%</b>
<b>"Maybe Would Not Buy"</b>	<b>6%</b>	<b>6%</b>	<b>6%</b>
<b>"Definitely Would Not Buy"</b>	<b>3%</b>	<b>3%</b>	<b>4%</b>
<b><i>Combined</i></b>	<b>9%</b>	<b>9%</b>	<b>10%</b>

These relatively small differences in purchase intentions for the different sizes add support to earlier research which shows that many consumers prefer medium size apples. These results also indicate that carrying either 100 or 125 size Red Delicious in grocery stores would be supported by considerable consumer preferences for and purchases of these sizes. This would be favorable for Michigan which, because of its climate conditions, produces fewer 72 size apples.

On the other hand, some consumers, as indicated by the results, prefer the larger apples. That is, there were 53% of consumers who indicated that they "definitely would buy" the 72 size compared to 39% who "definitely would buy" the 100 size and 33% who "definitely would buy" the 125 size. This tends to confirm retail grocers' common practice of carrying only large size tray-pack Red Delicious. In addition, however, the results on consumer purchase intentions provide evidence to support grocers carrying both a larger size such as 72 and a more medium-size such as 100 or 125.

In discussions following the visual tests for size, a number of consumers expressed a "lack of trust" for the quality, in regard to crispness, of large size apples,

which, they said, often “disappoint” them in this aspect. Consumers also said that medium to smaller size apples are more likely to be found at farm stands, grower markets, and orchards, which are places that consumers associate with “quality apples.”

Consumer participants were asked about the overall appeal or “goodness” of the apples. This aspect provided an additional measure of acceptability for each size of apple. For overall appeal of the three apples of different sizes, the larger apples rated the highest, with 79% of consumers rating the 72 size apples as either “extremely good,” or “somewhat good” (see Table 13). On the other hand, the 100 size apples rated almost as high, with 71% of the consumer participants rating these positively. The “goodness” scores for the 125 size were somewhat weaker, with 58% of consumers rating the size as either “extremely good,” or “somewhat good.” Yet, when the ratings of “extremely good,” “somewhat good,” and “indifferent” are combined, the overall appeal scores are very similar; 98% for 72 CT, 96% for 100 CT, and 96% for 125 CT. This indicates that none of the sizes were viewed negatively by consumers. The relatively high ratings by some consumers for medium size apples seems to offer another measure of relatively high consumer acceptance for the more medium sizes which may be of good potential for Michigan.

**Table 13: Overall Appeal Related to Size of Red Delicious Apples**

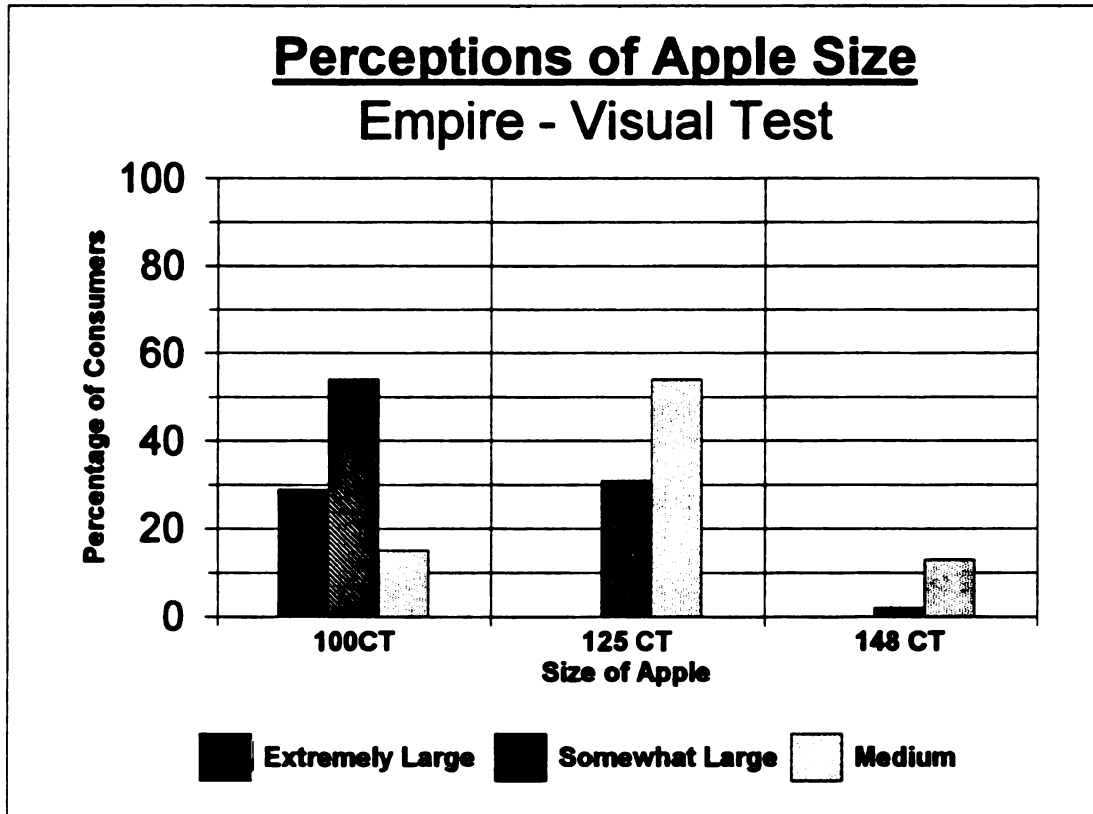
	<u>72 CT</u> (% of consumers)	<u>100 CT</u> (% of consumers)	<u>125 CT</u> (% of consumers)
<b>"Extremely Good"</b>	<b>34%</b>	<b>16%</b>	<b>6%</b>
<b>"Somewhat Good"</b>	<b><u>45%</u></b>	<b><u>55%</u></b>	<b><u>52%</u></b>
<b><i>Combined</i></b>	<b>79%</b>	<b>71%</b>	<b>58%</b>
<b>"Indifferent"</b>	<b>19%</b>	<b>25%</b>	<b>38%</b>
<b>"Somewhat Bad"</b>	<b>2%</b>	<b>4%</b>	<b>3%</b>
<b>"Extremely Bad"</b>	<b><u>0%</u></b>	<b><u>0%</u></b>	<b><u>1%</u></b>
<b><i>Combined</i></b>	<b>2%</b>	<b>4%</b>	<b>4%</b>

**7.3 Size Perceptions and Preferences for Empire.** Despite indicated consumer preference for medium sized apples, consumer participants in this project's visual tests rated the 100 size Empire considerably higher than the 125 and 148 size apples.

Similarly to Red Delicious, consumers were asked to categorize three tested sizes of Empire. For Empire these were 100, 125, and 148. As Table 14 and Figure 22 indicate, over half of the participants, 54%, perceived the 100 size as "somewhat large." The results also show that 29% of consumer participants perceived the 100 size as "extremely large," for a total of 83% of the consumers ranking it in the "large" category.

**Table 14: Perceptions of Size of Empire Apples**

	<u>100 CT</u> (% of consumers)	<u>125 CT</u> (% of consumers)	<u>148 CT</u> (% of consumers)
<b>"Extremely Large"</b>	<b>29%</b>	<b>0%</b>	<b>0%</b>
<b>"Somewhat Large"</b>	<b><u>54%</u></b>	<b><u>31%</u></b>	<b><u>2%</u></b>
<b><i>Combined</i></b>	<b>83%</b>	<b>31%</b>	<b>2%</b>
<b>"Medium"</b>	<b>15%</b>	<b>54%</b>	<b>13%</b>
<b>"Somewhat Small"</b>	<b>2%</b>	<b>15%</b>	<b>66%</b>
<b>"Extremely Small"</b>	<b><u>0%</u></b>	<b><u>0%</u></b>	<b><u>19%</u></b>
<b><i>Combined</i></b>	<b>2%</b>	<b>15%</b>	<b>85%</b>

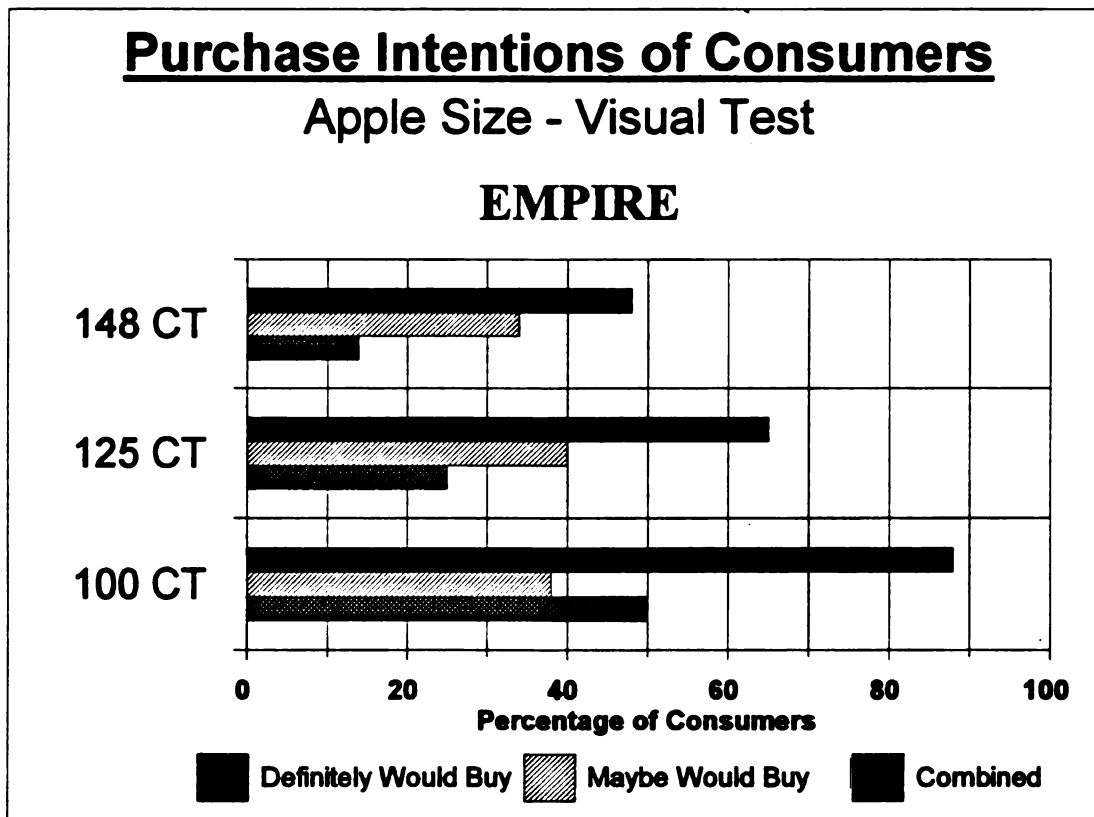


**Figure 22: Size Perception for Empire**

For the 125 size Empire, over half, 54%, of the consumers ranked this size as “medium,” while 31% perceived this size Empire to be “somewhat large.” Only 15% of the consumers rated the 125 CT Empire as “somewhat small.” These results indicate that consumers perceive 125 size Empire to be medium to somewhat large in size.

The reactions to the 148 size Empire were that 66% of consumer participants rated these as “somewhat small,” 13% rated it as “medium,” and 19% perceived it as “extremely small.” These reactions indicate that the 148 size tray pack Empire was perceived as small.

Purchase intention results for size indicate that consumers are more likely to purchase the largest size Empire tested, 100 size (Table 15 and Figure 23) than either of the smaller sizes. Eighty-eight percent of consumers said they “definitely would buy” or “maybe would buy” the 100 size Empire. On the other hand, nearly two-thirds of the consumers, 65%, said they either “definitely would buy,” or “maybe would buy” the 125 size Empire. For the 148 size, nearly half said they would buy this size. But nearly as many participants, 40%, said they either “maybe would not buy,” or “definitely would not buy” the 148 size Empire. These results indicate that a substantial majority of consumer prefer either the 100 or 125 size Empire.



**Figure 23: Purchase Intention for Size of Empire**



**Table 15: Purchase Intention Related to Size of Empire Apples**

	<u>100 CT</u> (% of consumers)	<u>125 CT</u> (% of consumers)	<u>148 CT</u> (% of consumers)
<b>"Definitely Would Buy"</b>	<b>50%</b>	<b>25%</b>	<b>14%</b>
<b>"Maybe Would Buy"</b>	<b>38%</b>	<b>40%</b>	<b>34%</b>
<b><i>Combined</i></b>	<b>88%</b>	<b>65%</b>	<b>48%</b>
<b>"Indifferent"</b>	<b>6%</b>	<b>29%</b>	<b>12%</b>
<b>"Maybe Would Not Buy"</b>	<b>4%</b>	<b>4%</b>	<b>28%</b>
<b>"Definitely Would Not Buy"</b>	<b>2%</b>	<b>2%</b>	<b>12%</b>
<b><i>Combined</i></b>	<b>6%</b>	<b>6%</b>	<b>40%</b>

The ratings for overall appeal for different sizes of Empire were similar to the purchase intention results, with 76% of consumers saying the 100 size Empire was either "extremely good," or "somewhat good." Although 50% of consumers rated the 125 size Empire positively, 49% were indifferent. Again, the ratings for the smaller, 148 size Empire were lower (Table 16), with 34% of the consumer participants saying the apples were either "extremely good" or "somewhat good." Thus the consumer responses on overall appeal of the apples again favor the large sizes of Empire.

**Table 16: Overall Appeal Related to Size of Empire Apples**

	<u>100 CT</u> (% of consumers)	<u>125 CT</u> (% of consumers)	<u>148 CT</u> (% of consumers)
<b>"Extremely Good"</b>	<b>32%</b>	<b>7%</b>	<b>5%</b>
<b>"Somewhat Good"</b>	<b>44%</b>	<b>43%</b>	<b>29%</b>
<b><i>Combined</i></b>	<b>76%</b>	<b>50%</b>	<b>34%</b>
<b>"Indifferent"</b>	<b>22%</b>	<b>49%</b>	<b>54%</b>
<b>"Somewhat Bad"</b>	<b>2%</b>	<b>1%</b>	<b>12%</b>
<b>"Extremely Bad"</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>
<b><i>Combined</i></b>	<b>2%</b>	<b>1%</b>	<b>12%</b>

**7.4 Comparison of Empire and Red Delicious Regarding Size.** In light of the Red Delicious results for size, results from the Empire tests indicate that size perception is relative by variety. This is evident by comparing the results of both the 100 size Empire and 100 size Red Delicious, as illustrated in Table 17.

**Table 17: Perceptions for 100 Size Apples Empire vs. Red Delicious**

	<u><b>EMPIRE</b></u> (% of consumers)	<u><b>RED DELICIOUS</b></u> (% of consumers)
<b>“Extremely Large”</b>	<b>29%</b>	<b>2%</b>
<b>“Somewhat Large”</b>	<b>54%</b>	<b>58%</b>
<b><i>Combined</i></b>	<b>83%</b>	<b>60%</b>
<b>“Medium”</b>	<b>15%</b>	<b>37%</b>
<b>“Somewhat Small”</b>	<b>2%</b>	<b>3%</b>
<b>“Extremely Small”</b>	<b>0%</b>	<b>0%</b>
<b><i>Combined</i></b>	<b>2%</b>	<b>3%</b>

The majority of consumer participants, 54%, rated the 100 size Empire as “somewhat large.” Although a similar percentage of consumers rated the 100 size Red Delicious as “somewhat large,” 37% of consumers said it was “medium,” versus 15% of consumers who rated the 100 size Empire as medium. These data are compared in Table 17. In addition, 29% of consumers said the 100 size Empire was “extremely large,” while only 2% of consumers said the same for the 100 size Red Delicious.

These results indicate that consumer perceptions of what is a “large” or “medium” apple are dependent somewhat upon variety. For instance, with Red Delicious, since consumers are more likely to see larger sizes of apples displayed in tray-pack more often, thus the perceptions of size may be based on these previous shopping experiences.

Although the results for Empire tend to indicate an overall preference for the larger, 100 size apples, results for the 125 size were generally favorable too. These research results indicate that consumers prefer Empire sizes between 125 and 100.

## **Chapter 8**

### **CONSUMER PREFERENCES FOR BAGGED APPLES BASED ON VISUAL TESTS**

**8.1 Introduction.** Bagged apples are very important to the Michigan apple industry because they represent a large majority of the state's fresh apple sales. Therefore, the opinions and preferences of consumers regarding bagged apples may be quite important to the strategic planning for that sector of the Michigan apple industry. Shippers, packers, growers, and trade customers can hopefully use this consumer market information to further improve performance in bagged apple sales.

In addition to tray-pack Red Delicious and Empire, consumer participants in this project visually examined and rated bagged Red Delicious or Empire apples on a number of aspects including purchase intentions and overall appeal. The sizes of apples in these bags were a minimum of 2 1/2 inches in diameter, thus approximately between 136 and 148 CT size.

In the focus group discussions following these visual tests, consumers expressed their likes and dislikes concerning bagged apples. The results of the visual tests and the focus group discussions follow in this section.

**8.2 Purchase Intention for Bagged Apples.** As Table 18 indicates, the consumer participants rated tray-pack apples much more positively than the bagged apples. While only 35% of the consumer participants said that they either "definitely would buy" or "maybe would buy" the Red Delicious in bags, 85% of the consumer participants said the

**Table 18: Purchase Intention for Bagged Apples vs. Bulk Apples**

<u>APPLE</u>	<u>Definitely</u> <u>Would Buy</u> (% of consumers)	<u>Maybe</u> <u>Would Buy</u> (% of consumers)	<u>Combined</u> (% of consumers)	<u>Indifferent</u> (% of consumers)	<u>Maybe Would</u> <u>Not Buy</u> (% of consumers)	<u>Definitely Would</u> <u>Not Buy</u> (% of consumers)	<u>Combined</u> (% of consumers)
Red Del Bags	16%	19%	35%	23%	23%	19%	42%
Red Del 72 CT	55%	30%	85%	6%	6%	3%	9%
Red Del 100 CT	39%	41%	80%	11%	6%	3%	9%
Red Del 125 CT	33%	38%	71%	19%	6%	4%	10%
Empire Bags	7%	37%	45%	30%	19%	7%	26%
Empire 100 CT	50%	38%	88%	6%	4%	2%	6%
Empire 125 CT	25%	40%	65%	29%	4%	2%	6%
Empire 148 CT	14%	34%	48%	12%	28%	12%	40%

same for the 72 size tray-pack apples. Similarly, 80% of the consumer participants said they either “definitely would buy” or “maybe would buy” the 100 size Red Delicious and 71%, of the participants, said they would buy the 125 size Red Delicious from bulk retail displays. These data indicate a significantly higher purchase intention by the consumer participants for the sizes of tray-pack Red Delicious apples that were evaluated versus the bagged Red Delicious.

Compared to the Red Delicious tray-pack apples, a larger proportion of the consumer participants, 45%, said they would not buy the Red Delicious in bags. Only 9% of the consumer participants said they either “maybe would not buy” or “definitely would not buy” the 72 size Red Delicious. An equal amount, 9%, said the same for the 100 size Red Delicious, and 10% said the same for the 125 size Red Delicious. These data again indicate that consumers are less likely to purchase bagged Red Delicious apples over tray-pack Red Delicious.

In the Empire tests, 45% of the consumer participants said they either “definitely would buy” or “maybe would buy” the Empire in bags. A similar percentage, 48%, said they would buy the 148 size tray-pack apples. As mentioned earlier, the bagged apples varied in size between 136 and 148. Thus, these data indicate that consumers are less likely to purchase these smaller sizes of apples regardless if they are bagged or not.

By comparison, a much larger percentage, 88%, said they would buy the 100 size tray-pack Empires. Nearly two-thirds of the consumer participants, 65%, said they either “definitely would buy” or “maybe would buy” the 125 size tray-pack Empires.

As with the Red Delicious, the consumer participants indicated they would be less likely to purchase bagged Empires versus tray-pack. While 26% of the consumer participants said they either “maybe would not buy” or “definitely would not buy” the bagged Empires, only 6% of the consumer participants said the same for the 125 size and the 100 size tray-pack Empires.

However, a greater percentage of the consumer participants, 40%, said they would not purchase the 148 size apples. These data indicate that although consumers may be more likely to purchase tray-pack apples, there is some threshold size where the acceptance and purchase intention levels for tray-pack apples diminishes. Although the bagged Empire apples were likely to have been between 136 and 148 in size, consumers preferred them over the smaller, tray-pack Empires. This is a significant finding considering the indicated low purchase intention for bags overall.

**8.3 Focus Group Discussions on Bagged Apples vs. Tray Pack Apples.** In the focus group discussions which followed the visual test ratings of the bagged apples, consumer participants further explained their negative attitudes toward bagged apples.

Many consumers described previous bad experiences with bagged apples, in terms of condition of apples at the time of purchase. Several consumers mentioned poor quality in association with bags, believing that bagged apples are “lower grade” apples. For example, a woman said although she often buys bagged apples, she “knows she’ll have to throw half of them away.” Many of these comments stemmed from experiences where consumers bought bagged apples, then discovered that many of the apples were bruised.

Consumers mentioned that “not being able to see, touch, and smell the apples” hinders the decision to purchase bagged apples. Several consumers said it is difficult to see apples in bags because of the colored logos on the bags, thus these consumers were unsure about the quality of the apples inside.

Some consumer participants mentioned that bagged apples are good for cooking, because appearance is of less importance. On the other hand, several other consumers said that they were less likely to buy bagged apples for cooking because, since they are smaller, they would have to peel and slice more apples. These consumers said they would rather buy a few large apples for use in cooking.

A few consumers said they favor bagged apples. Some of these consumers said they buy bagged apples out of convenience, or because the price is so low. A few consumers mentioned that bagged apples are often featured as a “buy one get one free” item. In addition, several consumers mentioned that certain varieties are only sold in bags, and thus must be bought bagged, if at all. These consumers mentioned that although they buy the variety in bags, they would prefer to choose their own apples out of a bulk display because they could be assured of higher quality.

When they do buy bags, the consumer participants indicated they are most likely to buy them at certain times of the year. Consumer participants most often mentioned buying bagged apples in the fall either in grocery stores, at orchards, and at farm markets. These consumers said they believe the quality of bagged apples is better in the fall than later in the winter or spring.



In addition, some consumers said they are more likely to buy certain varieties in bags more often. These varieties tend to be the varieties with smaller sized fruit. Some said that they buy them to be given to children or put in school lunches. Some consumers mentioned that varieties like McIntosh are sometimes only found in bags, thus had to be purchased in bags.

**8.4 Overall Appeal of Bagged Apples.** The data from the overall appeal ratings portion of the visual tests reiterate the negative attitudes many consumers have towards bagged apples versus bulk. As evident from **Table 19**, the consumer participants rated the tray-pack apples more positively in terms of the overall appeal or “goodness.” While 24% of the consumer participants said that the Red Delicious bags were either “extremely good” or “somewhat good,” a much higher, 79%, of the participants said the same for the 72 size Red Delicious. Slightly less, 71%, said the same for the 100 size, and 58% rated the 125 size as good. Therefore, all sizes of the tray-pack Red Delicious were rated much higher by consumers in regard to overall appeal than were the bagged apples.

One quarter of the consumer participants, 25%, perceived the bagged Red Delicious as either “somewhat bad” or “extremely bad,” while far fewer of the participants viewed the tray-pack Red Delicious negatively. Only 2% of the consumer participants perceived the 72 size as “bad.” The 100 and 125 sizes of tray pack Red Delicious were rated “somewhat bad” or “extremely bad” by only 4% of the consumer participants.

**Table 19: Overall Appeal for Bagged Apples vs. Bulk Apples**

<u>APPLE</u>	<u>Extremely Good</u> (% of consumers)	<u>Somewhat Good</u> (% of consumers)	<u>Combined</u> (% of consumers)	<u>Indifferent</u> (% of consumers)	<u>Somewhat Bad</u> (% of consumers)	<u>Extremely Bad</u> (% of consumers)	<u>Combined</u> (% of consumers)
Red Del. Bags	8%	16%	24%	52%	20%	5%	25%
Red Del. 72 CT	34%	45%	79%	19%	2%	0%	2%
Red Del. 100 CT	16%	55%	71%	25%	4%	0%	4%
Red Del. 125 CT	6%	52%	58%	38%	3%	1%	4%
Empire Bags	1%	22%	23%	71%	6%	0%	6%
Empire 100 CT	32%	44%	76%	22%	2%	0%	2%
Empire 125 CT	7%	43%	50%	49%	1%	0%	1%
Empire 148 CT	5%	29%	34%	54%	12%	0%	12%

The overall appeal ratings for Empire in bags were similar to the purchase intention results of bagged vs. tray-pack Empires. Less than a quarter of the consumer participants, 23%, said that the Empire in bags were either “extremely good” or “somewhat good,” while over three-quarters, 76% of the consumer participants said the 100 size Empires were good. Though 50% of the participants said the 125 size was good, slightly less, 34% ranked the 148 size Empire in the good category.

The Empire in bags were not rated quite as negatively as the bagged Red Delicious. Only 6% of the consumer participants said the Empire bags were either “somewhat bad” or “extremely bad.” Two percent of the consumer participants said the 100 size Empire was bad, and even fewer, 1%, of the consumer participants said the 125 size was bad. Yet 12% of the consumer participants said the 150 size Empire was either “somewhat bad” or “extremely bad.” These data again illustrate that although the bagged Empire apples are generally preferred less than the tray-pack Empires, there is a size threshold to the acceptance level of tray-pack Empires over bagged Empires. This preference for the bagged Empires over the smallest tray-pack Empires may be due to the fact that the bagged Empires were larger in size.

## **Chapter 9**

### **Highlights from the Focus Group Discussions**

**9.1 Introduction.** During the focus group phase of this research project, the consumer participants further discussed their preferences and buying behaviors regarding fresh apples. This focus group format allowed for some expression of ideas and individual preferences as well as synergistic discussions by the consumer participants.

During these focus groups, several themes and issues emerged and were repeated. These patterns of consumer perceptions are important to discuss since they indicate possible future preferences, behavior patterns, and concerns of consumers which may help to guide appropriate future strategies of the Michigan apple industry. In the following paragraphs some of the most often mentioned issues and concerns are discussed.

**9.2 The Importance of Crispness to Apple Quality.** In the focus group discussions, consumer participants were asked about what is most important to them regarding the quality of fresh apples. Clearly, consumer participants most often expressed the overall importance of crispness to the overall quality of an apple. Many consumers said that buying soft, mushy apples is the main reason they would decide to *not* buy certain apples or an apple variety again. These consumers indicted that soft, mushy apples are often found in the retail environment. Surprisingly, a number of these consumers understood that soft apples may be a result of low or no refrigeration and poor handling at the store

level instead of poor handling by growers or shippers. One focus group participant stated these thoughts as follows:

...even if the grower could grow the perfect apple, it goes on to processing and further handling. There can be a lot of damage done in that process, so I think the overall quality is a function of the whole process, from the picking of the apple to the time it is in the store and handled by the consumer. . .

These comments emphasize the need for quality control throughout the production, shipping, and merchandising process. This information can assist the Michigan apple industry in communicating to trade customers the importance of proper refrigeration for apples as they are transported through the marketing chain. For instance, retail produce departments can do more to preserve the quality of apples by refrigerating them.

**9.3 Influencing Consumers to Buy a New Variety.** Initial purchase of a new variety of apple as well as sustained repeat purchases are very important to the overall long-term success of new varieties in the retail environment. As part of the focus group discussion, consumers were asked, “What would most influence you to buy a new variety of apple?”.

In answering this question, consumer participants most often mentioned that they would like to taste or sample the new apple variety. In addition they mentioned wanting information about the new apple’s characteristics as a way to be introduced to a new variety through sampling. Some consumers mentioned that because apples brown so quickly, it would be necessary for a demonstration representative, or store employee to be in the produce department, cutting the apples as people shop. Consumers mentioned

that this person should be knowledgeable about the apple in order to discuss it and its characteristics with consumers.

In addition, a low price, or special promotion was mentioned by many consumers as a feature that would encourage them buy a new variety of apple. However, these consumers mentioned that low-priced apples must be high in quality, unblemished, and appear fresh. In other words, consumers are very unwilling to sacrifice quality for a lower price.

Several consumers stressed that they would be much more likely to purchase new varieties of apples from a tray-pack display rather than in bags. These consumers prefer tray-pack because they can only buy a few apples to see if they like the new variety before buying an entire bag. They said that they would be reluctant to buy a whole bag of a new variety the first time they tried it.

In general, these consumer comments indicate that high quality information about the variety and a promotional/price campaign are important to the success of a new variety.

**9.4 Apples in the Retail Environment.** Consumer participants spent a small portion of the focus group sessions discussing how and when apples are purchased and their previous apple buying experiences.

Many consumer indicated displeasure with seeing grocery store employees “abuse” apples, causing bruises and blemishes. These consumers said many times they see produce employees literally dumping boxes of apples onto displays. Thus, the consumers were less likely to buy those apples, fearing that the quality would not be

good due to this in-store damage. A few consumers also mentioned seeing bags of apples piled “too high.” These consumers perceived that the apples at the bottom of these displays would be bruised.

Several consumers said they avoid apple displays if produce employees neglect to remove bad or unappealing looking apples. These consumers mentioned that if they see several bad apples in a display, they perceive that the quality of those apples is low. Thus the saying, “one bad apple spoils the bunch” seems to be what some consumers perceive to be true.

A number of consumers mentioned that apples are also often abused in the check-out lane by cashiers or baggers. These consumers mentioned previous retail experiences where apples were placed at the bottom of a grocery bag, with other heavier items placed on top of the apples, bruising the fruit and thus reducing the quality.

Many consumers mentioned that they think the treatment of apples at the retail level is often the most important step in quality assurance. For example, a consumer participant noted, “if the apple is abused at the store, or on the way out of the store, the quality is totally gone.” This market information is very important considering that the retail environment is the last step in the apple marketing value chain before the apples reach the consumer. This consumer realized, as the Michigan apple industry has emphasized, that grocery retail employees and trade customers must understand the importance of apple refrigeration and handling as a key to insuring quality handling to the consumers. Thus, this information about how consumers perceive the retail treatment of

apples could be utilized to communicate the importance of quality control to trade customers.

In the focus group discussions, consumers were asked to describe aspects of the retail environment which attract them to apples, or influence them to buy apples. Many consumers indicated that although they don't necessarily choose the more attractive, bright, shiny apples, those apples are often very important in attracting them to the apple section of the produce department. A consumer participant mentioned, for example, that he "looks for the big, shiny, red apples, then goes over and buys the bagged apples." On the other hand, some consumers mentioned being turned off by apples that look "too perfect" in terms of color and shine.

Many consumers said they enter the produce department looking for a certain variety and proceed directly to it. These consumers expressed positive previous experiences with these varieties which they look for because of these consistencies in quality. Granny Smith, Gala, Fuji and McIntosh were mentioned as varieties consumers often look for in the produce section.

Most consumer participants said that the overall appearance of apples in apple displays is of greatest importance. Many consumers expressed being turned off by bruised or blemished fruit. In fact this was given as a reason many consumers decide not to buy certain apples. This result is similar to earlier findings in the telephone survey where consumers said that "unblemished and unbruised" was the second most important factor in the apple purchase decision.



**9.5 Information for Consumers About Apples- - Needs and Desires.** When asked about the need for more information about apples, consumers most often mentioned the need for more information about the characteristics of specific varieties of apples, information about the different uses for apples based on variety, and information about the nutritional quality of apples.

In general, consumer participants said they would like more information about apples. Consumers are not only interested in what different apples can be used for (cooking, eating, etc.), but they are also interested in knowing more about the characteristics of apples such as flavor and crispness level of certain apple varieties. Several consumers mentioned that this type of information is more often available in the fall, but should be available year - round.

Although a few consumer participants recalled seeing consumer information about apples in larger grocery chains' produce departments, on small signs, far more of the consumer participants did not mention seeing it in these traditional retail outlets.

Yet many consumers did mention seeing consumer information about the different characteristics of varieties of apples, and uses for those varieties at farm markets and orchards. These consumers said that this information was often printed on eye-catching, big, colorful signs, which were attractive and easy to read. In addition, these consumers said that employees at these outlets are more often able and willing to give information about the different varieties of apples than employees of traditional grocery produce departments.

This information indicates that the presentation of information about varieties of apples at farm markets and orchards may have more of an impact on consumers than the information presented at traditional grocery stores.

## **9.6 Variety Preferences.**

### **Favorites**

- **Granny Smith**
- **McIntosh**
- **Golden Delicious**
- **Older varieties found on orchards (e.g. Northern Spy)**

Most consumers said that they liked the above varieties because of the taste and consistency in high quality condition. Because these consumers had positive buying and eating experiences with these apples, they said that they tend to buy them over and over again.

### **Dislikes**

- **Red Delicious**
- **Soft, mushy apples**

The dislike for Red Delicious frequently was expressed during the Red Delicious taste tests, when consumers said they didn't like Red Delicious because of previous bad experiences with this variety. These experiences were usually associated with phrases like "[Red Delicious have] poor or no flavor," "[Red Delicious are] mealy, mushy apples," or "[Red Delicious] apples are too big."

Interestingly, the Red Delicious apples that were tasted in the taste tests were described as "surprisingly good" by a high number of the consumer participants. Many said that they "don't usually buy Red Delicious of this quality." This indicates that by

the time consumers purchase and eat Red Delicious apples, they are likely below the quality levels preferred in the consumer taste tests, (i.e. 12 - 15 pounds or higher.)

**9.7 Purchases from Farm Markets and Orchards.** A number of the consumer participants indicated a preference for buying apples directly from farm markets, road-side stands, and U-pick orchards, especially in the fall. Some consumer participants said they prefer apples from these outlets because the apples tend to be better and seem more “natural.” Many consumer participants tend to positively associate these types of retail outlets with freshness, crisp apples, unwaxed apples, knowledgeable employees, and more product information about each variety of apple.

Consumers said that at these types of retail outlets, they can taste certain varieties of apples before they purchase them, which helps to influence purchase of those varieties, and give the consumers new information about the variety. This indicates again the importance of tastings and information about certain varieties to influence purchases.

**9.8 Dislikes Regarding Fresh Apples.** When consumers were asked about what they *don't* like about apples, consumers mentioned the PLU stickers that are placed on individual apples, wax, pesticide residue and the limited availability of organics.

Consumers said that they don't like the PLU stickers for several reasons. Some consumers said that the stickers are hard to remove, or that the apples are damaged when they remove the stickers. Several consumers also said they are not sure what the sticker is made of, or what kind of adhesive is used to apply the sticker. These comments were sometimes from mothers of small children, who were concerned about children accidentally eating the stickers.

On the other hand, some consumers mentioned that they understand the need for the stickers in terms of pricing. Because there are so many varieties of apples in grocery stores now, these consumers said they do not want to be charged the wrong price for apples. In addition, several consumers indicated that the stickers with “lift-off tabs” are easier to remove than the other stickers.

Some consumer participants mentioned that stickers with more information would be helpful. In this regard, the consumers mentioned several informational aspects such as, variety name, suggested uses, organic (if the label applies), nutritional information, and flavor (sweet or sour) as items that, if placed on a PLU stickers, would make the stickers more informative and helpful to the consumers in their purchase decisions.

Although some consumers mentioned that they like shiny, waxed apples, some other consumers mentioned that they don’t like wax, preferring the fresh, natural look of apples. These consumers mentioned preferring apples from orchards or “just picked from a tree.”

Some consumers said they don’t like the wax that is applied to apples, they think it may be bad or harmful. These consumers said they want more information about the safety of the wax, and its ingredients.

Many of the consumer participants in the focus groups said they understand the need for pesticides, but were unsure about the safety and long-term effects of their use. Although a large number of consumer participants stressed the desire for unblemished and unbruised fruit, some of these same consumers mentioned concerns about pesticide residues. This dichotomy is interesting and could be an area for future research. It may

be helpful to investigate what amount of damage, due to a reduction of pesticide use, would be acceptable to consumers.

A few consumers mentioned that they tend to look for “organic” apples when shopping. These consumers mentioned that “organic” apples are hard to find, and, most often, are much more expensive than “non-organic” apples. These consumers said they would buy “organic” apples if they could find them regularly and afford them. The discussion did not include the extent of damage these consumers would accept with “organic” apples.

## **Chapter 10**

### **SUMMARY**

**10.1 Introduction.** In order to effectively compete for fresh market sales, Michigan must continue to provide apples with characteristics that are desired by consumers.

The main purpose of this thesis is to provide the Michigan apple industry with more specific information on consumer preferences for fresh apples in regard to various aspects of quality. In this research project, taste and visual tests of apples were used to investigate consumer preferences for crispness, color, and size.

**10.2 Review and Implication of Findings.** In terms of crispness, consumer participants expressed a high purchase intention for apples with at the least the medium pressure (12 - 15 PP) for both the Red Delicious and Empire apples. At lower pressures (8-11 PP) the consumers' indicated purchase intention percentages were significantly lower. The results in regard to crispness seem to indicate that the highest customer satisfaction will be attained if the industry can deliver at least 12 - 15 PP apples to consumers at the time of purchase.

However, during the taste tests, consumer participants were quick to say that they are rarely impressed with the crispness levels of apples they buy at grocery stores. Many consumers mentioned that when they do buy crisp apples, they tend to buy the same variety of apple again, concerned that a new choice may not be as crisp.

This information regarding the specific preferences for crispness is especially relevant due to the importance placed upon crispness by both trade customers and consumers. This data indicates that the quality level of apples, in terms of condition, is very important to consumers. The Michigan apple industry can utilize this data to continue to communicate to trade customers the importance of maintaining apple quality throughout the apple marketing process.

In terms of color, for Red Delicious, there was very little difference in the percentage of consumers who said they would buy the 90% color versus the 80% color. Though for Empire, consumers indicated they were significantly more willing to buy the 80% color than the 60% or 40% color apples. Newer varieties of apples with less than full red color have, to some degree, expanded the apple color palette for consumers. In focus group discussions, consumers indicated a preference for some of these newer varieties, like Gala and Fuji. Because of positive experiences with these varieties, in regard to quality, many consumers indicated they are more willing to try new, “different” types of apples, regardless of the color.

Again this data can be helpful to the Michigan apple industry - trade relations, perhaps in influencing trade customers to reduce the historic emphasis on high red color when purchasing apples. Data from this research project indicate that consumers may be about as willing to buy 80% color apples versus 90% color apples. Overall, consumers tend to be more concerned with the outer appearance of apples rather than the extent of red color, desiring apples that are unblemished and unbruised. In addition, as reported in

Chapter 4, only 25% of surveyed consumers consider color to be “extremely important” in the purchase decision.

In earlier consumer market research efforts, specifically the telephone survey conducted at Michigan State, consumers indicated an overall preference for “medium” sized apples versus “large” or “small” apples. A priority of the visual tests in this current research project was to estimate what size of apples consumer perceive to be “medium,” and whether they prefer them over “larger” or “smaller” apples in terms of purchase intention.

For Red Delicious, consumer participants perceived a “medium” size Red Delicious to be somewhere between 100 and 125 size. On the other hand, 85% of the consumers said they either “definitely would buy” or “maybe would buy” the 72 size apple. This apple, the largest of the three that were evaluated, was perceived by 72% of consumers to be “extremely large.” But, nearly as many consumers, 80%, said they either “definitely would buy” or “maybe would buy” the 100 size apples, and 71% of the consumers said they would “definitely would buy” or “maybe would buy” the 125 size apples.

For Empire, consumer participants indicated they were somewhat more likely to purchase the largest, 100 size Empire versus the 125 or 150 size Empires. Consumers tended to categorize this size apple as “extremely large” or “somewhat large.” Although consumers perceived the 125 size Empire as “medium,” 65% of consumers said they would buy it.



In the focus group discussions, consumers indicated that although size is not the most important characteristic which influences purchases, it is somewhat important in the overall appearance of apples. Consumers said that many apples they see in grocery stores are “too large.” In addition, the 72 size Red Delicious apples and 100 size Empires were often indicated by the consumers as “good” or the “favorite” of all the baskets of apples evaluated during the visual tests. These data and the above Empire and Red Delicious results tend to indicate that consumers are not quite as devoted to “medium” size apples as the telephone survey indicated, but they are looking for smaller apples in tray-pack or bulk retail displays.

Consumer participants indicated a preference for tray-pack apples versus bagged apples which they have purchased in the past. These consumers said they are often disappointed in the poor quality of bagged apples. In addition, they said they prefer to be able to choose their own individual apples, in smaller quantities to insure quality of the ones they select, and to provide variety in selection. The information about consumer preferences for bagged apples is very important considering the volume of apples produced in Michigan that are marketed in bags. However, in recent years, the Michigan apple industry has made it a priority to increase the volume of apples that are sold as tray-pack. In light of this consumer information on bagged apples, this goal seems to be consistent with the preferences of many consumers.

Important findings from the focus group discussions included; the repeated importance to consumers of crispness to the overall quality of apples, the importance of in-store tastings and samplings to encourage purchase of new varieties, concerns about the

handling of apples at the retail level, the need for more consumer information about the characteristics and uses of apples, the importance and positive retail atmosphere of farm markets and orchards, and consumer concerns about PLU stickers, wax, pesticides, and the availability of “organic” apples.

This research project provides information about specific consumer preferences in regard to fruit condition, color, and size. These results can be used along with and to build upon the consumer market research results from the earlier telephone survey and consumer focus groups. It is intended that this market information may be used to refine industry strategies to meet these consumer preferences in a high performance fashion.

**10.3 Recommended Methodologies for Future Research.** The methodologies used for the visual and taste tests and the focus group discussions were somewhat simple, yet effective at gathering a large amount of useful data. I recommend these methodologies, but advise (1) extending them to cover more apple attributes and (2) analyzing the data more effectively through different, more advanced analysis.

In terms of additional attributes, in the initial survey which is sent to the consumer participants before the testing sessions (see Appendix A), I advise asking consumers about the importance all of the attributes that were included in the telephone survey (see Ricks et al. 1995). This would allow for the studies to be more directly compared. In addition, I would investigate the consumers’ preference for the flavor of the apples that are tasted. Thus the researcher would gain a much richer understanding of consumers indicated purchase intentions, especially in the case of higher pressure apples. For instance in this study, high pressure apples were described to be less flavorful than

the medium or low pressure apples, but because flavor was not directly measured, this relationship could not be reliably documented.

Finally, I would advise analyzing the consumer preference data with a more advanced conjoint analysis model or a similar method which would allow for an understanding of the relative importance of each attribute tested for each evaluated apple. For instance, such a model could indicate for each category of apples whether color was preferred over size, size over condition, etc.

Due to time constraints, this data could not be analyzed with conjoint analysis or a similar model. However, future researchers could use the consumer preference data from this study for comparison to future findings in a conjoint analysis model.

**10.4 Implications for Future Research Efforts.** Although this research project produced results which may be of use to the Michigan apple industry, these results also indicate areas which may be important to future consumer research project planning efforts. In addition, many lessons were learned during this research project which may assist others when planning consumer research projects involving apples. These ideas and advice follow in this section.

**10.5 Areas for Future Research.** In this project, detailed, specific information was gathered for two varieties of apples, Red Delicious and Empire. This variety information will be very useful to the Michigan apple industry when planning variety-specific planting and production strategies. However, the responses and consumer preferences varied by variety. Thus it is recommended that additional varieties be evaluated with visual and taste tests. For instance, Granny Smith and Gala were mentioned by many

consumer participants as being favorite varieties, and thus more information about specific consumer preferences for them may be helpful to the Michigan apple industry.

In addition, it would be useful to test new varieties or varieties that are being developed in order to gain insight into consumer's preferences for their attributes before the varieties are in full scale production. Such research on emerging varieties could alleviate losses that might occur if the variety was planted by many farmers, but disliked by consumers.

## **APPENDICES**

**APPENDIX A**

**QUESTIONNAIRE**

Name:

Please circle the answer which best describes your personal tastes.

To me, the crispness of an apple is:

Extremely Important	Somewhat Important	Indifferent	Somewhat Unimportant	Extremely Unimportant
---------------------	--------------------	-------------	----------------------	-----------------------

To me, the color of an apple is:

Extremely Important	Somewhat Important	Indifferent	Somewhat Unimportant	Extremely Unimportant
---------------------	--------------------	-------------	----------------------	-----------------------

To me, the size of an apple is:

Extremely Important	Somewhat Important	Indifferent	Somewhat Unimportant	Extremely Unimportant
---------------------	--------------------	-------------	----------------------	-----------------------

## **APPENDIX B**

### **TASTE TEST AND VISUAL TEST QUESTIONNAIRE**



For each apple presented, please indicate your answer to the following questions.

To me this apple is:

<u>extremely</u> crisp	<u>crisp</u>	<u>neither</u>	<u>soft</u>	<u>extremely</u> soft
---------------------------	--------------	----------------	-------------	--------------------------

<u>extremely</u> large	<u>large</u>	<u>neither</u>	<u>small</u>	<u>extremely</u> small
---------------------------	--------------	----------------	--------------	---------------------------

<u>very deeply</u> colored	<u>deeply</u> colored	<u>neither</u>	<u>weakly</u> colored	<u>very weakly</u> colored
-------------------------------	--------------------------	----------------	--------------------------	-------------------------------

If I had to describe this apple, I would call it:

<u>extremely</u> good	<u>good</u>	<u>OK</u>	<u>bad</u>	<u>extremely</u> bad
--------------------------	-------------	-----------	------------	-------------------------

Would you buy this apple?

<u>definitely</u> yes	<u>maybe</u>	<u>indifferent</u>	<u>maybe not</u>	<u>definitely</u> no
--------------------------	--------------	--------------------	------------------	-------------------------

## **APPENDIX C**

### **FOCUS GROUP DISCUSSION QUESTIONS**

**Discussion Questions: Red Delicious/Empire**

**1. The apples you just evaluated were Red Delicious/Empire apples.**

**What things do you like about this variety?**

**What things do you not like about this variety?**

**How did you like the flavor of this apple?**

**2. Are there things about any of the apples you have evaluated today that you liked?**

**-probe specifics (what do you mean by that?)**

**Are there things that you did not like about any of the apples?**

**-probe specifics**

**3. While you were evaluating those apples, I'm sure you thought about the last time you bought apples. What things attract you to apple displays in the grocery store?**

**-displays**

**-demos**

**-tastings**

**-new varieties**

**-POP material**

**4. What characteristics influence you to purchase the apples you do purchase?**

**-crispness (What makes an apple "crisp")**

**-size (Are there specific sizes you look for?)**

**-color (Are there specific colors you look for?)**

**-do you see a variation of these qualities in the apples you buy?**

**5. Is there anything about apples in stores that you don't like . . .**

**-stickers**

**-skin**

**-handling in store**

**-safety of tastings**

**6. If apple growers could grow the perfect apple, how would you describe it?**

**7. What would influence you to try a new variety?**

**8. Finally, what is most important quality of the apples that you look for in apples?**

**-What is a high-quality apple? (How would you define it?)**

## **LIST OF REFERENCES**

## LIST OF REFERENCES

- Beggs, Jane L. 1996. Consumer Preferences for Fresh Market Apples. Master's thesis, Michigan State University.
- Criner, G., A.S. Kezis, H. Cheng, and M. Nord. 1995. Apple preferences, formulation and testing: Red Delicious, McIntosh, and Empire. *Journal of Food Distribution Research* 26, no.1: 64-71.
- Kotler, Philip. 1994. *Marketing management: analysis, planning, implementation, and control*. New Jersey: Prentice-Hall, Inc.
- Kruger, Richard. *Focus Groups: a practical guide for applied research*. Thousand Oaks, California. Sage Publications, Inc.
- Leonard, Robert and James Wadsworth. 1989. *Consumer preferences: a guide to Connecticut apple marketing*. Storrs, CT: The University of Connecticut.
- Manolo, A. 1990. Assessing the importance of apple attributes: an agricultural application of conjoint analysis. *Northeastern Journal of Agricultural and Resource Economics* 18, no. 1: 119.
- McCracken, V.A., B. Maier, T. Boylston, and T. Worley. 1994. Development of a scheme to evaluate consumer apple variety preferences. *Journal of Food Distribution Research* 24, no. 2: 58.
- Provost, J. and J. Ahern. 1993. An evaluation of early harvest Empire apples and resultant consumer preferences. Working paper, California Polytechnic State University, San Luis Obispo, Calif.
- Ricks, D., K. Heinze, J. Beggs, and P. Miklavcic. 1995. *Consumer perceptions and attitudes related to Michigan apples*. East Lansing: Michigan State University.
- "The Packer". 1993. *Fresh Trends: A profile of fresh produce consumers*. Lincolnshire, IL: Vance Publishing.
- . 1995. *Fresh Trends: A profile of fresh produce consumers*. Lincolnshire, IL: Vance Publishing.

———. 1996. *Fresh Trends: A profile of fresh produce consumers*. Lincolnshire, IL: Vance Publishing.

MICHIGAN STATE UNIV. LIBRARIES



31293016880571