ADOPTION OF NEW-MEDIA MARKETING IN THE GREEN INDUSTRY

by

BECATIEN YAO

B.S., National Polytechnic Institute of Côte d'Ivoire, 2001

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF SCIENCE

Department of Agricultural Economics
College of Agriculture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2016

Approved by: Approved by:

Co-Major Professor   Co-Major Professor
Dr. Hikaru H. Peterson   Dr. Aleksan Shanoyan

Copyright

BECATIEN YAO

2016

Abstract

Nurseries and garden centers face challenges to stay economically viable, particularly in rural areas. Their efforts to advertise horticultural products through traditional methods seem insufficient to increase their sales. Marketing through new media is receiving more attention by businesses across various industries. In order to assess whether this growing interest in new-media is applicable to the green house industry, it is important to determine their impact on business performance and the factors driving its adoption.

Few studies report the impact of social media on nurseries and garden centers performance. The literature on technology adoption shows that network and learning effects play a critical role in agricultural technology adoption (Bandiera and Rasul, 2006; Baerenklau, 2005), while perceived ease of use and perceived usefulness have been identified as the major factors of adoption of information technology (Davis, 1989; Lorenzo-Romero et al., 2014). This study builds on the known factors of agricultural and information technology adoption to determine the key variables affecting the extent of use of new-media marketing in the green industry. Using a survey, data were collected from 161 nurseries and garden centers across the United States.

Results indicate that the network effect had a robustly, positive effect on the extent of use of new-media marketing in the green industry. The estimated network effect was statistically significant in the models using frequency of online marketing use, frequency of social media use and hours of social media use as the respective dependent variables measuring the use of new media. Other statistically significant factors include the percentage of retail sales, the perceived usefulness, and the city population. The study also found that new-media marketing, measured by the number of hours spent on social media, had a positive impact on sales for nurseries and garden centers making more than $200,000 a year.

By providing evidence of new-media marketing effectiveness, these results contradict the belief that sales do not increase immediately after a social media campaign, suggesting a low return on investment. Besides this evidence, the magnitude of the network effect and the differences in critical factors driving adoption across firm size are key information to tailor training programs and make informed policy decisions to support marketing efforts.

Table of Contents

List of Figures

List of Tables

Acknowledgements

I am deeply thankful to Dr. Hikaru Peterson for her guidance during the research process, and her time and efforts in revising and editing. From working with Dr. Peterson, I have developed a better sense of task management and result driven work. The same gratitude goes to Dr. Aleksan Shanoyan for his precious help and advice during the project. Also, I would like to thank Drs. Boyer and Baker for serving in my committee, and for their valuable contribution to this study.

I would like express my gratitude to my parents, wife and children for their sacrifice, support, and encouragement throughout my Master's program in the Agricultural Economics program. Finally, I would like to thank my fellow graduate students for making my stay in Manhattan more enjoyable.

Chapter 1 - Introduction

The U.S. green industry ranked among the fastest growing segments of U.S. agriculture in 2004, as a result of two decades of steady growth (Hall et al., 2005). However, sales by individual nursery businesses have decreased over the last decade. From 2007 to 2012, the total sales of U.S. nursery and garden center products has shrunk by 12.72% whereas the number of nurseries and garden centers has increased by 3.87% (USDA, 2014). The nursery and greenhouse industry is facing numerous challenges to maintain a successful business. Campbell and Hall, 2010). Hodges et al. (2011) claimed that mass merchants had acquired almost half the market share from smaller, local garden centers within ten years of their entry into community markets. Similarly, Behe et al. (2013) reported that garden centers are facing increased competition and are using marketing channels that are less than ideal to reach today's modern, online consumer.

1.1.   The rise of new-media marketing

New-media marketing provides new opportunities to businesses to engage in social interaction with their customers on the Internet. Due to the participation of the customer in generating content, new-media marketing has deeply modified the configuration of the relationship between costumers and businesses since the last decade. These methods appear as an opportunity to build and maintain stronger consumer/business relationship. Consumers feel closer to a company when they are given the opportunity to directly and permanently communicate and express their opinion (Brown, 2010). Indeed, social media has the power to transform the perceived anonymous face of most large or medium size companies into a more human face by generating intimacy and immediacy between businesses and costumers (Merrill et al., 2011). Through social media such as Twitter, Facebook, Google+ and LinkedIn, consumers may share, at any time, their opinion about a product or brand with the company or within their

own network. In real time, this feedback is accessible by companies who may provide quick responses, interacting with multiple costumers.

Although few studies have formally addressed the social media impact on business performance, its proliferation among companies suggests a benefit from its adoption as a marketing tool. A study released in 2014 by the University of Massachusetts-Dartmouth Center for Marketing Research found an increase in the number of Fortune 500 companies creating and sharing content via social media from 23% in 2011 to 34% in 2013. Moreover, a survey conducted by Harvard Business Review Analytic Services (2010) revealed that more than three-quarters (79%) of the 2,100 organizations surveyed reported having adopted or preparing social media initiatives. The spread of social media use among companies is justified by its effectiveness to improve business productivity. Referring to Web 2.0, a broader set of technologies comprising social media, Andriole (2010) identified six performance areas that could be improved by their deployment: knowledge management, rapid application development, customer relationship management, collaboration/communication, innovation, and training. Stelzner (2014) investigated the use of social media in promoting businesses. Nearly all (97%) of the 2,800 marketers surveyed were participating in social media marketing. These marketers emphasized the role of social media in increasing exposure, developing loyal fans, providing marketplace insight, reducing marketing expenses and improving sales. Undeniably, social media is becoming a key tool in marketing strategies.

The cost of a social media strategy implementation varies depending on the industry and the size of the business. Social media expenses include marketer's salaries, content, branding, search, technology and analytics (Cohen, 2013). Deploying a social media strategy can be costly, especially for large companies. On the other hand, small to medium businesses will incur low to

virtually no cost in deploying their social media strategy. The Marketing in a Digital World SMB and Consumer Survey (2011) found that the majority of the small and medium businesses surveyed (59%) spent less than $100 to conduct their social media marketing strategy on various channels. "In contrast to paid traditional media, new media (in which consumers create content and this content is exchanged between other consumers and potentially between manufacturers) are primarily available for free" (Onishi and Manchanda, 2012, page 221).

1.2. Motivation

Rural or family owned nurseries and garden centers face challenges to maintain their customers in the context of rural depopulation. Indeed, the long term trend of rural depopulation is accelerating, particularly in the Great Plains, the Corn Belt, the Delta-South, and the Appalachia-East (FDIC, 2014). In addition, repetitive and large scale advertisement campaigns necessary to increase their sales are costly. Improving the marketing strategy of small scale nurseries and garden centers requires to take into account the current trends of consumer preferences that have changed over the last decade, particularly with the rise of online purchasing. For example, having searched for gardening information through the Internet increased the likelihood to purchase horticultural products online by 19% (Behe et al., 2013). Following these trends, several studies have emphasized the necessity for garden center business owners to reevaluate their marketing practices in order to meet changing consumer preferences (Behe et al., 2013; Stebner, 2015).

Although social media marketing is increasingly being adopted by small and medium businesses, observations reveal little interest among rural nurseries and garden centers. A few of them maintain a social media account or an interactive website. Stebner (2015) reported that garden centers remained unsure of the impact of a social media strategy on their business

performance. Reasons for this seeming reticence can be lack of resources and risk aversion. A social media strategy requires some time to maintain and monitor a website, and specific knowledge about social media management. A survey (Stelzner, 2014) found that social media marketers faced five main issues: finding the most effective tactics, engaging audience, measuring the return, picking the best management tools and finding the target audience. Merrill et al. (2011) mentioned three major areas of risk rising with the growing use of social media: reputational, legal and operational risks. Reputational risks emanate from the access of social media by millions of customers who can spread in a short time an accidental false claim or a benign flaw in a business operation. Legal risks include employment, privacy, security, intellectual property and media risks, and operational risks occur when employees accessing social media platforms at work accidently download malwares and viruses, threatening their company's network and data.

The framework of technology adoption has been widely used in the literature to explain how decision makers make choices when facing a new technology (Davis, 1989; Sago, 2013; Teo, 2009). It aims to determine the key factors influencing the process of adoption of an innovation by an individual or a firm. Adoption is addressed by the literature under various approaches. For some, adoption is referred to as a binary outcome that is making the decision to whether using or not a technology (Feder et al., 1985). For others, adoption is regarded as the extent of usage of an innovation (Onishi and Manchanda, 2012).

The importance of studying technology adoption stems from its ability to predict the diffusion of innovations in a broad range of fields. Agricultural policy makers might be interested in studying adoption to identify the factors that matter the most for a successful implementation of a new technology that improves farm yields. Information technology firms

would use the adoption framework to determine how to best structure their service content. Studying adoption can help education professionals to understand how to harness a new technology to enhance students' performance. Although the adoption framework presents some limitations, it has been effective in shedding the light on the individual, organizational and environmental factors that are more likely to influence the diffusion of a new technology.

1.3. Objectives

This study aims to use a theoretical framework of technology adoption to determine the factors that influence social media adoption by nurseries and garden centers. More precisely, the study focuses on the relevance of the network effect in new-media marketing adoption, controlling for key factors identified by previous studies. The specific objectives of the study are the following:

1. Evaluate the extent of use of new-media marketing by nurseries and garden centers.
2. Identify key factors in new-media marketing adoption by nurseries and garden centers.
3. Determine the impact of new-media marketing use on sales.

Descriptive statistics of data from a survey designed for the purpose of this study will be used to evaluate the extent of use of social media by nurseries and garden centers. The key factors of new-media marketing adoption will be identified by specifying an empirical model based on the technology adoption framework. This research will use the firm theory to address the impact of new-media marketing on sales.

This study is organized in six chapters. The next chapter will present previous studies on technology adoption, definition of key terms and the state of knowledge on new-media

marketing use. Then, the following chapter on data will focus on the survey instrument used to collect the data and the data summary. In the methods chapter, the theoretical framework will be presented, and the empirical models will be specified. Results will be discussed in the fifth chapter, and the concluding chapter will summarize the findings, discuss limitations of the current study, and present implications for future studies on new-media marketing adoption.

Chapter 2 - Literature review

This chapter will present the relevant literature pertaining to technology adoption, new-media marketing adoption and its impact on sales, and new-media marketing in the green industry. The first subsection will describe how scholars have studied technology adoption in the agricultural industry and review existent studies on adoption of information technology and marketing strategies. The second subsection will address the concept of new-media marketing and previous studies discussing its adoption and impact on sales. The third subsection will present the green industry and related marketing strategies. Finally, findings and limitations of previous approaches will be summarized in the fourth subsection to lay the foundation for the definition of a new-media marketing adoption framework in the green industry.

2.1. Technology adoption

This subsection will focus on agricultural and information technology adoption. Nurseries and garden centers are components of specialty crop farmers, as defined by the USDA (2014). Adoption behavior of nurseries and garden centers can be modeled using the framework of agricultural technology adoption by farmers. On the other hand, new-media marketing falls under the category of information technology. Various theories of information technology adoption will also be reviewed in this subsection.

2.1.1. Agricultural technology adoption

Zilberman and Kaplan (2014) provided a concise history of alternative approaches of modeling adoption in agriculture. It is first important to underline the difference between adoption and diffusion. "The literature distinguishes between diffusion, which is measured by the aggregate share of individuals or share of land using a new technology, versus adoption by individuals" (Zilberman and Kaplan, 2014, page 3). Early studies on adoption focused on

diffusion. Diffusion includes a temporal dimension captured as a threshold model, or S-Shape model, where a small number of individuals adopt the technology at the early stages and more agents adopt the technology as it spreads to the point where the marginal rate of adoption declines at the later stages (Feder et al., 1985), with the following functional form:

$$P_t = k * (1 - e^{-(a-bt)}) \ ,$$

where P_t is the percentage of farms using the new technology at year t, a a measure of initial diffusion, b the indicator of the rate of diffusion, and k is the final rate of diffusion. Griliches (1957) studied the causes of the cross-sectional differences in rates of use of hybrid seed corn in different regions of the United States. He observed three parameters: hybrid seed corn availability in the region, acceptance, and the equilibrium level of use. With regard to acceptance, he found that profitability of the shift from conventional to hybrid seed corn was the main factor accounting for the differences in the rates of adoption between regions. The equilibrium level of use mentioned by Griliches (1957) describes the percentage of acreage of corn planted of hybrid corn at which the use of hybrid seed neither increases or decreases.

Figure 1: Percentage of total corn acreage planted in hybrid corn
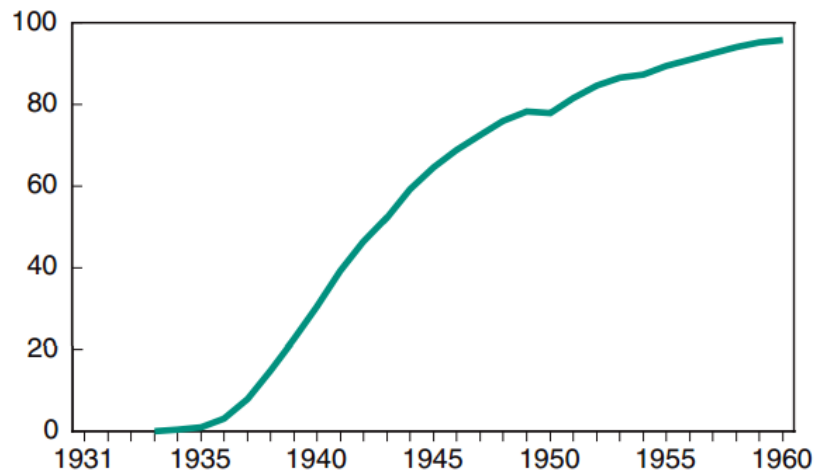
The S-shaped diffusion path assumes that imitation is the driving factor of the diffusion process (Mansfield, 1961). This diffusion path comprises of three steps: an initial step where few agents adopt the technology at an early stage, a second step where the profitability of the technology leads to more agents adopting it through imitation, and a third step with a lower rate of adoption when the technology is widespread. The literature suggests that this later decrease in adoption rate is explained by poor performance of the technology, resistance against the technology or the emergence of an alternative technology (Zilberman and Kaplan, 2014). Griliches (1957) also suggested that advertisements carried by Extension agencies and private companies may impact the rate of acceptance. His model assumes homogeneity of agents and imitation (Zilberman and Kaplan, 2014).

Critics of the imitation model stress its lack of microeconomic foundation, particularly equilibrium models. Studies after Griliches' work introduce the agent decision making criteria to account for heterogeneity across farmers. David (1975), Stoneman (1983) and Feder et al. (1985) are good exposition of this approach. They built their models upon three assumptions: agents make profit-maximizing or risk aversion decisions, they have heterogeneous characteristics, and they

adopt a technology by an endogenous learning process (Zilberman and Kaplan, 2014). It is assumed that they update their prior beliefs as they gather more information about a given technology. The Bayesian model, first time mentioned by O'Mara (1971), accounts for this updating process. Hiebert (1974) investigated the effect of uncertainty and imperfect information on the adoption of fertilizer, using a stochastic production function and assuming risk aversion. He finds that the probability of adoption increases with the amount of available information.

The later adoption literature attempts to estimate more realistic models of technology adoption by including the learning effect and the neighborhood or peer group effect.

2.1.2. *Learning effect*

The literature identifies two components of the learning effect: learning by doing and learning by others. Lindner et al. (1979) and Stoneman (1983) introduced the concept of learning by doing. They argued that a new technology is first regarded with subjective beliefs. With experimentation, agents become increasingly familiar with the technology introduced and update their beliefs, since they acquire a better insight of the output of the new technology from their own experience. This new perception of the technology plays a key role in the decision to allocate more or less resources (e.g., land) to the technology. Jensen (1982) extended this notion to a population of agents who differed in their prior beliefs with regards to the new technology. His model led to an aggregate, intra-firm diffusion curve that emerges as the population updates its beliefs over time. The diffusion curve derived from his model was either concave or S-shaped when original beliefs were assumed to be distributed uniformly and the proportion of adoption was similar to the actual observed proportion.

Learning from others, regarded as a "wait and see" perspective, includes information externality. Agents might observe the outcome of a new technology experimented by their

neighbors before updating their beliefs about this technology (Baerenklau, 2005). Two modeling approaches are needed to account for the impact of these externalities on their behavior. Since the impact of the externalities is noticed in the future, the agents must be modeled as forward-looking agents. On the other hand, because the optimal action by any agent depends on the actions of all other agents, agents should be modeled as strategic as well.

Researchers have obtained various results regarding the importance of learning effect in adoption. Besley and Case (1994) developed a model where the effect of learning could be estimated. Foster and Rosenzweig (1995) used a forward-looking, non-cooperative behavior model in an attempt to measure the effect on behavior of waiting to see how well a new technology worked. They found that spillovers from learning from others had little observable effects on adoption behaviors. Baerenklau (2005) further suggested that dynamic externalities might be of little importance for smaller, less costly and reversible decisions. Conversely, Conley and Udry (2010) showed evidence that pineapple farmers in Ghana adopted new fertilizers following the successful experience of their peers.

2.1.3. Network effect

The network effect or peer group effect is also referred to as "herd behavior" (Banerjee, 1992). It embodies imitation and involves no dynamic externalities. This adoption factor is based on the possibility that agents can be influenced by the current decisions made by their peers without necessarily updating their beliefs from the observable outcomes of a new technology adopted by their neighbors (Baerenklau, 2005). Herd behavior is easily observable among financial markets participants. "An individual can be said to herd if she would have made an investment without knowing other investors' decisions, but does not make that investment when she finds that others have decided not to do so" (Bikhchandani and Sharma, 2000, page 3).

Studying network effect is important in the design of policies that encourage farmers to use a new technology. It is essential that organizations promoting these technologies understand how their technologies fit into the complex and dynamic agricultural industry (CIMMYT, 1993). Nonetheless, modeling network effect has been challenging since it requires strong assumption on information exchange between agents. Banerjee (1992) constructed an empirical model that featured agent decision rules accounting for herd behavior. He concluded that his model failed to characterize correctly herd behavior.

Baerenklau (2005) built an empirical model that accounted for the network effect also referred to as the neighborhood effect, learning by doing, learning from others, and risk preferences. Data were collected from 34 sample farms belonging to three distinct groups of grazing networks. There was anecdotal evidence of neighborhood effect in these networks. First, in these communities, a farmer who adopted the mainstream technology was appreciated by her community for her active role. Second, no farmer wanted to lag behind others regarding the adoption of a new technology. However, the results of this study indicated that the neighborhood effect was not relevant in adoption.

The neighborhood effect and the learning effect are often confounded into the social network effect. Bandiera and Rasul (2006) discussed farmers' decisions to adopt a new crop in Mozambique, sunflower. Their results suggested that choices made by family members or friends influenced their decision to adopt the new crop. Moreover, this relationship was shaped as an inverse U curve, meaning that the adoption rate decreased with an increase in the number of adopters in the family or social network. They also found that informed farmers were less likely to be influenced by their network and that the relationship between network effect and informed farmers was also shaped as an inverse U.

2.1.4. Information technology adoption

In the context of information technology, the technology acceptance model (TAM) has been one of the most widely used model to study adoption (Teo, 2009). Proposed by Davis (1986), TAM explains how external variables influence belief, attitude and intention to use (Park, 2009). Studying acceptance of computers, Davis (1989) suggested two critical determinants of information technology adoption: perceived ease of use and perceived usefulness. Perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort" and perceived usefulness entitles "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, page 320). In the technology acceptance model (Figure 2), perceived ease of use and perceived usefulness impact positively the intention to use a technology which determines the actual acceptance of the technology. Moreover, the perceived ease of use affects the perceived usefulness. To estimate the empirical model, data were collected across firms or individuals using a questionnaire. Based on a 10-level scaling method, respondents were asked to rate how a technology is useful and easy to use in their daily work (David, 1989). Coefficients were estimated for all relationships in the model (arrows in Figure 2) to predict the acceptance of the technology.

Figure 2: Technology Acceptance Model (Davis, 1989)
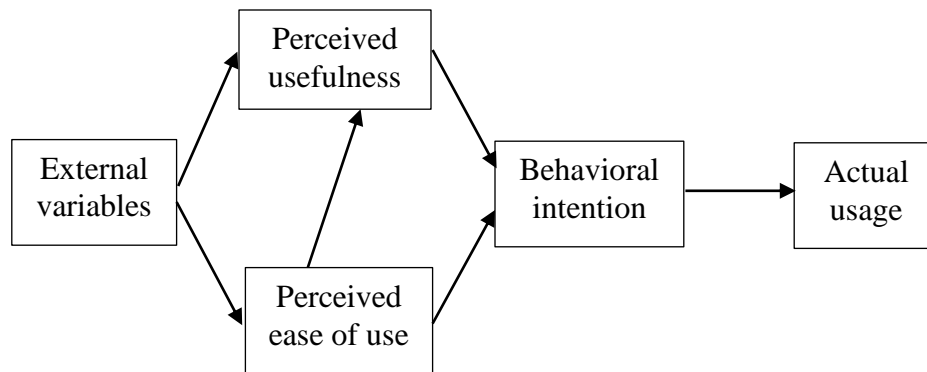
Studying the determinants of e-commerce adoption, Grandon and Pearson (2004) found that perceived usefulness played an important role in adoption. Consistent with Grandon and Pearson (2004), El-Gohary (2012) concluded that perceived usefulness and perceived ease of use were both critical for e-commerce adoption in the Egyptian tourism industry.

Several extended versions of the TAM have been suggested in the literature. Taylor and Todd (1995), Venkatesh and Davis (2000), Venkatesh et al. (2003), Lin et al. (2007) are example of extended versions of the TAM. New variables such as task-technology fit (Dishaw and Strong (1999), personal innovativeness (Chiu et al., 2005), and perceived risk (Lee, 2009) have been added to the TAM model. Van Ittersum et al. (2006) reviewed the literature on existing versions of the technology acceptance model and identified three variable categories: variables related to the technology (including complexity, price, and compatibility), characteristics of the user (such as age, gender), and characteristics of the firm (including size, sector, and product scope).

2.2. New-media marketing

In this study, new-media marketing will refer to all online marketing tools, including social media, blogs, websites and HTML newsletters. While websites, blogs, and HTML

newsletters are generally well known, social media, which is a newer term, leads sometimes to confusion.

2.2.1. Social media and Web 2.0

The Merriam-Webster dictionary describes social media as the "forms of electronic communication through which users create online communities to share information, ideas, personal messages, and other content (as videos)". The channels referred to as "forms of electronic channels" include websites and online applications dedicated to forums, microblogging, social networking, social bookmarking, social curation, wikis and other platforms (WhatIs.com, 2014). Social media is often confused with the related concepts of Web 2.0 and user generated content (Kaplan and Haenlein, 2010). A look at the history of social media is necessary to understand the difference among these terms.

The era of Social Media started in 1998 when Bruce and Susan Abelson founded "Open Diary", an elementary blog-hosting website drawing online daily writers to a social platform (Kaplan and Haenlein, 2010). Users were allowed to share comments, unlike earlier online diaries that had been launched since 1994. Indeed, the real ancestor of Internet communities was Usenet, created in 1979 by Tom Truscott and Jim Ellis from Duke University. This platform led to moderated newsgroups where online contents were summarized and shared. The term "Web Log" appeared in 1997, one year before the creation of the "Open Diary", and was shortened as "blog" in 1999.

With an exponential development of information technologies and the subsequent availability of high-speed Internet access, more elaborate social networking websites have emerged in the 2000s: Friendster in 2002, Myspace in 2003, and Facebook in 2004 (Kaplan and Haenlein, 2010). They contributed to the creation and the popularization of the term "social

media", which is defined by Curtis (2013) as Internet sites where people share, interact and discuss without a moderator. On the other hand, Web 2.0 is perceived as trends in online media towards new media and social media, rather than a technological update of the World Wide Web. Social media was first mentioned in 2004 by Tim O'Reilly in his attempt to designate a new trend in the use of the World Wide Web, where content were continuously modified by users in a collaborative manner rather than webmasters or moderators (Kaplan and Haenlein, 2010). Lastly, UGC is referred to as any material created and uploaded by an Internet user, as opposed to the content created by professionals (International Advertising Bureau, 2008). For the purpose of this study, social media and Web 2.0 will be used interchangeably.

2.2.2. *Adoption of social media marketing*

Social media adoption has mainly been addressed from the end-user or consumer's perspective with scant attention paid to small and medium businesses. Zilberman and Kaplan (2014) examined the influence of social networks on food decision-making from the consumer standpoint by reviewing the adoption literature. They argued that the exchange of information among members of a network was increased by social networking sites and concluded that social media may had considerable impacts on major food related choices by consumer. Liu and Lopez (2013) proposed an approach to estimate the impact of social media exposure on demand for carbonated soft drinks. They combined a utility maximization and a social media exposure function to explain how social media influenced consumer valuation of product characteristics. They suggested that conversations about specific brands increased consumer awareness about those brands and that conversations about sugar reduced consumer valuation of sugary drinks. The methodology used in these studies is based on consumer's utility maximization and is not adapted to the firm's problem.

From the firm's standpoint, most of the studies conducted on social media adoption use the technology acceptance model. For example, using the TAM framework to study Web 2.0 adoption, Lorenzo-Romero et al. (2014) found that only the perceived ease of use was a determinant in the adoption of Web 2.0 as a marketing tool by Spanish retailers. Similarly, Shaw (2013) analyzed the competencies, importance and motivations for agricultural producers' use of online marketing using the technology acceptance model, along with two other IT technology adoption frameworks: the diffusion of innovation by Rogers (2003) and the uses and gratifications theory by Katz et al. (1973).

Wamba and Carter (2014) stressed the uniqueness of new-media marketing and the need to distinguish social media from other types of innovation. Features such as real time sharing of customers' choice and active engagement of users differentiate this technology from other and necessitate addressing social media marketing using a more adapted framework (Wamba and Carter, 2014). They posited that three sets of characteristics impact adoption of social media by small and medium enterprises: firm characteristics (e.g., firm innovativeness, firm size), manager characteristics (e.g., age, gender, and education), and environmental characteristics (e.g., firm geographic location). Their results indicated that firm innovativeness, firm size, manager's age and industry sector had significant impacts on the adoption of new-media marketing by firms. Nah and Saxton (2013) modeled the adoption of social media by nonprofit organizations using key factors identified by the nonprofit literature. They posited and concluded that similar three groups of factors may impact social media adoption: organization characteristics (organizational strategies and capacities), management characteristics, and environmental factors (e.g., external pressures).

2.2.3. *Measuring the impact of new-media marketing on business performance*

Following the rise of social media, web publishers and vendors proposed multiple metrics to allow their clients to assess their social media strategy performance (Interactive Advertising Bureau, 2009). Unfortunately, some of those metrics are being abandoned, because they are not easily applicable (Fisher, 2009). In a search of consistency in the reporting of metrics across advertisers, the Interactive Advertising Bureau provided standard definitions for two types of social media metrics in 2009. The general metrics apply to social media websites and to web publishers incorporating social features to their websites. The second type of metrics are more specific to blogs, widgets, and social media applications.

The general metrics are presented in Table 1. Social media websites increase the interaction between customers and firms, and across customers. Customers will value the popularity of firms' social media website by assessing the frequency of participation by other users or customers. They will focus on metrics such as unique visitors, page views, video installs, comments or pictures posted. Firms will be more concerned with engagement of customers, measurable using metrics such as return visits, interaction rate, time spent and so forth.

Table 1 : General metrics applicable to social media websites

Metric	Description
Unique visitors	Unique individual or browser which has accessed a site or application and has been served unique content and/or ads such as e-mail, newsletters, interstitials or pop-under ads
Cost per unique visitor	Total cost of the placement or application, divided by the number of unique visitors
Page views	When the page is actually seen by the user. Some platforms, like Facebook cache preview images for applications, which can mean that page views are not counted until a user clicks through to an application canvas page
Visits (specific to UGC/Social media)	A single continuous set of activity attributable to a cookied browser or user (if registration-based or a panel participant) resulting in one or more pulled text and/or graphics downloads from a site
Return visits	The average number of times a user returns to a site or application over a specific time period
Interaction rate	The proportion of users who interact with an ad or application. Some will be involuntary depending on where the ad or application is placed on screen, so it is highly dependent on placement
Time spent (section, microsite, community)	The amount of elapsed time from the initiation of a visit to the last user activity associated with that visit. Time spent should represent the activity of a single cookied browser or user for a single access session to the web site application or other property. Most publishers consider a session continuous if and only if not broken by more than 30 minutes of inactivity
Video installs	Number of video players that have been placed by a user onto their page. Also called embed, grab or post. A video player is a type of widget
Relevant actions taken (custom to widget or application creative execution) and cost per relevant action	Action examples: contest/sweeps entries, coupons downloaded / redeemed, games played, videos viewed, uploads (e.g. images, videos, poll votes, messages sent (e.g. bulletins, updates, emails, alerts, invites sent, newsfeed items posted, comments posted, friends reached, topics/forums created, number of group members or fans, reposts ("shares")

Source: Interactive Advertising Bureau, 2008.

Blogs are websites created by individuals to discuss a specific subject (Table 2). They also allow users to add content. The particularity of blogs metrics is their capacity to capture the relevance of the content shared by customers and the customers' profiles. Marketing campaigns can therefore be tailored to the customers' profile. For example, the conversation size metrics gauge the interest of customers on a specific topic.

Table 2: Blogs metrics

Conversation size metrics	Number of conversation relevant sites
	Number of conversation relevant Links
	Conversation reach
Site relevance metrics	Conversation density of conversation relevant posts
Author credibility	Number of conversation relevant posts on the site
	Number of links to conversation relevant posts on the site
	Earliest post date for conversation relevant posts
	Latest post date for conversation relevant posts
	Duration between earliest and last post date for conversation Relevant posts
Content freshness and relevance	Earliest Post Date for Conversation Relevant Posts
	Latest Post Date for Conversation Relevant Posts
	Mean-time Between Posts

Source: Interactive Advertising Bureau, 2008.

Widgets are applications that can be installed on different platforms, while social media applications are specific to a given platform (Table 3). Widgets and applications have various purposes including alerts, events, gaming, and educational. Similar to social media websites metrics, widgets and application metrics provide information on the audience of a given

platform. For example Widget's unique user reach is equivalent to social media website's unique visitors.

Table 3: Widgets & social media application metrics

Installs - Applications	Total installations of application
Active users	Total users interacting with application over a specific time frame, usually day/week/month. Many applications have rapid growth but lose activity over time
Audience profile	User demographics from self-reported profile information
Unique user reach	Percentage of users who have installed application among the total social media audience (or calculated as active application users per audience)
Growth	Average number of users within a specific time frame
Influence	Average number of friends among users who have installed application
Application/Widget installs - User	Number of application or widgets installed by a user onto their profile page or other area. Also called embed, grab or post
Active users/Widgets in the wild	Number of people regularly using an application at a given point in time Number of widgets on a user page at a given point in time
Longevity/Lifecycle	Average period of time for which an application or widget remains installed by a user

Source: Interactive Advertising Bureau, 2008.

By defining these metrics, the International Advertising Bureau attempted to provide social media marketers with a relevant return on investment (ROI) measurement framework. They assess the level of interaction of people with a website or application, and also reveal the

way people are interacting with the website. Nonetheless, marketers are still finding it challenging to use these metrics. The Chief Marketing Officers (CMO) survey conducted in 2014 found that the use of traditional ROI metrics to measure social media impact on businesses had overall decreased by 17.7% on average from 2010 to 2013 (The CMO Survey, 2014).

Table 4: Use of traditional return on investment (ROI) metrics to measure social media impact from 2010 to 2013

Metrics	Aug-10	Feb-13	Change 2010-2013
Hits/Visits/Page View	47.6%	40.9%	-14.1%
Repeat Visits	34.7%	24.9%	-28.2%
Conversion Rates (From visitor to buyer)	25.4%	21.1%	-16.9%
Number of Followers or Friends	**24.0%**	**30.5%**	**27.1%**
Sales Levels	17.9%	8.7%	-51.4%
Revenue Per Costumer	17.2%	9.2%	-46.5%
Buzz Indicators (Web Mentions)	**15.7%**	**16.2%**	**3.2%**
Customer Acquisition Costs	11.8%	10.2%	-13.6%
Profits Per Customer	9.4%	4.5%	-52.1%
Online Product/Service Ratings	8.2%	6.0%	-26.8%
Customer Retention Costs	7.7%	3.0%	-61.0%
Net Promoter Score	**7.5%**	**9.8%**	**30.7%**
Other Text Analysis Ratings	**6.6%**	**8.5%**	**28.8%**
Abandoned Shopping Carts	3.8%	2.8%	-26.3%
Total Average			-17.7%

Source: The CMO survey, 2014.

These metrics are limited in assessing the effectiveness of online marketing efforts. Social media is more likely to impact non-purchase behaviors at first, notably opinions shared by customers or social media users about a company or brand. Therefore, social media metrics, when used directly, are limited in providing accurate insight of the efficiency of a marketing campaign. Duncan (2010) reported that ROI metrics did not provide sufficient information about how the media marketing strategy has influenced business goals. Although various web analytics methodologies and software can help measure the value of an online marketing campaign, these methodologies present multiple limitations. First, they are hard to integrate to other forms of

traditional and social media measurement. Also, most of the web analytics are based on click-through. They may not capture a customer directly typing a URL into the browser.

The frequency of use and the time spent on new-media marketing measure the levels of engagement of a firm with a given social media platform. They are more direct measures of new-media marketing use that have been proved to be relevant. Not only do these parameters provide numeric values adapted to quantitative methods, frequency of use also allows to tailor the scale of measurement to the respondent. Researchers from the "Pew Internet and American Life Project", "The CMO Survey", "Social Media Examiner" and various other marketing research organizations address social media use based on the frequency of use and time spent on social media marketing. Indeed, the literature is replete with examples of studies using these variables to measure social media activity. Nah and Saxton (2012) studied social media adoption by nonprofit organizations by assessing its frequency of use and time spent on new-media marketing. Similarly, Junco (2012) looked at the relationship between Facebook activity and student engagement basing her assessment on the frequency of Facebook use.

2.3. Adoption of new-media marketing in the green industry

2.3.1. Green industry overview

The U.S. green industry consists of producers, distributors and services associated with ornamental plants, landscape and garden supplies and equipment. The industry is comprised of several segments including wholesale nurseries, greenhouse and sod growers, landscape architects, contractors and maintenance firms, retail garden centers, home centers and mass merchandisers with lawn and garden departments, and marketing intermediaries such as brokers, horticultural distribution centers, and re-wholesalers (Hall et al., 2005). Hall et al. (2005)

identified five categories of operators involved in the production and distribution of environmental horticulture supplies and services: input supply firms, production firms, wholesale distribution firms, horticultural service firms, and retailers. Input supply firms offer plant material, agrichemical and fertilizers, machinery and equipment and consulting services to ornamental plant growers and landscape services and retailers. Plant material grown by production firms include floriculture crops and nursery crops and specialized products such as turfgrass sod. Floriculture crops comprise bedding plants, potted flowering plants, foliage plants, cut cultivated greens, and cut flowers.

Figure 3 shows the number of producers with operations exceeding $100,000 by type of floriculture plant from the 2012 Agricultural Census. The number of producers is highest for annual bedding or garden plants and potted herbaceous perennial plants, with respectively 1,537 and 1,241 producers. The lowest numbers of producers are reported for cut cultivated greens and cut flowers (USDA, 2014). The threshold of $100,000 sales may explain this relatively low share of cut greens and flowers growers in the total number or producers, who might tend to operate on a smaller scale. The graph may also be interpreted as the level of popularity of a given category among producers, as most producers grow more than one category of floriculture plants.

Figure 3: Number of producers with operations exceeding $100,000 by type of floriculture plant in 2012
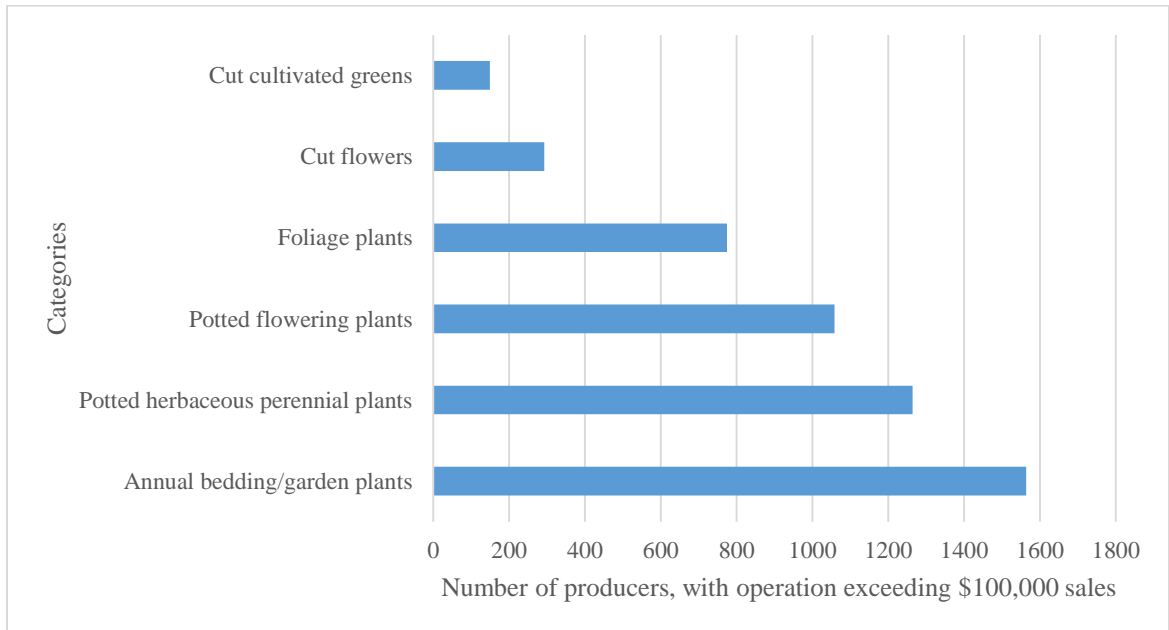
Source: USDA, 2014

Nursery crops are referred to as ornamental trees and shrubs, fruit and nut trees, vines, and ground covers. They are woody perennial plants grown in containers or in-ground and primarily used for landscaping, not for nutrition. Production firms' locations are based on natural resources and market accessibility, since nursery crops are often grown without covered protection. Large operators such as mass merchandisers and home centers have risen in the last decade, resulting in new marketing opportunities for large growers in response to these large quantities of nursery crops demanded. Producers may also sell related products such as soil and sod.

Turfgrass sod is produced by more specialized farms, and varieties grown are tightly related to the region of production. Sod is used for residential or commercial developments, landscaping or re-landscaping existing developments, for sports turf facilities such as athletic fields and golf courses, or for commercial applications such as public and private schools, and

roadside use. Sod producers' activities are strongly influenced by the installer, though the choice

of the variety of sod to purchase is made by the customer. The green industry comprises also of

distributors, horticultural services and retailers as shown in Figure 4. This study will focus on the

"nursery and greenhouse production" segment of the green industry.

Figure 4: Market Structure and Economic Linkages of the Green Industry
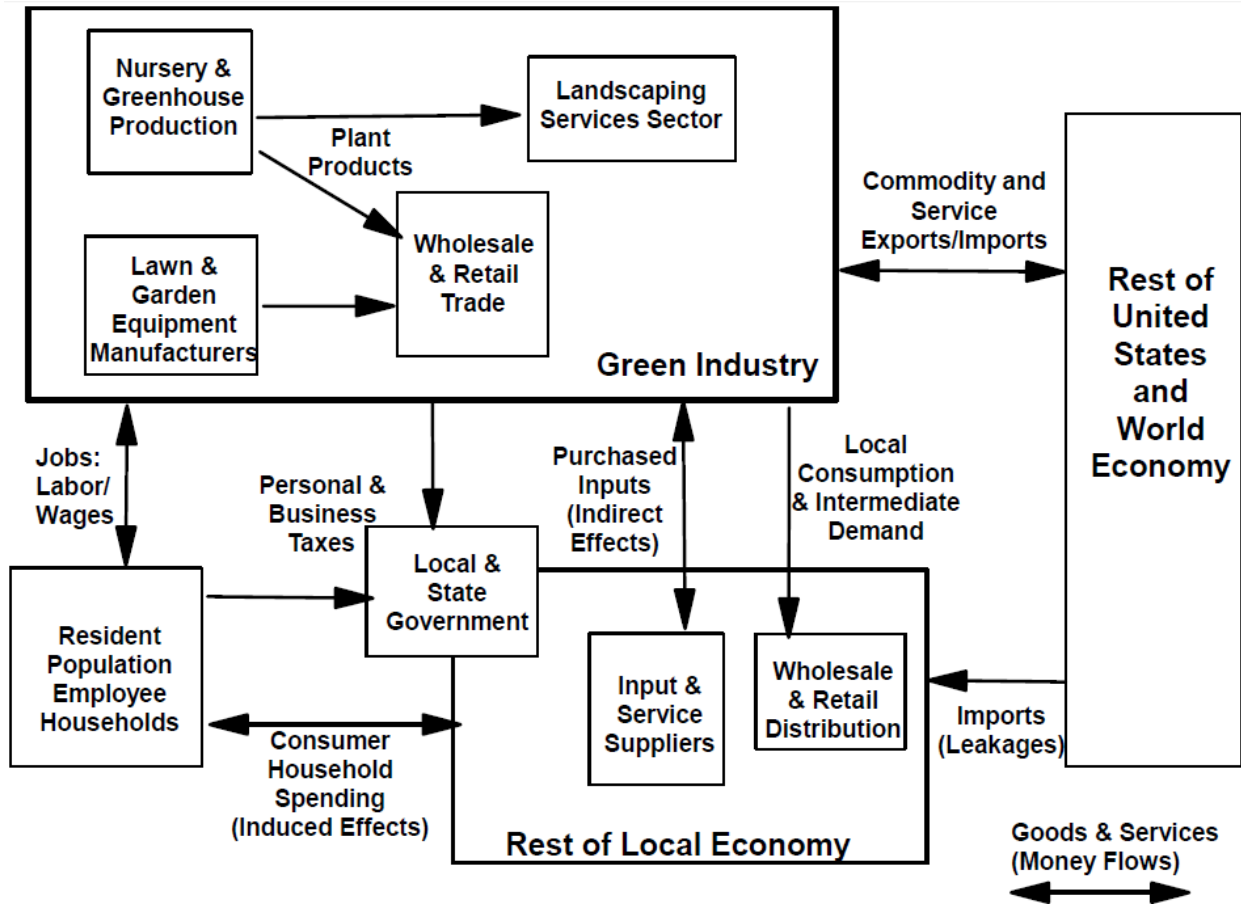
Adapted from Hall et al., 2005.

Sales, advertising practices and transaction methods in the U.S. green industry differ by

region. Behe et al. (2008) conducted a survey in 44 states covering 15,888 nursery firms. They

found that the coastal regions had a higher percentage of wholesale sales, whereas interior

regions had a higher percentage of retail sales. With regard to advertising methods, the survey

found that Newsletters and yellow pages were the most important form of advertising in the Great Plains; trade journals were the most important method in the south central and southeast regions; and catalogs were the most important advertising method for all other regions. The percentage of sales to repeat customers varied from a low of 65.6% in the Great Plains to a high of 76.2% in the southeast. The Appalachian (26.9%) and southeast (26.8%) regions had the highest percentage of negotiated sales, whereas the northeast had the lowest. Although significant differences generally existed among regions in the percentage of sales spent on various transaction methods, nurseries in all regions used in-person, telephone, and mail order as their three most important sales transaction methods, except for the southeast where trade shows were the third most important method of sales transactions. Landscape professionals, rewholesalers, and single-location garden centers were the major market outlets in all regions (Behe et al., 2008).

2.3.2. New-media marketing adoption in the green industry

Few studies have addressed the factors of new-media marketing adoption in the green industry. The recent literature focuses on the level of use of social media across agricultural farmer's populations. Shaw (2013) discussed the level of use of online communication tools by beginning farmers and ranchers in Texas, Illinois, and Georgia. His results showed that all groups of farmers are not using online communication tools to their full potential. Topp et al. (2014) provided meaningful assessments of the level of use of Pinterest by agricultural producers and businesses. They found considerable differences between agricultural segments in the degree of use of Pinterest to reach customers, with a higher number of pinners in the livestock segment. Specialty crops accounted for 9.1% (n=428) of Pinterest users. This study further indicated that agribusinesses and agricultural organizations were not using new-media marketing tools to their

27

full potential. These results have particular implications for our study target. First, they suggest that farmers may obtain low outcome from their social media efforts, given their ineffective use of this marketing method. The second conclusion that could be drawn from the results of this study is the low use of new-media marketing tools by nurseries and garden centers which belong to the specialty crops segment.

Another group of studies look at adoption in the green industry. Yet, they address technologies fundamentally different from new-media marketing. Hall et al. (2009) examined the factors affecting the adoption of sustainable practices in horticulture. They concluded that ease of implementation, production risk perceived by growers, and operation size were the factors most likely to influence adoption of sustainable practices by horticultural products growers. Sustainable practices in horticulture are costly to implement and require updating or replacing part or all the production system. Conversely, implementing a new-media marketing strategy requires little cost. Most social media platforms are free and provide assessment tools. Russell (2014) highlighted that Facebook and Twitter offered well-documented and open use application protocol interface (API), tools necessary to assess a social media marketing campaign. In addition, new-media marketing tools can be used in synergy with traditional media marketing tools. Onishi and Manchanda (2012) provided evidence that traditional media and new-media marketing can work together to drive sales up.

In summary, previous studies on agricultural technology adoption have found that network effect, learning effect, risk preferences, and initial cost weigh in adoption decisions. Pertaining to social media adoption, the literature has identified perceived ease of use, perceived usefulness, firm-level variables, manager-level variables, and external variable as relevant variables to include. This research will be grounded on the variables identified by previous

studies as impacting technology adoption in agriculture and information technology. There is no known study that has addressed either the determinants of new-media marketing adoption by nurseries and garden centers, or the relationship between new-media marketing adoption and business performance of nurseries and garden centers. This study will expand upon the current state of knowledge on new-media marketing adoption to fill the gap.

Chapter 3 - Data

3.1. Survey instrument

3.1.1. Justification for using a survey

The goal of the study was to determine the main factors driving online marketing adoption by nurseries and garden centers. More specifically, the study examines the role of the neighborhood and learning effects in adoption and the impact of online marketing use on nursery business performance. To apply the conceptual framework of technology adoption, not only the business owner's level of use of online marketing should be assessed but also the usage of the Internet and social media among their "neighbors" should be known as well. Business characteristics and demographics are necessary to profile businesses and owners. However, information available from databases of public institutions is insufficient. The green industry has drawn little attention from public and private institutions during the last decade. For example, the last Census of Horticultural Specialties, which contained detailed production and sales data pertaining to floriculture, nursery and specialty crops, was conducted by the USDA in 2009. Moreover, the specificity of the data required, especially those pertaining to business owners' opinion on impacts of various marketing practices, requires a tailored data collection method. Additionally social media in agriculture is a new topic and few publications exist on the subject. Given the study's emphasis on nurseries and garden centers, a specific group of farmers, the method to use should involve collecting data directly from nurseries through a survey.

The choice of a web-survey is justified by its low cost, flexibility in design and set up, its adaptability, and its fast distribution (Dillman et al., 2014). A web-based survey allows the survey flow to be tailored to each type of respondent. For example, a non-social media user was automatically directed to questions relevant to his profile, skipping all the questions about social

media activity. In addition, the survey was tested and set up to accommodate smartphone and tablet browsers, rendering it more versatile and accessible. The web survey also has appealing features such as graphic enhancements to emphasize sections or sentences and conditional formatting to set a range of values for a given question, avoiding aberrant numbers. A business establishment year could not be later than 2015 (the year when the study was conducted), for example.

The survey link was emailed or mailed to respondent using a postcard. Respondents who responded to the postcard mailing had to type a short survey link in their computer or phone browser to access the survey. Although mailing the survey link involved some cost, it was much less expensive than mailing multiple pages of a survey. Reminders were set up and automatically sent on defined dates. Emailing the link was particularly applicable to its diffusion through html newsletters, nursery associations and various networks by allowing to reach a larger base of businesses. Another advantage is that emails perform better in reaching the right recipient in many cases. Mail addresses can be either inaccurate or outdated, in both cases leading to returns. For example, one of the respondent reported that his nursery had changed name and ownership. He then forwarded the email inviting him to take the survey to the new owner. Forwarding the invitation to take the survey would have been less obvious with a mailed survey, since additional costs would be involved.

3.1.2. Survey design

The survey consisted of 40 questions pertaining to online marketing practices of nurseries and garden centers. Questions were formulated around four themes: business characteristics, overall marketing practices, online marketing practices, and respondent demographics and use of

social media. A panel of experts including an Associate Professor and Extension Specialist for ornamental nursery crop production and garden centers, a Professor of food marketing and consumer economics and an Associate Professor of agricultural communications at Kansas State University oversaw the development and implementation of the survey. The panel reviewed each section of the instrument to provide the appropriate industry-based vocabulary consistent with their respective fields, to ensure that the relevant indicator was used to capture the data needed for the study and to make sure that the survey was in line with the goal of the study. The survey can be found in Appendix B.

The survey was designed and distributed using Qualtrics software, a web based data collection tool available through Kansas State University. Qualtrics allows users to design a web-survey without programming knowledge. Dillman et al. (2014) emphasize the necessity to design web surveys that are compatible with different devices, and display similarly across various operating systems and browsers. Qualtrics provides a preview of the survey in a mobile device version along with the computer screen version to check the compatibility of the survey to both devices.

The surveys that enable respondents to backtrack to correct or refer to previous responses improve data quality (Dillman et al., 2014). Couper et al. (2011) showed that not allowing respondents to return to previous questions significantly increased early exits. Although requiring response to each question before moving to the next can be critical to the study, Dillman et al. (2014) suggested not setting this restriction for all questions, allowing respondents to skip questions for which they have no answer rather than providing an inaccurate answer or quitting the survey. In the survey, 23 questions out of 40 were set in forced-choice format. They

addressed critical information such as marketing expenses (question 09), annual gross sales (question 29), and perceived importance of social media (question 18).

To improve respondent's focus on the task at hand, Dillman et al. (2014) recommended emphasizing visually essential information. Key terms such as "social media" and "online marketing" were italicized. The question stem was presented in the largest font and bolded, while instructions were kept in regular font. For example, question 10 was presented as follows:

How often do you use the following *marketing venues* to reach your customers? For each venue, select the frequency that is closest to your situation in 2014.

where the phrase "marketing venues" was italicized. The aforementioned presentation drew the focus of the respondent on the information needed, differentiating the stem of the question in bold from the instruction.

The response area or respondent region designated the response format needed, which could be text, dollar amount, number of years or other formats to avoid confusions regarding the response needed. Besides, an instruction was added to the response choices to indicate the nature of response when necessary. For example, question 24.a was formulated as follows:

There are workshops and training available for online marketing strategies. If there were one tailored to your specific industry and business needs, how much you would be willing to pay for a:

a. One time training for you or your employee to carry out social media marketing for your business? Write in a dollar amount.

In all questions formulated with multiple choices, answer choices were exclusive to prevent ambiguity.

Order effects may occur when a respondent choose the first sound answer rather than the best answer in order to rapidly complete the survey (Krosnick, 1991). Primacy, which is the likelihood of early responses to be selected due to memory and cognitive limitation, is another

cause of order effect. To average this effect, responses were randomized as in question 12, where respondents were asked to rank the impact of various online marketing activities on business sales.

The survey was designed to account for three types of respondents: (1) respondents not using any online marketing, (2) respondents not using social media as an online marketing strategy, and (3) respondents using social media for online marketing. In other words, the survey comprised of three different sets of questionnaires. Thus, the survey had to be tailored to prevent respondents being presented questions not relevant to them. Qualtrics contains a feature, "skip logic" that redirects each type of respondent to the set of questions addressing her marketing strategy. Figure 5 shows the general algorithm of the web-questionnaire. Another feature, "display logic" was used to display questions contingent to specific answers. For example, question 20 asked: "Did you hire a third party firm/consultant to conduct your social media activities in 2014?". If "yes" is selected, then the respondent was asked to provide her expense in 2014 for social media consulting services. The same feature was used in question 39 where respondent were asked whether they would like to be involved with the project team or not. They were then invited to provide their email address if they agreed to be involved.

Figure 5: Web-questionnaire algorithm
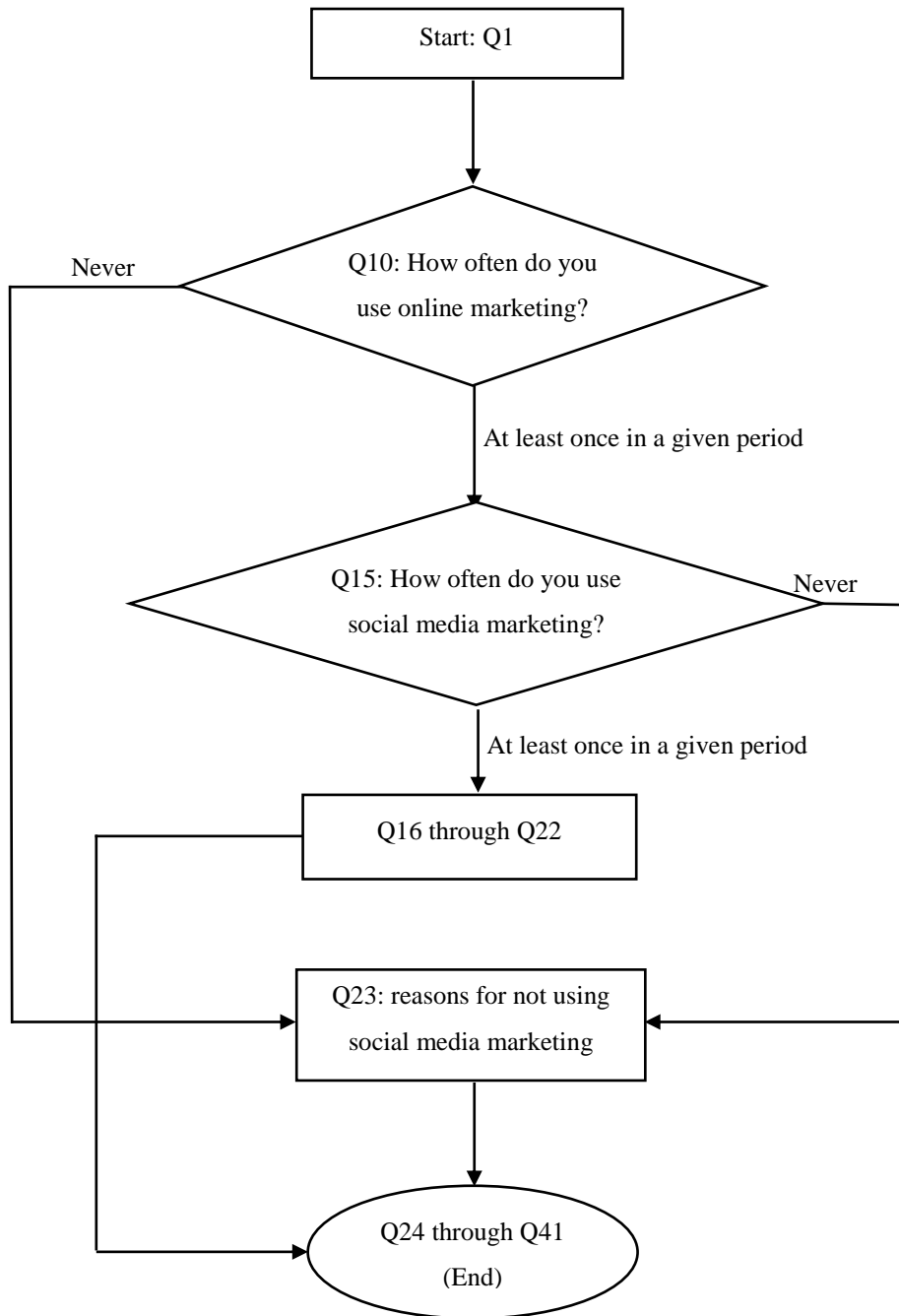
Although open-ended questions have the advantage that respondents are not influenced by the listed options that would appear in a closed-ended question (Revat, 2005), answers are not easily analyzed using quantitative methods. Thus, only one open-ended question was included in

the questionnaire. The questionnaire included two types of close-ended questions. The first type

of closed-ended questions implied ordered responses. In the survey, responses were ordered

following a five-point Likert scale. For example, question 23 provided various reasons for not

using social media marketing and asked respondent the extent to which they agree with the

answer as following:

- Strongly disagree

- Disagree

- Neither agree nor disagree

- Agree

- Strongly agree

The second type of closed-ended questions solicited non-ordered responses, with the latitude to

provide a non-listed response using a text entry field displayed for this purpose.

Respondents must be allowed to stop filling the survey when necessary and complete it at

a later time. When added to the survey interface, this functionality prevents data loss that can

arise from power outages, connection failure or other emergency (Dillman et al., 2014). Qualtrics

allows recording the network used to distribute the survey by setting an embedded data

parameter. Response time has been set to three months with the possibility to continue taking the

survey after interruption. This feature is made possible by the cookies stored in the web browser

which allows respondents to start taking the survey and complete it at a later date. Nonetheless,

once a survey link had been opened from a device, it has to be completed from the same device;

otherwise responses cannot be retrieved.

The survey was pretested by a nursery marketing specialist and two other people having no relationship with nursery and garden centers. Suggestions made by these respondents were considered for the final version of the survey.

3.1.3. Survey distribution

The goal of the distribution was to reach as many nurseries and garden center businesses as possible in 48 contiguous states of the United States, in both rural and urban areas. The survey was exclusively distributed electronically. According to Pew Research Center (2013), 83% of all adults in the United States use the Internet in 2013, 70% have broadband Internet access, and 60% of all adults access the Internet on their cell phone in 2013. Respondents were invited to enter into a drawing for two $50 Amazon gift cards as incentive to take the survey, as recommended by Dillman et al. (2014).

The survey was distributed in multiple stages to the lists summarized in Appendix D in the end. First, 42 email addresses were collected over the telephone from an available directory of 507 live plant licensees from Missouri (406 licensees) and North Dakota (101 licensees). The survey link was initially sent to these 42 nurseries on March 25, 2015. The first reminder was sent one week later, and a second reminder two weeks from the initial email. Dillman et al. (2014) stressed the importance of reminders and stated that the highest response rate is reached after the first reminder, one week from the initial email. In total 9 responses were collected including 7 responses prior to the first reminder and two responses after the first reminder.

Given the small size of the initial sample and the subsequent insufficient number of responses, the distribution list was extended to professional magazines and associations of the green industry, reached in April 2015 through the professional network of an agricultural Extension Specialist for ornamental nursery crop production and garden centers and the personal

network of a horticulture professional from California. From the 31 magazines, associations,

societies and personal listserv included in this network, 27 complete responses were collected

one month from this second distribution attempt. The peak garden center season starts in April,

the period when the second distribution attempt was made. There was a lower probability to

obtain a high rate of responses. In fact, to increase the odds for participation, the survey had to be

distributed during a non-peak season, when nurseries and garden center owners or managers

could use their spare time to complete the survey. For most nurseries and garden centers, the

slow season is observed from December to March, and in July (C. Boyer, personal

communication, December 4, 2015).

After an assessment of the survey progress by the panel of experts in September 2016,

two new distribution networks were exploited to reach a higher number of nurseries and garden

centers: a second directory of live plant licensees and a list of 83 executives of nursery and

landscape associations and magazines in the United States and Canada, obtained from the

agricultural Extension Specialist. The directory of live plant licensees contained the address of

496 nurseries including 460 nurseries from Kansas, 36 from Missouri, Oklahoma, Illinois,

Nebraska and California (Table 5).

Table 5: Repartition of live plant licensees reached by state

State	# Licensees	Percentage
CA	1	0.20%
IL	4	0.81%
KS	460	92.74%
MO	24	4.84%
NE	2	0.40%
OK	5	1.01%
Total	496	

Pertaining to the distribution method to the licensees' directory, reaching nurseries via

social media was proposed to send the survey link, using the Facebook account of the Center for

Rural Enterprise Engagement at Kansas State University. Finally, this method was dismissed for a mail distribution since non-personal Facebook accounts are not allowed to send messages. The mail distribution consisted in sending a postcard designed by the Center for Rural Enterprise Engagement that included a photo of the Extension Specialist (see Appendix C). The use of a contact familiar to the survey audience in the postcards aimed to created intimacy between the respondents and the surveyor (Dillman et al., 2014). The postcard also contained a short version of the survey URL easing the process of typing the survey link in the browser's address bar. It was made available through an online software that tinyurl.com hosts. Out of the 496 businesses of the licensees' directory, 139 businesses whose email address were retrieved online received an email reminder two weeks after the post cards were mailed.

Regarding the list of association and magazine, a note introducing the survey was emailed to the executives, asking them to distribute the survey link through their respective magazines and associations on September 21, 2015. The introducing note contributed to reducing skepticism for taking the survey (Dillman et al., 2014). Most magazines posted the survey link in two publications or more, ensuring that their readers were informed about the survey.

In total, 192 individuals completed the survey: 9 respondents from the first North Dakota and Missouri distribution list, 166 from the lists of association and magazines, and 17 from the second live plant licensee-based mailing list. Respondents were located in 35 states in the U.S., in Canada, and South America. The U.S. respondents are depicted in Figure 6.

Figure 6: Geographic location of U.S. survey respondents
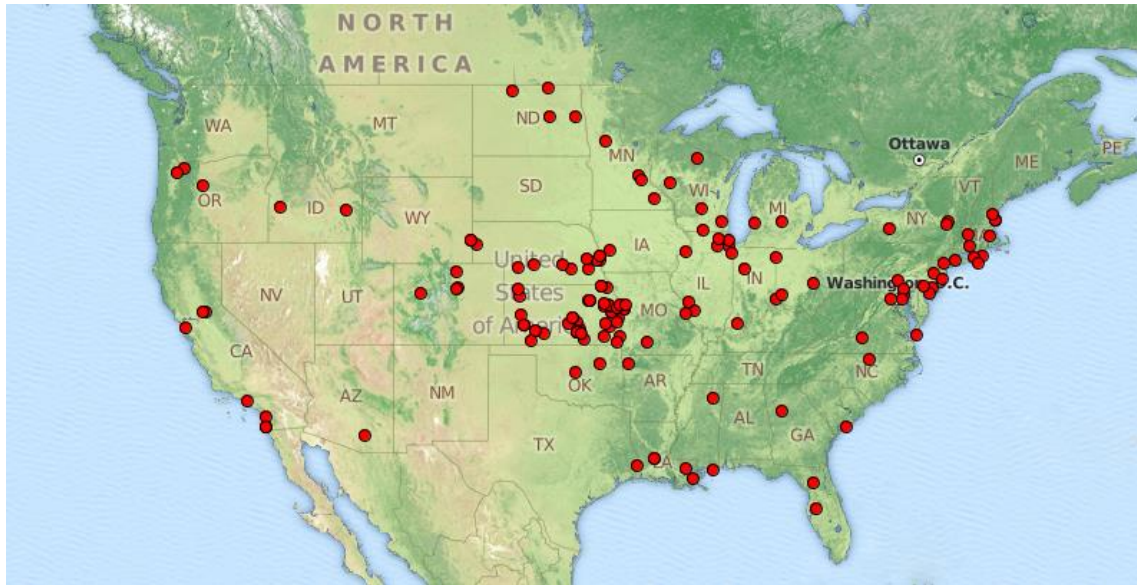
3.2. Data summary

The survey included 40 questions in total, summarized in 4 categories: respondent

characteristics, business characteristics, marketing practices and market characteristics.

Respondent characteristics included respondent demographics and work related data. Business

characteristics included general information related to the nursery such as products and location.

Marketing practices included both traditional and online marketing use. Based on the respondent

zip code, additional demographic data were generated to account for market characteristics. Out

of the 192 responses obtained, 161 were complete and included in the subsequent analysis.

Responses were collected using Qualtrics software and processed using RStudio, version

0.99.483 and Stata, version 13.1. Descriptive statistics for selected variables are summarized in

Table 6. Responses from all survey questions are included in Appendix A.

Table 6: Summary statistics of selected variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Respondent characteristics					
Age	161	49.93	12.64	21	75
Frequency of personal social media use	161	4.77	2.91	0	7
Number of social media friends	161	165.93	183.67	0	500
Business characteristics					
Number of full time employees during peak seasons	161	30.63	71.74	0	500
Number of full time employees during non-peak seasons	161	18.01	45.85	0	400
Number of part time employees during peak seasons	155	20.96	63.14	0	600
Number of part time employees during non-peak seasons	145	7.08	27.43	0	300
Period of operation (months)	155	10.16	3.05	1	12
Total sales 2014 (in $1000)	161	1633.03	1720.88	1.25	5000
Years in operation	161	34.57	26.11	0	130
Nurseries marketing practices					
% sales retail	161	69.64	36.93	0	100
% sales to garden centers	161	5.42	14.80	0	100
% sales to landscapers	160	11.96	18.92	0	100
% sales to mass merchandisers	161	0.26	1.35	0	10
% sales to rewholesalers	161	3.15	11.38	0	90
2014 overall marketing expenses (in $1000)	161	53.05	122.38	0	1000
$ amount of social media consulting service	18	11700.61	24166.27	1	90000
Frequency of print advertisement per week	161	0.68	1.41	0	7
Frequency of TV advertisement per week	161	1.06	1.99	0	7
Frequency of fair attendance per week	161	0.13	0.713	0	7
Frequency of online marketing use per week	161	3.62	2.78	0	7
Frequency of social media use per week	151	5.36	2.94	0	7
Hours of social media marketing per week	143	3.82	4.44	0.5	20
Membership in professional associations	161	3.09	1.60	1	6
Number of businesses monitored online	151	6.13	3.57	1	11
Overall marketing time (hours/week)	161	13.68	29.31	0	200
Period since first social media use (years)	142	5.08	2.90	1	15
Professional online groups	161	3.13	1.65	1	6
Proportion of sales under contract	159	0.10	0.23	0	0.95
Willingness to pay for a one time training	161	204.32	592.33	0	5000
Willingness to pay for a monthly subscription	161	170.86	1201.49	0	15000
Willingness to pay monthly for a consulting service	159	62.31	425.48	0	5000
Market characteristics					
City population	153	114216.8	361787.9	105	3857799

3.2.1. Respondent characteristics

Most respondents (60.3 %, n = 161) were 45 to 64 years of age. Slightly fewer female respondents (48.5%) than male counterparts responded to the survey (Table 7). To test whether the sample was a good representation of the U.S. nursery farmers' population, chi-square tests were performed. First, the distribution of respondents' age was compared to the distribution of U.S. nursery, greenhouse, floriculture, and sod farmers' age. The 2012 Census of Agriculture conducted by the USDA/NASS provides estimates of the U.S. nursery, greenhouse, floriculture, and sod population in six age ranges: under 25, 25 to 34, 35 to 44, 45 to 54, 55 to 64 and 65 and over. The computed Chi-square was 47.18, higher than the critical Chi-square value for 6 degrees of freedom (11.07 at the 5% significance level), rejecting the null hypothesis that sample and the farmer's population have the same age distribution. On average, the sample respondents were younger than U.S. nursery, greenhouse, floriculture, and sod farmers.

A second Chi-square test was performed to determine whether gender was distributed similarly in the sample and the nursery, greenhouse, and floriculture operators' population in the U.S. in 2012. The test revealed that the sample consisted of a higher proportion of women (48.5%, n = 161) against 21.6% of women among principal operators of nurseries, greenhouses, and floriculture operations in the U.S.

The results obtained from the test were predictable. Given the low rate of non-social media users among the respondents, one would suggest that active social media users had a higher interest in taking the survey. The sample would then result from a selection based on the interest in social media and differ from the population of nursery operators in the U.S. Another explanation could be that the sample of the survey contained managers and marketing managers or operators who are not principal operators. Further, a Chi-squared test was conducted to

compare the gender proportions between the sample and the U.S. population of active social media users. According to Fitzgerald (2012), females account for 58% of Facebook users against 42% of male counterparts. In the sample, respondents using social at least twice a week were considered active users. The computed statistic was 0.0052, lower than 3.841 the critical value at 5% significance level for 1 degree of freedom. The sample and the U.S. population had equivalent gender proportions of active social media users.

More than half of the respondents had a bachelor or associates degree (57.1%, n = 161), while 88.8% of the respondents have at least attended some college. Among respondents having attended some college, 74% (n = 143) were using social media for personal purposes more than twice a month. At this level, they can be considered social media adopters. This percentage is consistent with the 70% of social media adopters provided by Pew Research Center (2015) for the same education level. Social media adoption rate among respondents with a college degree (83%, n = 108) was slightly higher than the 76% of Pew Research Center (2015). This result is reasonable since the survey has likely raised more interest among social media users. Only 11.2% (n = 161) of the respondents were not social media users. The rate of social media adopters was also higher among the respondents with a high school diploma or less compared to the U.S. population counterpart. The same explanation holds for the latter group of respondents.

Table 7: Repartition of respondents by age, gender and education level

	Count	Percentage
Age		
18 to 24	3	1.86%
25 to 34	23	14.29%
35 to 44	22	13.66%
45 to 54	46	28.57%
55 to 64	51	31.68%
65 to 74	15	9.32%
75 and over	1	0.62%
Total	**161**	**100.00%**
Gender		
Male	83	51.55%
Female	78	48.45%
Total	**161**	**100.00%**
Education		
Less than high school graduate	2	1.24%
High school graduate - diploma or GED	9	5.59%
Technical, trade, or vocational school	7	4.35%
Some college (no degree)	35	21.74%
Bachelor or associate degree	92	57.14%
Masters, doctorate, or professional degree	16	9.94%
Total	**161**	**100.00%**

Regarding positions held by the respondents in the business, 63.4% (n = 161) of the respondents were business owners, while 23.6% were managers (Table 8). A few marketing managers (8.1%) had responded to the survey. This low rate of marketing managers among respondents shows that either owners or managers conduct their own social media marketing activities or contract their media marketing services to third party consultants. Other respondent roles included "Extension Master Gardener", "office manager", "sales manager" and "search engine optimizer".

Table 8: Repartition of respondents by position and tenure in the business

Role	Less than 1 year	1 to 4 years	5 to 9 years	10 years and more	Total
			Tenure		
Owner/Operator	1	10	13	76	**100**
Owner/Non-operator	0	0	2	0	**2**
Manager	1	8	13	16	**38**
Marketing Manager	2	3	3	5	**13**
Other	1	2	1	4	**8**
Total	**5**	**23**	**32**	**101**	**161**

The majority (62.7%, n = 161) of the respondents had worked at the nursery for 10 years and more. Only 3.1% of the respondents had joined or owned the nursey within one year. As expected, most owners had worked at their business for at least 10 years (76%). The sample was representative of the U.S. farmers' population in term of years on present farm. The 2012 Census of Agriculture provides the number of principal farm operators by ranges of five years of presence on their farm. The Chi-squared test results in a computed statistic of 1.137, which is less than the critical value at the 5% significance level for 2 degrees of freedom (5.991).

The personal social media activity of the respondents was assessed by questions 33, 34 and 35 of the survey (Appendix B). First, Respondents were asked to report their personal use of social media and the number of social media accounts they were following on a regular basis. More than half of the respondents (58.4%, n = 161) were regular social media users while only 16.15 % of the respondent never used social media for personal purposes (Table 9).

Table 9: Personal social media use, adoption attitude and number of friends of respondents

Frequency of use of social media	#	%
At least once a day	94	58.39%
2-6 times a week	25	15.53%
Once a week to 2 times a month	11	6.83%
Once a month	5	3.11%
Less than once a month	8	4.97%
Do not use	18	11.18%
Total	161	100.00%
First use of social media	**#**	**%**
Trial and error	121	75.16%
From a relative or friend	48	29.81%
From a professional	12	7.45%
I had a formal training	2	1.24%
I have never tried to use social media	8	4.97%
Other	6	3.73%
Number of friends	**#**	**%**
0	27	16.77%
1-10	24	14.91%
11-50	24	14.91%
51-100	21	13.04%
101-500	41	25.47%
Over 500	24	14.91%
Total	161	100.00%

The percentage of daily social media users per age range was between 66.0% (n = 47) for respondents aged 55 to 64 and 86.1% (n = 43) for respondents aged 45 to 54, suggesting a relatively lower use of social media for personal purposes than the use of the same media for professional purposes (Figure 7). It is important to notice that respondents aged 75 and over and respondents aged 18 to 24 were excluded in this analysis due to the low number of responses from these respective age ranges.

Figure 7: Proportion of daily social media users for personal and professional purposes by age
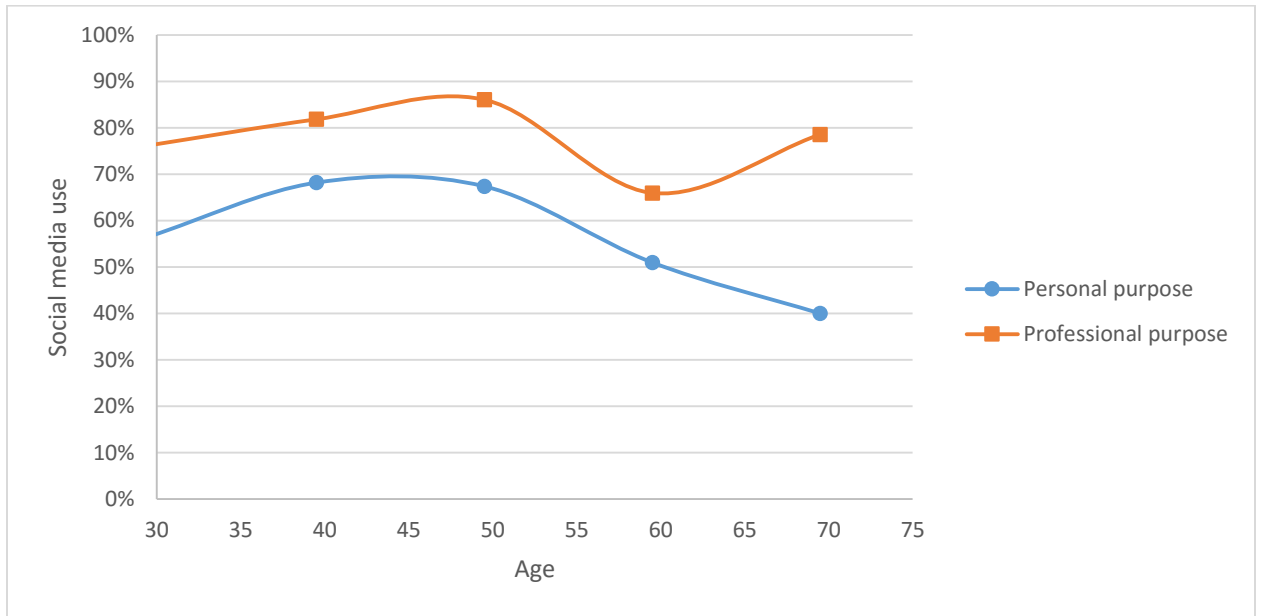
The second question describing the social media activity of the respondents was related to their attitude toward new technology such as social media. The majority of the respondents (75.2%, n = 161) reported having learned to use social media by self-initiative (Table 9). Social media activity at personal level was also measured by the number of accounts being followed by an individual, particularly the number of friends and likes. Question 36 of the survey asked nursery owners to report the number of personal or business social media account they were networking with. Respondents were almost equally distributed across all ranges of number of friends reported, between 13% and 17% (n = 161). A higher number of respondents were observed only for owners networking with 101 to 500 individuals (25.5%) (Table 9).

3.2.2. Business characteristics

Question 3 of the survey was related to the products and services offered by the businesses following Hall et al. (2005)'s description of products and services offered by the green industry.

Respondents' products and services ranged from 1 to 15 categories (Table 10). The most prominent product category was retail bedding and nursery stock (73.3%, n = 161), while only 1.2% of the respondents offered wholesale garden equipment. This statistic is supported by the value of nursery crops sales in 2012 provided the 2012 Agricultural Census. The sales of nursery stock crops were the highest ($5 billion) in the green industry. Among floriculture crops, bedding and garden plants sold for the highest value ($3.6 billion), representing 62% of the value of floriculture crops. Respondents mentioned various other offerings including pottery, gift and jewelry retail, herbs and vegetables, pet shop, agritourism, education services, and vocational training for individuals with disabilities.

Table 10: Products and services offered by the respondents

Products/services	Count	Percentage
Greenhouse / annuals	94	58.39%
Lawn & garden equipment	10	6.21%
Nursery container and field	66	40.99%
Landscape architecture/design	46	28.57%
Landscape services/build	56	34.78%
Retail landscape materials	68	42.24%
Retail florist and florist supplies	17	10.56%
Retail food & beverage	16	9.94%
Retail general merchandise	87	54.04%
Retail lawn & garden products	88	54.66%
Retail bedding & nursery stock	118	73.29%
Retail garden equipment	28	17.39%
Wholesale florist and florist supplies	4	2.48%
Wholesale garden equipment	2	1.24%
Wholesale landscape materials	22	13.66%
Wholesale bedding & nursery stock	43	26.71%
Wholesale lawn & garden products	10	6.21%
Other	19	11.80%

Table 11 presents the repartition of respondents across different sales ranges. The sample comprises nurseries of almost all sizes ranging from small (less than $2,500) to large ($5 million or greater). Firms making less than $100,000 represent only 19.3% of the respondents, suggesting a higher participation of bigger firms. Approximately half of the respondents (43.5%) reported a total value of sales exceeding $1 million. Various reasons can explain these large differences in sizes in the green industry. Businesses in the green industry offer various products and services ranging from basic retail of florist supplies to landscape architecture and installation. In addition, total sales includes both nursery products sales and non-nursery related products sales. In most cases, nursery and garden centers operators are involved in other sectors such as agriculture, food and beverage or general merchandise retail.

Table 11: Total sales made by respondents in 2014

Sales in 2014	#	%
Less than $2,500	8	4.97%
$2,500 to $4,999	0	0.00%
$5,000 to $9,999	1	0.62%
$10,000 to $24,999	5	3.11%
$25,000 to $49,999	11	6.83%
$50,000 to $99,999	6	3.73%
$100,000 to $249,999	19	11.80%
$250,000 to $499,999	19	11.80%
$500,000 to $999,999	22	13.66%
$1 million to $4,999,999	46	28.57%
$5 million or greater	24	14.91%
Total	**161**	**100.00%**

The period of operation was asked in question 5 for each nursery. The more seasonal nurseries were open only one month a year (1.3%, n = 155) against 63.87% of the respondents open year round. As illustrated in Figure 8, businesses making higher sales were open year round. Nurseries open for less than 3 month a year make less than $250,000 of sales. Only 3 nurseries

making more than $1 million were open less than 3 months a year. The data reveal that these businesses retail general merchandise in addition to nursery products. A possible explanation could be that retail for the nursery and garden center is a seasonal, complementary activity to the year-round, main business.

Figure 8: Respondents period of operation by nursery size
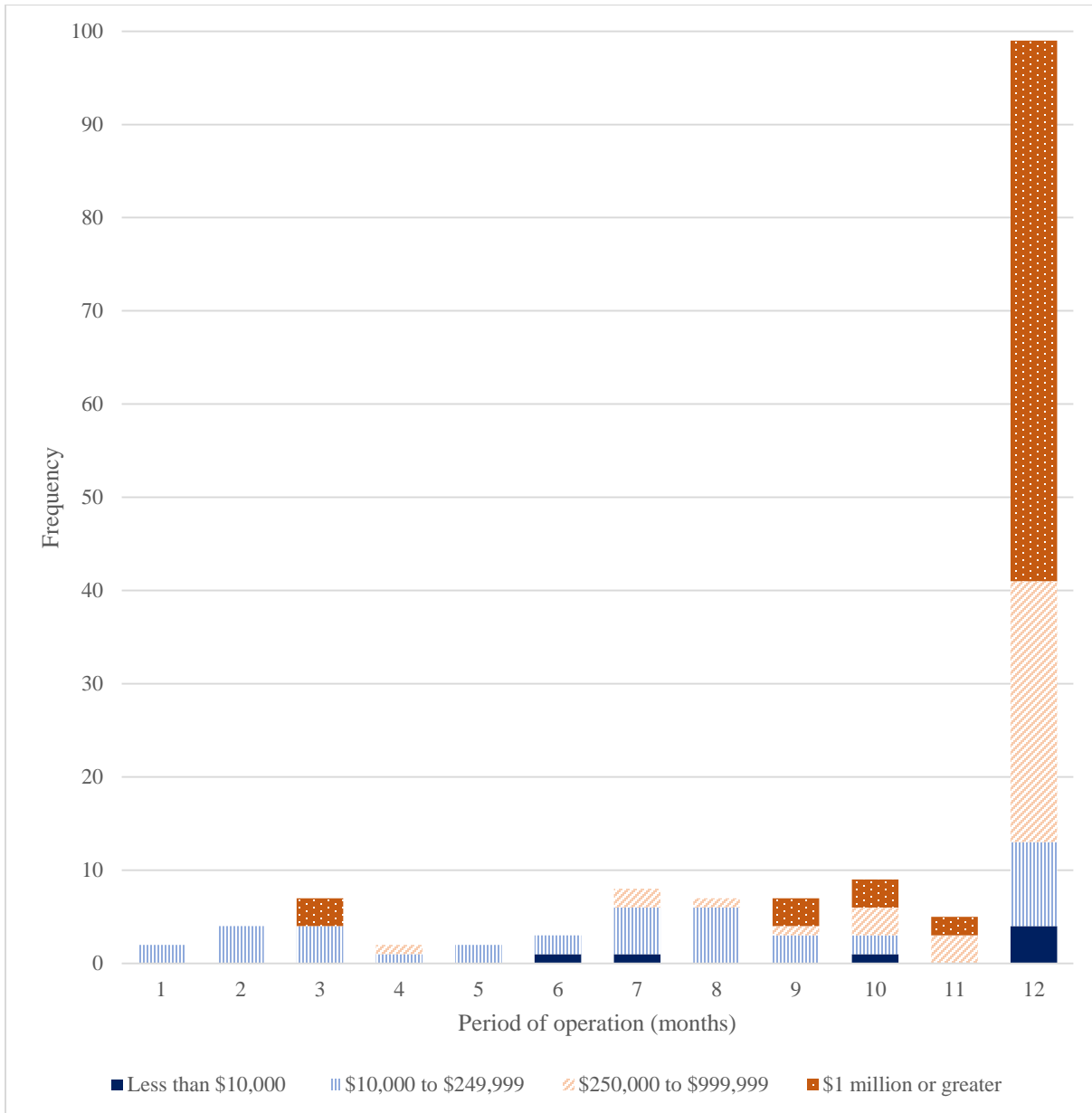
The analysis of the nursery number of full time employees by sales category (Figure 9) leads to two conclusions: (1) the size of the nursery was related to the sales level, and (2) a greater number of respondents were medium ($10,000 to $250,000) to large (more than $1,000,000) businesses.

The higher participation of bigger nurseries could be explained by their interest in taking the survey as active social media users themselves. One of the questions in the survey asked the respondent's willingness to receive the results of the survey. Overall 84% (n = 161) of the respondents were interested in the survey results. Among the business having shown interest in the results, 80% (n = 135) were businesses making at least $100,000 in sales.

Figure 9: Number of full-time employees by nursery size
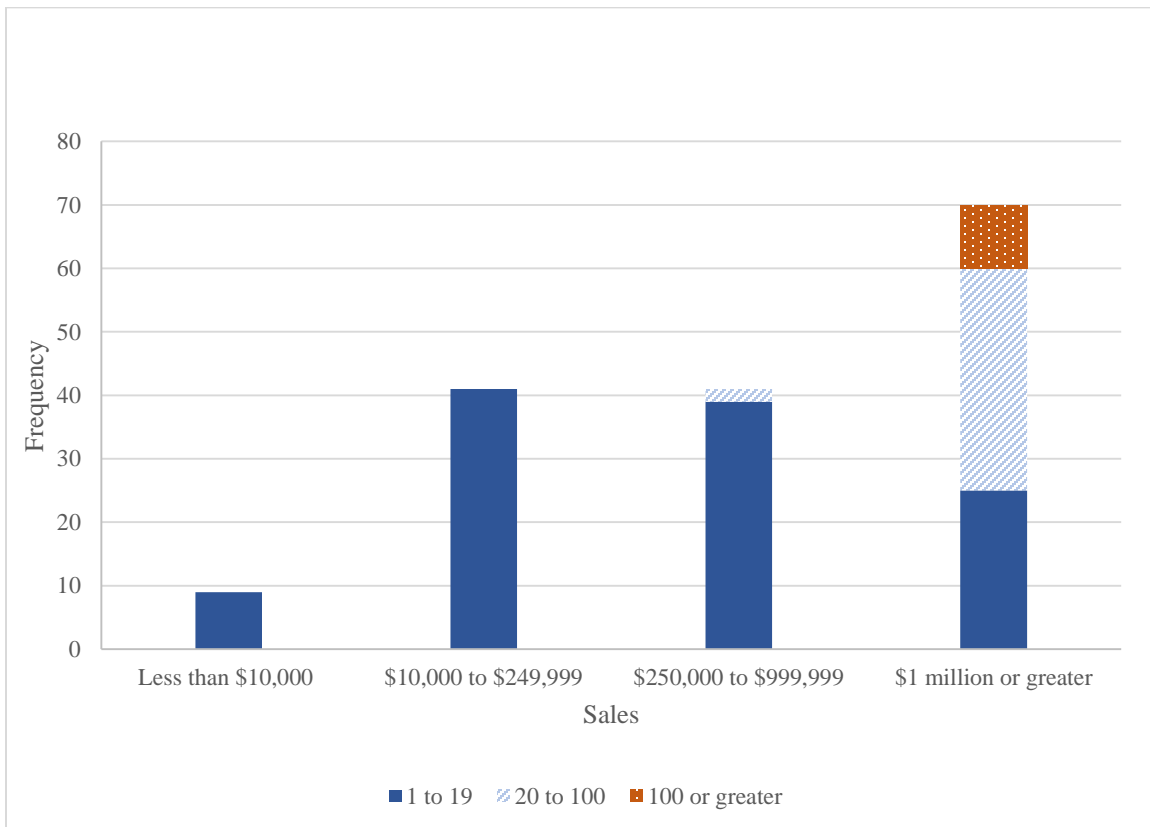
Table 12 compares the number of employees in the nurseries surveyed to the average hired farm labor of nurseries, greenhouse and floriculture farms provided by the 2012 Census of Agriculture. The Census distinguishes part time workers from full time workers using a threshold of 150 days worked a year. The average number of workers was higher in the sample relative to the census. Regarding part time employees, the Census' average number of workers per farm fell within the range of the sample averages, closer to the non-peak season's average. The average number of full time workers during non-peak season in the sample was about twice the average number of permanent workers from the Census. However, the high standard deviation in the sample indicates that these ranges could vary with a larger sample.

Table 12: Average number of employees of survey respondents

		Part time	Full time
Ag Census		7.98	9.97
Survey	Non peak season	7.08	18.01
	Peak season	20.97	30.63

Question 28 investigated the number of years responding businesses had been in operation in 2015, when the survey was launched. Most nurseries that completed the survey had been in operation for more than 10 years (Table 13). Overall, all ranges were represented in the sample, with a few number of respondents having been in operation for more than 100 years (5.0%, n = 161).

Table 13: Years of operation

	#	%
Less than 1 year to 5 years	14	8.7%
6 to 10 years	9	5.6%
11 to 20 years	34	21.1%
21 to 30 years	28	17.4%
31 to 50 years	41	25.5%
More than 50 years	35	21.7%
Total	**161**	**100.0%**

3.2.3. *Nursery marketing practices*

Regarding marketing practices, retail was the most popular marketing channel: among the respondents, 56% (n = 161) made more than 80% of their sales through this channel and 41.6% (n = 161) made more than 90% of their sales at retail (Table 14; Figure 10). These proportions exceeded Behe et al. (2008)'s findings. Nationwide, 18.9% of the 15,588 firms surveyed by Behe et al. (2008) sold only at retail while 45% marketed their products through both retail and wholesale channels. They also found that retail sales were the highest in the Great Plain region (67.2%). Their results supported the high proportion of retail sales found among respondents. In the current study, respondents were mainly located in the Great Plains. In contrast, 95.6% (n = 161) did not market any of their product through the mass merchandisers' channel (Table 14; Figure 10), compared to Behe et al. (2008)'s 36.4% (n=15,588 firms). Respondents also reported marketing up to 10% of their products through channels not listed in the survey including construction and maintenance firms, municipalities and universities and non-profit organizations.

Table 14: Percentage of sales made through various marketing channels

Percentage of sales	Retail		Garden centers		Landscapers		Mass merchandisers		Rewholesalers	
	#	%	#	%	#	%	#	%	#	%
0 to 10%	29	18.01	139	86.34	114	71.25	161	100.00	150	93.17
11 to 20%	3	1.86	9	5.59	15	9.38	0	0.00	2	1.24
21 to 30%	2	1.24	5	3.11	10	6.25	0	0.00	5	3.11
31 to 40%	4	2.48	2	1.24	8	5.00	0	0.00	2	1.24
41 to 50%	3	1.86	2	1.24	6	3.75	0	0.00	0	0.00
51 to 60%	8	4.97	2	1.24	3	1.88	0	0.00	0	0.00
61 to 70%	9	5.59	0	0.00	1	0.63	0	0.00	0	0.00
71 to 80%	13	8.07	0	0.00	1	0.63	0	0.00	1	0.62
81 to 90%	23	14.29	1	0.62	1	0.63	0	0.00	1	0.62
91 to 100%	67	41.61	1	0.62	1	0.63	0	0.00	0	0.00
Total	161	100	161	100	160	100	161	100	161	100

Figure 10: Number of nurseries by percentage of sales made through retail and mass merchandisers channels
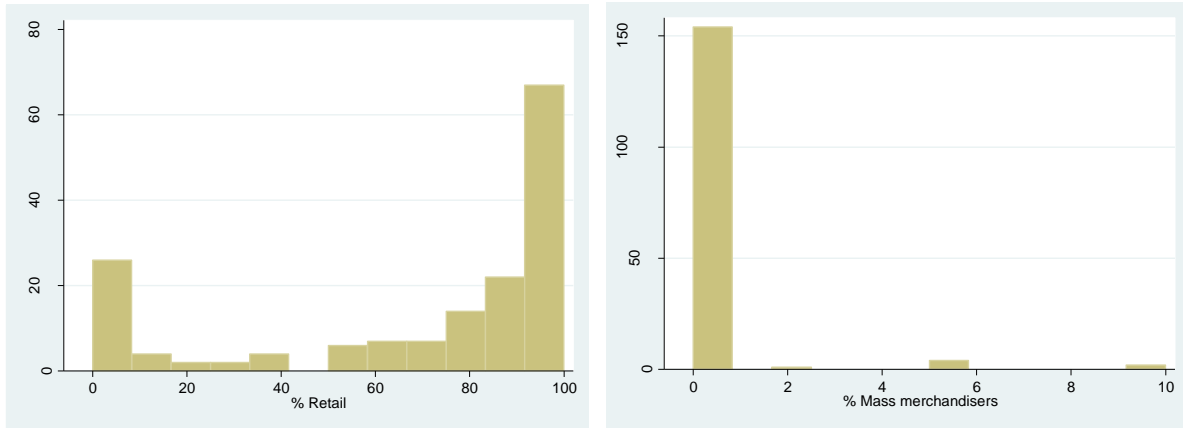
Question 6 of the survey asked the nurseries to report the percentage of sales made through contract. According the Economic Research Service of the USDA, one third of the total value of production on U.S. farms is produced under contractual arrangements, either production or marketing contracts. In the green industry, marketing contracts may impact negatively the use of new-media marketing as less effort would be needed to secure sales. A few nurseries (4.4%, n = 159) made more than 90% of their sales under contractual arrangements (Table 15). On the other hand, 59.8% (n= 159) of the nurseries surveyed did not resort to contractual arrangements to market their products.

Table 15: Percentage of sale value achieved by respondents under contractual arrangement in 2014

Percentage of sales	#	%
0%	95	59.8%
1% to 10%	33	20.8%
11% to 25%	12	7.6%
26% to 50%	7	4.4%
51% to 90%	5	3.1%
More than 90%	7	4.4%
Total	**159**	**100.0%**

Tables 16 and 17 summarize the type of device and Internet connection used by

respondents available and used to conduct their new-media marketing strategy asked in questions

8 and 11. Regarding the type of connection, wireless (45.6%, n = 161) and cable (30.6%, n =

161) were the preferred modes for respondents (Table 16). The results also show that nurseries

were generally using more than one type of connection in their operation, since the number of

responses (231) exceeded the number of respondents (n = 161). Pertaining to the devices used for

new-media marketing, desktops (78.7%) and smartphones (66.7%) were the most prominent

(Table 17). Similar to the type of connection, nurseries used more than one device for their new-

media marketing activity.

Table 16: Type of Internet connection available in nursery surveyed

Type of connection	#	%
There is no Internet access on site	5	3.13%
Dial up	4	2.50%
Wireless	73	45.63%
Mobile	22	13.75%
Broadband	26	16.25%
DSL	39	24.38%
Cable	49	30.63%
Satellite	4	2.50%
ISDN	1	0.63%
Other	8	5.00%
Total	**231**	

Table 17: Device used by respondents for new-media marketing

Device	#	%
Laptop	83	55.33%
Smart phone	100	66.67%
Tablet	55	36.67%
Other mobile device	1	0.67%
Desktop	118	78.67%
Total	**357**	

Prior to addressing the online marketing activity of respondents, questions 9 and 10 investigated their general marketing strategy. While total marketing expenses were asked in question 9, question 10 asked respondents to report the frequency of use of various marketing venues. Marketing expenses averaged $53,050 and ranged from $0 to $1million, suggesting an important differences among marketing strategies. Nurseries used mainly two marketing venues on a daily basis: personal interactions (32.9%, n= 161) and online marketing (32.3%, n = 161) (Table 18). Further, question 31 evaluated the number of hours allocated weekly to marketing tasks. Nurseries spent on average 13 hours a week performing various marketing activities (Table 19).

Table 18: Frequency of use of various marketing venues by nurseries (n = 161)

Marketing venue	Daily	2 to 6 times a week	1 to 4 times a month	Once a quarter	1-3 times a year	Less than once a year	Never
Print advertisements (newspapers, store circulars, postal mailings)	2.48%	6.83%	35.40%	8.70%	21.12%	8.07%	17.39%
Personal interactions (phone calls, emails, visits)	32.92%	14.91%	27.95%	6.83%	6.21%	1.86%	9.32%
Television/radio	5.59%	14.29%	14.91%	2.48%	9.32%	6.21%	47.20%
Fairs/trade shows/garden shows	0.62%	1.24%	2.48%	9.32%	36.02%	13.66%	36.65%
Online marketing (websites, blogs, social media, e-newsletters)	32.30%	30.43%	21.74%	3.73%	3.73%	1.86%	6.21%

Table 19: Weekly overall marketing time of nurseries in hours

Marketing hours	#	%
0 to 10 hours	122	75.78%
11 to 20 hours	16	9.94%
21 to 30 hours	6	3.73%
31 to 40 hours	6	3.73%
41 to 50 hours	4	2.48%
51 to 60 hours	2	1.24%
61 to 70 hours	0	0.00%
71 to 80 hours	0	0.00%
81 to 90 hours	0	0.00%
11 to 100 hours	1	0.62%
More than 100 hours	4	2.48%

To assess the perceived usefulness of new-media marketing by nurseries, question 12 asked to rank the four following online marketing venues based on their importance: websites, HTML newsletters, blogs and social media platforms. Question 18 asked to describe the

perceived impact of social media in five different areas: online presence, community

relationships, industry insight, sales, in-store traffic and customer education. Social media

platforms received the most number of first ranking among online marketing venues (45.04%)

(Table 20). Advertising through websites and HTML newsletters were considered equally

important but less essential than social media. Respondents reported the critical role social media

played in maintaining an active online presence (50.5% selecting "extremely important", n =

144) and building positive relationship with customers (51.4% selecting "extremely important",

n = 144) (Table 21). Generally, social media was perceived to positively impact the six areas

mentioned: online presence, community relationships, industry insight, sales, in-store traffic and

customer education. However, fewer respondents (23.6% selecting "extremely important", n =

131) stressed the importance of social media in learning about the market place.

Table 20: Importance of selected online marketing venues according to respondents (n = 131)

Marketing venues	First	Second	Third	Fourth	Fifth
Websites	25.95%	33.59%	30.53%	8.40%	1.53%
HTML newsletters (e.g. Constant Contact, MailChimp)	25.95%	27.48%	24.43%	18.32%	3.82%
Blogs	0.76%	7.63%	17.56%	58.78%	15.27%
Social media platforms (Facebook, Twitter, etc.)	45.04%	25.19%	22.90%	6.11%	0.76%
Other	2.29%	6.11%	4.58%	8.40%	78.63%

Figure 11 through 13 illustrate the social media and online marketing use. Figure 11

compares the use patterns in social media and online marketing. The proportion of respondents

that use social media relatively less frequently (4-6 times a year or less) was similar to the

Table 21: Perceived importance of social media in selected areas (n = 144)

Area	Not at all important	Slightly important	Moderately important	Quite important	Extremely important
To have an active online presence	3.47%	6.94%	12.50%	26.39%	50.69%
To build a positive community with customers	2.78%	5.56%	10.42%	29.86%	51.39%
To learn about marketplace	4.86%	11.81%	34.03%	25.69%	23.61%
To improve sales	3.47%	9.72%	17.36%	29.17%	40.28%
To increase customer traffic into the store	7.64%	6.94%	17.36%	21.53%	46.53%
To educate customers	2.78%	5.56%	17.36%	31.25%	43.06%

proportion of respondents that use online marketing less frequently. On the other hand, online marketing and social media users differed in the frequency of their use. While more respondents were daily social media users (115 respondents) compared to online marketing users (52 respondents), fewer nurseries used social media once a month or once a quarter, relative to online marketing users. These dissimilarities may seem unrealistic. One might expect the number of daily online marketing users to be at least equal to the number of daily social media users, given that online marketing encompasses social media. Reasons for such dissimilarities can arise from respondents erroneously perceiving social media and online marketing as exclusive. The popularity of social media platforms such as Facebook might have contributed to this confusion. Moreover, only two respondents had formal training in social media. Stebner (2015) also found that few garden center owners or employees had formal training in new-media marketing techniques and were more likely to confuse online marketing and social media. Overall, 76% of the respondents were regularly using social media for business purposes, once a week or more. This rate supports again the hypothesis that active social media users were more represented among respondents. Besides social media, websites and HTML newsletters were the next most frequently used marketing venues (Figure 12).

Figure 11: Frequency of use of online marketing and social media
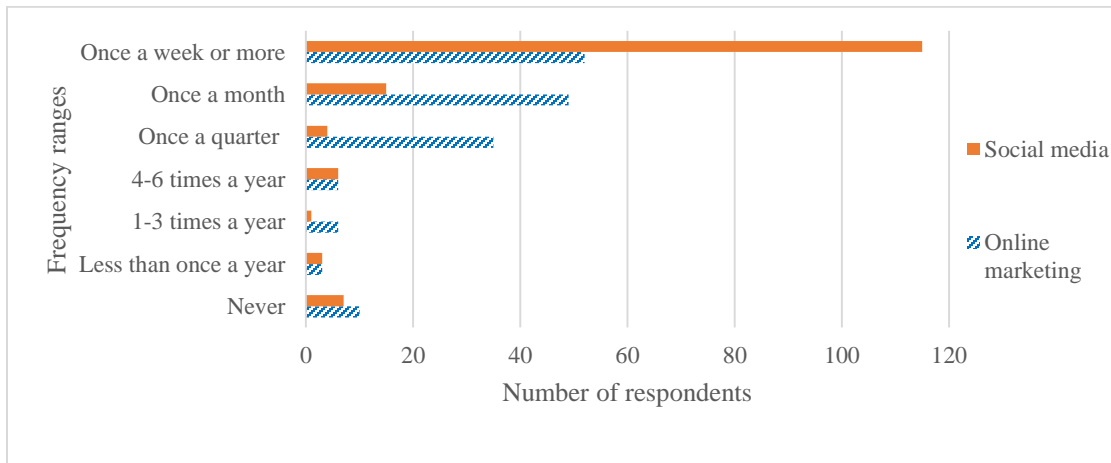
Figure 12: Frequency of use of selected online marketing tools
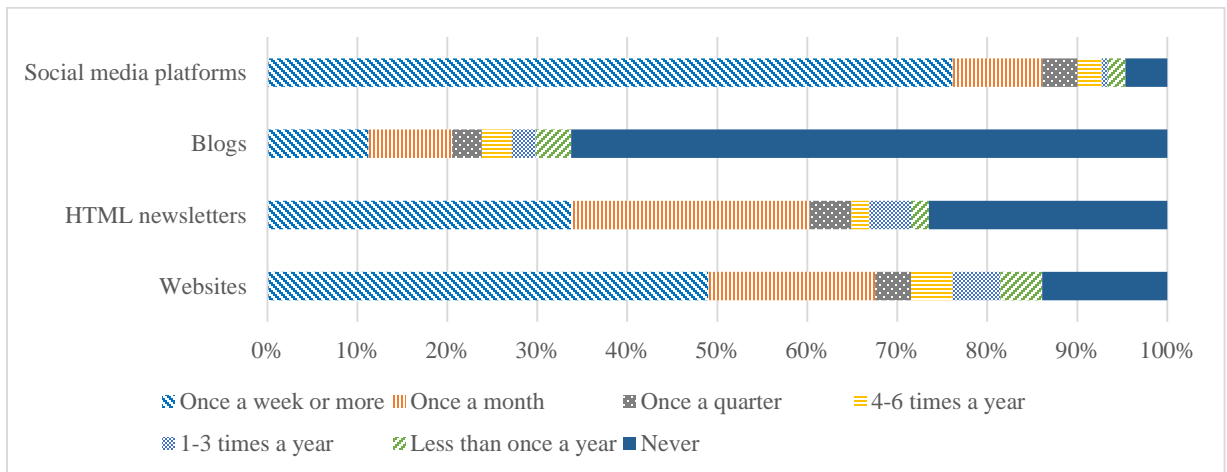
Figure 13: Frequency of use of selected marketing venues
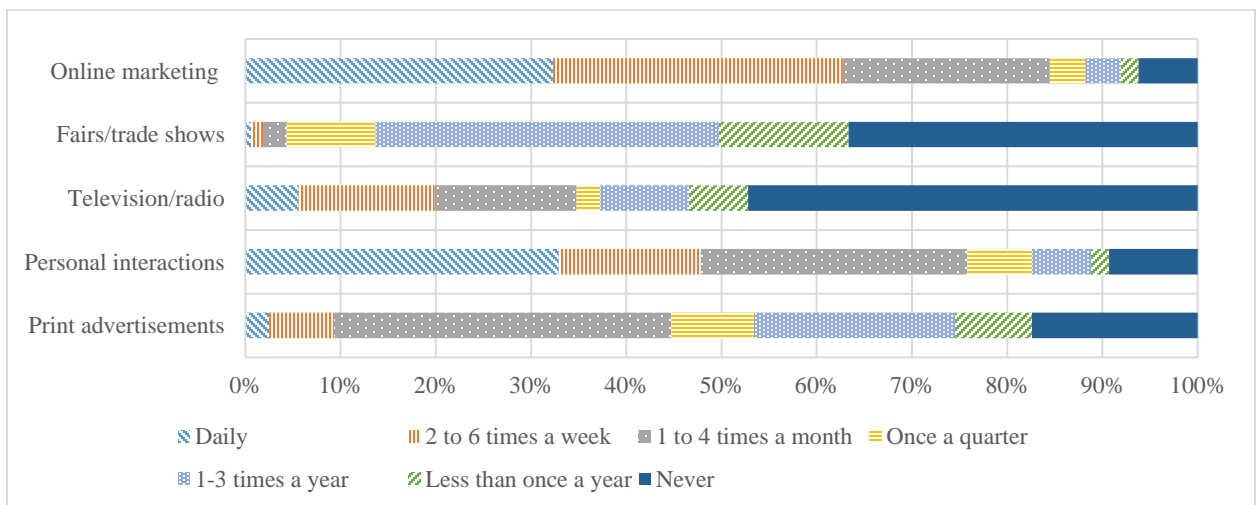
As it pertains to marketing venues, respondents reported that they reached their customers more frequently by personal interactions and online marketing (Figure 13). However, one should not conclude that these two marketing venues were the most important to the businesses since the question captures the frequency rather than the dollar amount allocated to each marketing venue. Stebner (2015) found that traditional marketing venues (print advertisement, radio, TV) were the preferred marketing method among garden centers.

Questions 13 and 32 aimed to capture the characteristics of the professional networks for each nursery. Question 13 asked to the respondents the number of businesses they were following online on a regular basis, while Question 32 asked the number of professional networks where they were involved. The number of businesses monitored online represented a group from which the nursery owner or manager can learn online marketing tips or imitate what peers were doing by observing. It is assumed that the exposure of the nursery to new-media marketing strategies will increase with the size of their online network. The term "regularly" stresses the relatively permanent contact with the group. Responses are summarized in Table 22 and 23. If respondents were following less than 11 businesses online (72.2%, n = 151), the number of respondents involved in online networks seemed uniform across numbers of networks. In question 32, the goal was to capture the number of groups that shared business-related information with the nursery. The number of overall professional associations was distinguished from the number of online association or groups. Here, the information shared was not necessarily related to online marketing. This set up is similar to the one used by Baerenklau (2005) to capture the network effect. The overall number of professional association and the number of online associations were similarly distributed across respondents. The calculated correlation coefficient was 0.304, indicating a weak positive linear relationship.

Table 22: Number of businesses monitored online by respondents

Number of businesses	#	%
0	17	11.26%
1	8	5.30%
2	16	10.60%
3	20	13.25%
4	16	10.60%
5	14	9.27%
6	11	7.28%
7	2	1.32%
8	4	2.65%
9	1	0.66%
10+	42	27.81%
Total	151	100.00%

Table 23: Number of professional association or society by respondent

	0	1	2	3	4	5+	Response
Membership in professional associations/ societies	19.25%	22.36%	19.88%	19.25%	7.45%	11.80%	161
Online networks (Facebook or LinkedIn groups, forums)	19.88%	18.63%	26.09%	14.91%	4.97%	15.53%	161
Other	16.77%	0.00%	0.62%	0.00%	0.00%	1.24%	30

Social media marketing expenses through consulting services averaged $11,700, representing 22% of total marketing expenses. This result indicates that new-media marketing receives less financial attention from nurseries than traditional marketing venues. The Pearson correlation coefficient between the amount allocated to social media services and the dollar sales amount is 0.58, indicating that bigger firms allocate more resources to social media marketing. About one in eight respondents hired a third party to conduct their social media activity in 2014 (Table 24).

Table 24: Percentage of nurseries having hired a third party firm to conduct their social media activity in 2014

Third party hired	#	%
Yes	18	12.59%
No	125	87.41%
Total	143	100.00%

Social media represented on average 39% of the time allocated to overall marketing, which averaged 13.7 hours a week. Time allocated to social media, along with the frequency of social media use, are more precise measures of social media use than the dollar amount spent on social media marketing. These two measures are often used to assess social media activity. However, this percentage does not provide an accurate representation of the importance of new-media marketing compared to other marketing venues. Nursery owners may spend less time in a week to prepare print advertisement but they may allocate more financial resources to reach customers through a large diffusion of the ad. For this reason, frequency of use of social media and frequency of use of other marketing venues will not be compared in this study.

Table 25: Time allocated to social media in a week

Answer	Bar	Response	%
Less than 1 hour	24.48%	35	24.48%
1 to 2 hours	30.07%	43	30.07%
3 to 4 hours	19.58%	28	19.58%
5 to 9 hours	18.18%	26	18.18%
10 to 19 hours	4.90%	7	4.90%
20 hours and more	2.80%	4	2.80%
Total	0.00%	143	100.00%

Although most respondents were social media users, 17 nurseries did not conduct their marketing strategy using social media. Question 23 investigated the reasons for not using social

media among the 17 non-social media users (Table 26). The tabulation of responses show that the lack of time and the preference for direct interaction the two main reasons precluding nurseries to include this tool in their marketing strategy. On the other hand, 47% of non-social media users reported that the lack of training did not prevent them of using social media.

Table 26: Reasons for not using social media (n=17)

Question	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
I don't know how to get started.	4	4	5	2	2
I don't have time.	3	1	4	3	6
Technology changes so quickly that I can't keep up with it.	3	4	6	2	2
It is a costly investment.	2	4	6	4	1
I don't think it's important.	4	2	6	2	3
My customers don't think it's important.	1	3	7	3	3
I would prefer face-to-face interactions with my customers	0	1	4	5	7
Returns from social media marketing are uncertain.	1	1	9	4	2
Returns from social media marketing are low.	1	1	9	3	3

Respondents were asked to report their willingness to pay for a training covering marketing strategies based on social media (Figure 14). They reported that they would pay on average $204 for a one time training, $170 for a monthly subscription and $62 for a monthly consulting service. A large number of respondents were willing to pay between 0 and $2000 for a one time social media workshop, suggesting respondents recognized the importance of social media marketing.

Figure 14: Willingness to pay a one-time fee for a social media workshop

3.2.4. Market characteristics

The respondent zip code and Census 2012 and 2014 databases were used to generate additional demographic data: respondents' city and state population estimates, the percentage of the population living in a household with high-speed Internet use, and regions. The U.S. Census Bureau provides data based on the Census zip code tabulation areas (ZTCA) which are different from the USPS zip code tabulation. Respondents' zip codes were matched with the Census zip codes using the Missouri Census Data Center online application. To ensure that respondents typed their zip codes correctly, the question had a validation rule to impose responses that were five digits of the U.S. zip codes and six digit-letters combination of the Canadian zip codes. In addition, respondents' zip codes were cleaned using the R package "zip code" by Breen (2012) to prevent errors such as the omission of a zero first-digit during the import of response data from Qualtrics.

Population of communities where these businesses were located ranged from 105 residents in Rocklake, ND to 3.9 million residents in Los Angeles, CA, with a mean of 114,217 residents.

Respondents were located in 153 different cities. All cities had between 1 and 2 respondents except Wichita, KS (6 respondents), Omaha, NE (4 respondents), Manhattan, KS (3 respondents) and Shawnee Mission, KS (3 respondents). Regarding the regions, the Midwest had the highest percentage of respondents (60.8%, n = 153), with Kansas accounting for 29.2%. The three other regions, the Northeast, the South and the West had similar percentages of respondents, respectively 13.7%, 13.1% and 12.4%. According to the 2012 Agricultural Census (USDA, 2014, the leading states in floriculture and bedding crops were California, Florida, Pennsylvania, New York and Michigan, accounting together for 31.8% of U.S. nurseries and garden centers. The high rate of survey participation in the Midwest can be explained by the survey being partially distributed through the professional network of a Kansas Extension specialist.

The first objective of the study was to evaluate the extent of use of new-media marketing by nurseries and garden centers. The results show that new-media marketing are not unknown by nurseries and garden centers. Most respondents reported using new media regularly in their marketing efforts. A higher proportion of social media users was found among nurseries making higher sales.

Chapter 4 - Methods

 The data analysis was aimed to address the second and third objectives of this study: to identify the factors affecting new-media marketing use by nurseries and to assess the impact of using new-media marketing on sales. The analysis was guided by the theoretical framework of technology adoption. Key variables of network effect from agricultural literature and technology acceptance model from marketing literature were combined into a model that accounts for business-level, market-level and decision-maker level factors in the adoption of new-media marketing.

Multiple linear regression models were estimated using the ordinary least squared (OLS) method, and a Hausman test was performed for endogeneity issues. Stata 13.1 and R were used to conduct the statistical analysis. This chapter discusses the methods used to respond to the research questions. Results are presented in chapter 5.

4.1. Conceptual framework

4.1.1. Technology adoption

The literature provides several approaches for analyzing technology adoption depending on the field of study. Assessing agricultural technology adoption is frequently associated with the study of factors that impact an economic agent decision to use certain technology as a binary outcome (Cameron, 1999; Barham et al., 2004; Useche et al., 2009). Similarly, in marketing literature, adoption is often modeled using the technology acceptance model, where perceived usefulness and perceived ease of use are the main factors driving the decision to adopt a marketing tool. For example, Lorenzo-Romero et al. (2014) found that only perceived ease of use played an important role in the process of Web 2.0 adoption as a marketing tool. Modeling

adoption as a binary outcome provides critical information about the factors that drive the decision to use a technology. Yet it does not tell much about factors that impact the extent of use of a given technology.

In many cases, the level of adoption varies across farmers (Ma and Shi, 2014). Aldana et al. (2011) presented a strong defense of sequential adoption, where uncertainty with a divisible technology can lead to a pattern in which farmers adopt a single component of the technology, following a Bayesian process. Zilberman and Kaplan (2014) and Ayu and Abrizah (2011) are examples of studies defending the focus on the intensity of adoption also referred to as the extent of usage. The usefulness of extent of usage modeling stems from its ability to determine the marginal effect of factors expected to impact the level of use of the technology rather than the decision to adopt. Moreover, only 6% (n = 151) of the respondents in this study were non users of new-media marketing. Therefore, a measure of the extent of usage of new-media marketing, accounting for both the initial decision to adopt and the level of use of the technology is more suited to analyze the dataset gathered from the survey.

4.1.2. Network effect

The theory underlying the network effect is based on the hypothesis that agents update their beliefs about a technology as more of their peers use it. Bandiera (2005) claimed that network effects are positive when there are few adopters in the network, and negative when there are many, following an inverse U shape. She also showed that family and friends adopting a technology positively influenced farmers' decision to adopt the same technology, contrary to religious groups that have no significant impact on adoption decisions. In agricultural technology adoption, empirical evidence of the network effect was established by Besley and Case (1994), Foster and Rosenzweig (1995), Conley and Udry (2003), and Munshi (2004). Network effect

was captured by the number of agents in one's network that have adopted a technology. Baerenklau (2005) distinguished the network effect from the learning effect. He referred to the network effect as externalities that did not involve any learning aspect. On the other hand, the learning effect embodies learning by doing and learning from others. The latter entails individuals actually learning from their peers' experience, contrary to the network effect that involves no learning aspect. Baerenklau (2005) used a sampling method grounded on mutually exclusive groups within a network. Modeling the network effect requires strong assumptions that do not hold when studying social media. By definition, social media involves exchange of information. Thus, the network effect cannot clearly be distinguished from the learning effect. This study will regard the network effect as a measure of social influence, which includes both the peer group effect and learning from others.

4.1.3. Effect of promotion and advertisement on sales

The economic theory suggests sales increase with effective promotion and advertising (Palma et al., 2012). Yet, depending on the type of advertising, firms might experience different outcomes. Crespi (2007) showed that a dominant firm producing high-quality goods and facing competition from a group of lower quality producers could be harmed by a generic advertising campaign while the low quality producers were left unaffected. Pertaining to the green industry, the same results were confirmed by Rimal and Ward (1998) for several plant categories. A few studies have addressed the effect of individual firm advertising on green industry sales. Campbell and Hall (2010) found a positive effect of advertisement on sales for a majority of plant categories.

To address the impact of new-media marketing on sales, individual firm level advertising effect is examined in this study. Palma et al. (2012) stated that green industry promotion and

advertisement initiatives cannot be regarded as generic or brand advertising. Nurseries allocate resources to promotion and advertisement to increase all product sales at their business location rather than specific brands sales. More precisely, advertisement and promotion efforts are typically measured in terms of marketing expenditures (Campbell and Hall, 2010; Palma et al., 2012). However, due to their low cost, measuring new-media marketing in terms of expenditure will not capture the investment incurred by the firm for its media marketing efforts. Instead, frequency of use and the time spent on social media marketing will be considered in this study as new-media marketing efforts to evaluate their impact on sales.

New-media marketing effectiveness leads to different interpretations. The Internet Advertisement Bureau has provided a clear framework of metrics that can be used to gauge the effectiveness of a social media strategy. These metrics are classified into three categories: social media metrics, blog metrics and widgets and social media application metrics. Although this framework offers effective ways to evaluate a communication outcome, such as brand awareness, marketers have mixed opinions about their usefulness when it comes to assess the return on investment of a campaign. They do not reveal the financial impact of marketing efforts. The effectiveness of a new-media marketing strategy, addressed as a relationship between the intensity of use of social media and the level of sales, provides a more convenient approach to evaluate the impact social media on a business performance.

4.2. Empirical model specification

The objective of this section is to specify a model that investigates the factors affecting new-media marketing adoption by nurseries and garden centers. Ultimately, new-media

marketing use is modeled as a function of the network effect, controlling for business

characteristics, owner's characteristics and market characteristics.

4.2.1. Determinants of new-media marketing adoption

The first hypothesis posits that the network effect has a positive impact on new-media

marketing use. Since social media marketing strategy is a relatively new phenomenon, it is

assumed that the strategy is still at an early stage of diffusion among nurseries and garden

centers. The relationship between new-media marketing adoption and network effect is assumed

to be positive. Three specific measures of the extent of use of new-media marketing were

defined for the dependent variable, leading to three models addressing this first hypothesis. The

first model was specified using the frequency of online marketing use, the second model the

frequency of social media use, and the third model the number of hours spent on social media

marketing. The right hand side variables were the same for all three models.

According to the literature, three sets of variables are expected to impact new-media

marketing adoption by firms: firm characteristics, manager's characteristics and environmental

characteristics. This paper uses Wamba and Carter's (2014) approach to incorporate these three

sets of characteristics as control variables in the adoption model.

4.2.2. Impact of new-media marketing use on sales

To test the hypothesis, new-media marketing use has a positive impact on sales, a second

model was formulated with total sales specified as a function of the use of new-media marketing.

Additional variables were included to control for business characteristics and market

characteristics. The new-media marketing use, which is the variable of interest in this model,

was modeled using the three different measures: frequency of online marketing use, frequency of social media use, and hours spent on new-media marketing. The control variables were the same for all three versions of the second model.

From the previously derived theoretical results, it follows that sales varies positively with individual firms marketing expenditures which include market research, product development, promotions, advertisement and service. According to the survey, nurseries conduct their new-media marketing activities either with in-house resources or by contracting with a third party firm. In either case, they allocate some time to generate content and interact with their customers online.

4.3. Explanatory variables definition and justification

Two models were estimated corresponding to each proposition. The explanatory variables are categorized in three groups: respondent characteristics, business characteristics, and market characteristics. The variables are summarized in Table 27 and discussed in turn below.

Table 27: Explanatory variables by proposition

Propositions (models)		Proposition 1: The network effect has a positive impact on new-media marketing use.	Proposition 2: New-media marketing has a positive impact on sales.
Explanatory variables	Variable of interest	Online network Professional network	Use of new-media marketing
	Business characteristics	Marketing expenditures Years in operation Retail sales Number of employees	Marketing expenditures Business age Number of employees Months open in a year
	Respondent characteristics	Respondent age Perceived usefulness	
	Market characteristics	Population Region	Population Region

4.3.1. Business characteristics

- Online network

The literature identifies the network effect as a determinant in adoption (Bandiera, 2006). In our study, this factor is captured by the number of businesses the nursery is following online. As suggested by the social media industry report 2015, marketers tend to look at the platforms that their peers are using.

- Professional network

The number of associations or societies the nursery is involved is included to control for its exposure to new technologies, particularly new-media marketing. The effect of the number of professional networks is expected to be positive since nurseries are exposed to more information with their participation in professional association.

- Marketing expenditures

Marketing expenditures are expected to impact sales positively, as reported by Palma et al. (2012) and Onishi and Manchanda (2012). The former reported that expenditures on print advertisement, Internet promotion and mass promotion had all a positive impact on sales for nurseries making more than $250,000 a year. The latter found that social media and traditional advertisement methods had a positive effect on business performance.

- Business age

Campbell and Hall (2010) found that the number of years in operation was a determining factor of sales in the green industry, particularly for herbaceous perennials. Based on Campbell and Hall (2010)'s findings, the years in operation along with an increasing number of employees are expected to impact sales positively. However, since sales are impacted by various factors such as the location, the number and quality of products and services offered and the size of the business, no inference can be made about the direction of the impact of the years in operation on sales.

- Retail sales channel

Depending on the quantity and the intensity of the channels through which nurseries market their products, marketing decisions will differ across the green industry. Due to their higher exposure to customers, retailers are more likely to reach their customers through online marketing practices than wholesalers. Thus, the retail variable is expected to have a positive coefficient.

- Number of employees

The number of employees during peak season is a measure of the size of the nursery, and is expected to be positively correlated with sales. It may also impact new-media marketing use because there is a higher probability of assigning an employee dedicated to new-media marketing in bigger firms.

- Period open

Smaller nurseries operating seasonal business are likely to make fewer sales than nurseries opened all year round, all else equal.

4.3.2. Respondent characteristics

- Age of the respondent

The use of new-media marketing, particularly that of social media marketing, varies with age. Stelzner (2015) reports in "The social media industry reports 2015" that there is a relationship between age and social media use. For example, of those who spend more than 40 hours a week on social media marketing, 54% are younger than 40. A survey conducted by Pew Research Center in 2015 suggests this relationship could be non-linear (Figure 15). To obtain a better fit to the data, the variable age is squared in the model specification. This transformation will account for non-linearity.

Figure 15: Percentage of Internet users using Facebook by age
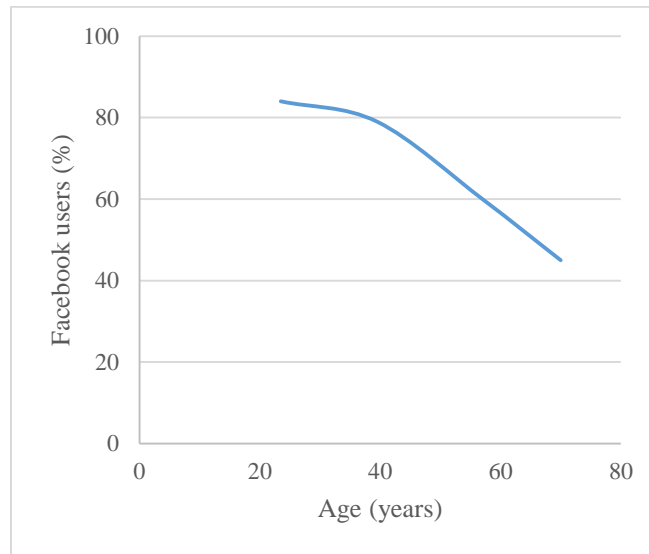
- Perceived usefulness

The perceived usefulness has been identified by the literature as an important factor driving the adoption of social media as a marketing tool. Along with the perceived ease of use, the perceived usefulness was tested in the technology acceptance model (TAM). A survey conducted in 2014 by Stelzner in 2014 indicates that 92% of social media marketing users found social media important for their business.

4.3.3. Market characteristics

The market characteristics reflect where the business is located based on the provided zip code.

- Population

The demographics of the nursery's neighborhood play an important role on the demand for horticultural products. Campbell and Hall (2010) found that consumers generally only travel a short distance to either their primary (91.1% travel less than 6 miles) or secondary (83.9% travel less than 6 miles) garden center. From these results, one can posit that nurseries located in a populated area are likely to have more customers than their counterparts in less populated area.

This study includes the population of the closest city to the nursery into the model to account for this factor.

The size of the customer base can shift the demand curve. A population increase can impact the size of the customer base, which in turn, impact positively demand. Considering this indirect effect suggests that the impact of population on demand may not be linear. To account for this non-linear relationship, the model includes the squared term of population.

- Region

Behe et al. (2008) found that nurseries have different marketing practices depending on their region. For example, the Appalachian (26.9%) and Southeast (26.8%) regions were more likely to market their product through negotiated sales than the Northeast. Similarly, regional differences are expected for social media use and sales. Given the small sample, the four Census divisions were considered rather than the subdivisions.

4.3.4. Variables not included

Regarding the variables included in the survey but not taken into account by the model, two justification can be provided: either the low rate of responses or the high correlation with variables included in the model. Learning by doing which is an adoption factor identified by the literature has been omitted from the model since almost all the respondents reported to be early adopters. Similarly, the Internet connection type and the devices used for social media marketing have been excluded from the model because of their low variability across responses.

4.4. Model equations

In summary, the first model is specified as follows:

$$U_i = \alpha_0 + \alpha_1 n_i + \alpha_2 p_i + \sum_{j=1}^{4} \beta_j b_i^j + \sum_{k=1}^{2} \gamma_k r_i^k + \sum_{l=1}^{5} \delta_l m_i^l + \epsilon_i \ (4.1),$$

where U_i is the extent of usage of new-media marketing by firm i, n_i is the number of businesses that are being followed online by the nursery, representing the size of the nursery's online network, and p_i is the number of professional associations or societies in which the nursery is involved. Business characteristics are represented by b_i , with b_i^1 the marketing expenditures, b_i^2 the number of years that the nursery has been in operation, b_i^3 the percentage of sales made through direct retail to customers, and b_i^4 the number of employees. Finally r_i controls for the respondent characteristics, with r_i^1 for the respondent's age squared and r_i^2 for the perceived usefulness, and m_i is a vector of market characteristics, with m_i^1 the population of the city where the business is located, m_i^2 the population squared, and m_i^3 , m_i^4 and m_i^5 dummy variables representing respectively the regions of Northeast, South and West. The Midwest was the base region. ϵ_i is the individual nursery idiosyncratic term. α_1, α_2, β_j, γ_k and δ_l are coefficients measuring the respective marginal effects on sales of the number of businesses monitored online, the number of professional associations, the business characteristics, the respondent characteristics and the market characteristics. α_0 is the intercept.

The frequency of use is measured on a weekly basis. All responses from questions formulated using a monthly or yearly basis are converted in weeks. Marketing expenditures and the city population were divided respectively by 1,000 and 10,000.

Proposition 2 is tested by estimating the following econometric model:

$$\textbf{\textit{TS}}_i = \alpha_0 + \alpha_1 \textbf{\textit{U}}_i + \sum_{j=1}^{4} \beta_j \textbf{\textit{b}}_i^j + \sum_{k=1}^{5} \gamma_k \textbf{\textit{m}}_i^k + \epsilon_i \quad (4.2),$$

where $\textbf{\textit{TS}}_i$ is a measure of the total sales in 2014, $\textbf{\textit{U}}_i$ is the use of new-media marketing, $\textbf{\textit{b}}_i^j$ is the vector of business characteristics :

b_i^1 = marketing expenditures,

b_i^2 = number of years in operation,

b_i^3 = the number of full time employees during the peak season,

b_i^4 = the number of months when the business is open in a year,

and m_i^k is the vector of market characteristics:

m_i^1 = the population of the city where the business is located,

m_i^2 = the population squared,

m_i^3, m_i^4 and m_i^5 are dummy variables representing respectively the regions of Northeast, South and West with the Midwest as the base region. ϵ_i is the individual nursery idiosyncratic term. α_0 is the intercept, α_1 measures the effect of an additional media marketing on sales, β_j and γ_k capture the respective marginal effects of business characteristics and market characteristics on sales.

4.5. Testing for structural break

The presence of a structural break was investigated using the Chow test to determine whether businesses of different sizes were making different marketing decisions. Hampton (2001) found differences in marketing decisions between small and large firms in the green industry, with $200,000 as the sales boundary. While smaller growers concentrated their sales on traditional garden centers and landscaping channels, larger nurseries attended more to larger trade shows and used more active sales strategies including outside sales force. Similarly, Palma et al. (2012) studied the effects of firm promotion expenditures on green industry sales by firm size categories. They distinguished small farms [$10,000 to $250,000] sales from medium firms [$250,000 to $1 million], large firms [$1 million to $5 million] and very large firms [$5 million or more]. Rationale for this test in studying the impact of new-media marketing on sales stems from the profit maximization theory. Firms allocate their resources to marketing campaigns to

maximize profit. While social media marketing's low cost may not hurt bigger firms, smaller firms may bear higher relative cost of conducting a new-media marketing strategy. It is well known that most small nurseries conduct their new-media strategy on their own, avoiding additional costs that could originate from hiring a social media consulting firm. From this perspective small firms incur low costs in implementing their new-media strategy. Considering the hours allocated to a new-media marketing, small firms may bear a relatively high fixed cost to implement their new-media strategy since they have generally few workers. Another way to look at the cost of a social media strategy is the opportunity cost of allocating hours to the new-media campaign rather than a traditional marketing strategy.

The Chow test is used to test an eventual change in a parameter value from one data set to another. It is a F statistic comparing intercepts and/or regressors estimated for two groups using a dummy variable. The Chow test can be performed on the basis of a restrict model (r) forcing equality between the regressor estimates of the two groups and an unrestricted (ur). The F test is formulated as following:

$$F = \frac{[RSS_r - RSS_{ur}]}{RSS_{ur}} \cdot \frac{[n - 2\,(k+1)]}{k+1} \quad (\textbf{4.3}),$$

where SSR_r is the sum of squared residuals of the restricted model, SSR_{ur} is the sum of squared residuals of the unrestricted model, n is the number of observations, and k the number of parameters.

In our study, the Chow tested the equality between the coefficients in equation (4.2) fit to the sub-sample comprising the firms making \$200,000 or more (large firms) and the same coefficients for the sub-sample including the firms making less than \$200,000 (small firms) on one hand, and the coefficients of the full sample on the other hand. The null hypothesis was:

H_0 : There is no difference between the fits in the full sample and the sub-samples.

The actual test is run as follows:

- The restricted model comprising both samples is estimated and the residual sum of squares SSR_r is calculated;

- Two separate regressions are run using respectively the sub-sample comprising small firms' observations and the one including large firms' observations. The subsequent residual sum of squares (RSS) are computed with RSS_1 designing the small firms' RSS and RSS_2 the large firms' RSS.

- The F statistic is computed using the obtained RSS values following the formula (Wooldridge, 2012):

$$F = \frac{[RSS_r - (RSS_1 + RSS_2)]}{RSS_1 + RSS_2} \cdot \frac{[n - 2\,(k+1)]}{k+1} \quad \textbf{(4.4)}$$

- The computed F is compared to the critical values from the F test table with F ($k + 1$, $n - 2(k + 1)$) degrees of freedom.

4.6. Testing for endogeneity

Endogeneity implies a regressor is contemporaneously correlated with the disturbance vector. A correlation between one of the regressors and the disturbance vector would question the validity of the estimated coefficient of the regressors, because the estimated coefficients would be biased and inconsistent. The explanation for this bias stems from the OLS procedure that attempts to explain the variation in the dependent variable by assigning credit to the regressors for this variation. If one regressor is correlated to the disturbance, the procedure will assign in error part of the disturbance variation of the dependent variable to the regressor correlated to the disturbance (Kennedy, 2008).

Wooldridge (2012) described three sources of endogeneity: omitted variables, measurement errors and simultaneity. Simultaneity occurs when one or more of the explanatory variables is jointly determined with the dependent variable. The concern for endogeneity arises from the use of a survey as data collection method. Not only the respondent can provide inaccurate responses but also, since few existing studies address social media use in the green industry, omitted variable error or simultaneity are more likely to occur. The fact that proxy variables such as the number of professional networks the nursery is involved and the number of businesses the nursery follows online are used for the network effect is an illustration of possible measurement error.

To perform the test for endogeneity, Hausman (1978) suggested comparing the OLS to the 2SLS estimates and determining the significance of the differences between the two sets of estimates. The 2SLS is estimated using instruments satisfying three criteria: they are uncorrelated with the disturbance term and the dependent variable, and are correlated to the variable being tested. In case the difference is statistically significant, the variable being tested must be endogenous.

In estimating the impact of online marketing and social media use on sales, the main concern is reverse causality. It is well known that firms decide on the marketing strategy based on the expected reaction of their customers (Gupta and Zeithaml, 2006). As a consequence, marketing variables are endogenous. Because nurseries are more likely to define their social media and online marketing usage depending on the expected level of sales, social media and online marketing use were suspected to be endogenous. Moreover, there may be other omitted variables. For example, Campbell and Hall (2010) found that increased technology used in green

industry firm's promotion efforts had various effects on sales depending on the size of the business.

Two instruments are used to address endogeneity of social media and online marketing use: the percentage of the state population living in a household with high-speed Internet use and the perception of the business owner regarding the contribution of social media in building a positive community. Several instruments used in the literature on business performance factors assessment are population-based variables, since they are exogenous to the firm. For example, Zheka (2006) used regional variations in social trust factors to instrument for corporate governance choices. In the present study, the percentage of the state population living in a household with high-speed Internet use (US Census Bureau, 2013) is a proxy for social media use by potential customers. Given the high relationship between social media and Internet access, high-speed Internet availability must impact social media use by the population of a given area. The validity of this instrument is grounded on the state population online activity being exogenous to the factors that influence individual nursery sales.

The perception of the business owner regarding the contribution of social media in building a positive community is the best proxy for social media use obtained from the survey that is not directly related to sales. Although this factor might impact sales in the long run, the perception of the importance of social media in building a positive community is less likely to be determined by the current sales level. Moreover, because the first instrument is a state level factor, variability across businesses within the same state is not captured. An instrument capturing business level social media activity may add more precision to the model.

The test is performed in two steps following the two-stage least squares procedure. First, the new-media use is regressed on the instruments: percentage of households living in a house

with high speed Internet s_i and perception of the respondent regarding the impact of social media

on the relationship with the community c_i , and the other explanatory variables. For the purpose

of the test, the new-media use will be specified as hours spent on social media marketing h_i.

$$h_i = \alpha_0 + \alpha_1 s_i + \alpha_2 c_i + \sum_{j=1}^{4} \theta_j b_i^j + \sum_{k=1}^{5} \mu_k m_i^k + v_i \quad (\textbf{4.5})$$

The predicted value $\widehat{h}_i$ was calculated for each observation and included in the original equation

(4.2).

$$TS_i = \alpha_0 + \alpha_1 \widehat{h}_i + \sum_{j=1}^{4} \beta_j b_i^j + \sum_{k=1}^{5} \gamma_i m_i^k + \epsilon_i \quad (\textbf{4.6}),$$

Chapter 5 - Results and discussion

This chapter will discuss the results of the estimation of the models testing the two propositions: the determinants of new-media marketing adoption and the impact of new-media marketing on sales. Among various key factors of adoption, the first proposition analyzes more specifically the role of the network effect (variable of interest) on social media use. The results of the Chow test are included in this chapter as a rationale for the estimation of two different sub-models for the second proposition based on two firm size groups. The test for endogeneity will also be presented in the third section of the chapter.

5.1. Determinants of new-media marketing adoption

The first proposition hypothesized that the network effect had a positive impact on new-media marketing adoption. The proposition was tested in three empirical models, each with a distinct measure of new-media marketing use: the frequency of online marketing use, the frequency of social media use and the time spent on social media marketing. In all models, the network effect was measured by two variables: the size of the online network and the size of the general network. The size of the online network is captured by the number of business that are being followed by the nursery while the general network size is captured by the number of professional associations the nursery is involved in. The results of the models estimation are presented in Table 28.

The size of the online network was statistically significant and positive in the three models as expected. The significance level was particularly high ($p < 0.01$) in Model 2, using the frequency of social media use as the left-hand side variable. One additional business in the online network increases the frequency of use of online marketing by 0.17 times a week, the frequency

Table 28: Estimation of the new-media marketing use models

		Model 1		Model 2		Model 3	
Dependent Variable		**Online marketing frequency**		**Social media frequency**		**Hours of media marketing**	
Variables of interest	Online network	0.1680	*	0.2498	***	0.2314	*
		(0.0682)		(0.0667)		(0.1074)	
	Professional network	0.1532		0.1652		0.0721	
		(0.1458)		(0.1425)		(0.2295)	
Business characteristics	Marketing expenditures	-0.0009		-0.0007		0.0029	
		(0.0023)		(0.0022)		(0.0036)	
	Years in operation	0.0030		0.0092		-0.0082	
		(0.0094)		(0.0092)		(0.0148)	
	Retail sales	0.0023		0.0159	*	-0.0103	
		(0.0073)		(0.0071)		(0.0114)	
	Number of employees	0.0080		0.0008		0.0040	
		(0.0044)		(0.0043)		(0.007)	
Respondent characteristics	Age squared	-0.0002		0.0001		0.0006	
		(0.0002)		(0.0002)		(0.0003)	
	Perception	0.7906		0.7967		2.0809	*
		(0.5106)		(0.4991)		(0.8038)	
Market characteristics	Population	0.0192		0.2251		0.6029	*
		(0.1674)		(0.1636)		(0.2635)	
	Population squared	0.0001		-0.0001	*	-0.0001	
		(0.0001)		(0.0001)		(0.0001)	
	Northeast	0.6330		0.2527		2.8896	**
		(0.6455)		(0.6311)		(1.0163)	
	South	1.0869		-0.7222		0.5668	
		(0.7419)		(0.7253)		(1.1681)	
	West	0.7950		0.6959		1.7081	
		(0.7323)		(0.7159)		(1.1529)	
	Intercept	1.5081		0.9770		-1.3211	
		(1.0161)		(0.9934)		(1.5998)	
Adjusted R^2		0.12		0.21		0.23	
N		137		137		137	

***,**,* denote significance at the 1, 5, 10 percent significance levels, respectively

of use of social media by 0.25 times a week, and the time spent on social media marketing by 14 minutes a week, holding everything else constant respectively.

On the other hand, the size of the general professional network was not statistically significant in the three models. One possible interpretation would be that nursery stakeholders easily observe their peers adopting new-media marketing within online networks, rather than physical networks. This argument would support a learning-by-others or peer-group effect. However, in the absence of variables that distinguish learning-by-others from the peer-group effect, it seems difficult to credit this result to one of these two effects over the other one. Another explanation could be that the professional association may have so many members that they do not capture the degree of relationship among their members.

The business characteristics variables are marketing expenditures, years in operation, retail sales and number of employees. The marketing expenditures variable was not significant in all three models. The coefficient has positive values in the first two models and a negative value in the third model. Similarly, the number of years in operations was positive in Models 1 and 2 and negative in Model 3, but is not significant in all three model. The percentage of sales made through direct retail to costumer's impacts positively the frequency of use of social media as suggested by the results of Model 2. The coefficient estimate of retail sales is statistically significant at the 5% level. In Model 3, this coefficient is negative but not significant. As expected, garden centers selling more products through direct retail to customer are more likely to engage with customers than garden centers selling to mass merchandisers. This would justify their higher frequency of social media use to reach their customers. The number of employees has a positive effect on new-media marketing adoption but the coefficient is not statistically significant in all three models.

The age squared coefficient is not statistically significant in all three models. The perceived usefulness, which reflects beliefs that new-media marketing has a positive impact on the business performance, was positive and significant at the 5% level in Model 3. This result contradicts the findings of Lorenzo-Romero (2014) that perceived usefulness was not relevant in social media adoption. However, her study looked only at the retailing sector, excluding the other segments of the value chain such as production and services. Conversely, our study comprises the whole value chain of the green industry including nurseries, garden centers, retailers, wholesalers and horticultural services providers. According to the results, nursery owners do not increase the frequency but spend more hours on new-media marketing when they think that the business will benefit from this marketing tool. In other words, garden center owners spend 2 more hours a week working on social media marketing when they increased their belief that social media was increasing the revenue at their store by a score of 1 on the 5-point scale provided.

The population coefficient is positive in all three models but only significant in Model 3 at the 5% level. In larger cities, garden centers have a larger customer base that they attempt to reach using social media. The population squared is negative in Models 2 and 3, but positive in model 1. However, this coefficient is only significant at the 5% in Model 2. The rationale for modeling population in squared term was to take into account a decreasing effect of additional residents on demand as the population grows. Because the squared term has a U-shape, a negative coefficient inverses the U Shape and reflects this decreasing effect expected. The results also show that social media is more adopted in the Northeast than in the Midwest, consistent with Behe et al. (2008) who found that Northeast nurseries spent more on web advertising than

Midwest nurseries. Northeast nurseries spend on average 2.88 additional hours marketing through new media compared to their Midwest counterparts, all else equal. In the sample, the Northeast has the highest percentage of large firms (making more than $1,000,000) (Figure 16). This suggests a positive relationship between the size of the firm and the extent of use of social media marketing. The South and West variables were not statistically significant.

Figure 16: Firm sizes by regions
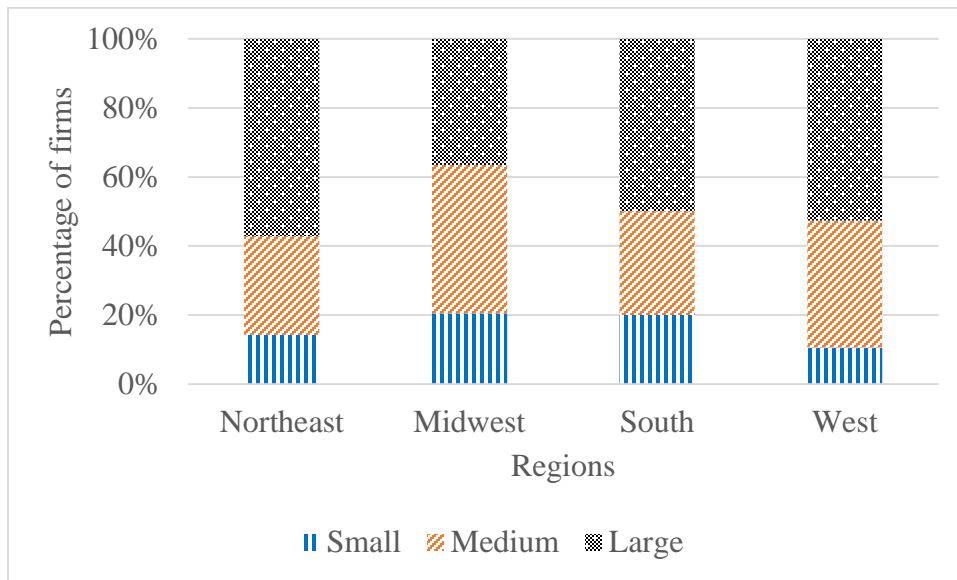
The adjusted R^2 was the highest for Model 3 (30.78%) followed by Model 2 (21%) then Model 1 (11%). The set of explanatory variables better explained the variability within the hours spent on social media marketing than the frequency of use of online marketing and social media. However, the differences in goodness of fit does not undermine the validity of Models 1 and 2 as they are also informative. For example, Model 2 identified key variables unnoticed by Model 3 such as the percentage of retail sales or the population squared. One possible explanation for the difference between online marketing model (Model 1) and social media models (Models 2 and 3) could be their possible influence by alternative set of variables. On the other hand, frequency of

use and time spent on social media marketing could capture different aspects of extent of social media use.

5.2. Impact of new-media marketing usage on sales

The model estimated to explain the impact of new-media marketing on sales uses the time spent on social media marketing as the dependent variable. While frequency of use appears as an accurate and widely used measure of the extent of use of social media, it is less representative of an input allocated to maximize profit than hours. The model assumes that time can be allocated to marketing or other input to maximize profit while frequency of use does not necessarily reflect cumulative amounts of effort.

5.2.1. Results of the Chow test

A Chow test was conducted to define whether small firms (less than $200,000 sales) were different from larger firms in their marketing decisions. The test was run following the procedure described in section 4.5. The Chow test confirmed a difference between the estimates of smaller firms and bigger firms. The computed F was 2.72, while the critical value for 11 and 110 degrees of freedom was 2.45 at the 5% significance level. The null hypothesis of equality between the two groups was rejected. In fact similar results were obtained when using respective cut values of $100,000, $500,000 and $1,000,000 (Table 30) indicating that the firms should be categorized in multiple ranges of sales value. Due the small size of the sample, two categories were retained for the study. The cut of $200,000 was used consistently with the literature (Palma et al., 2012; Hampton, 2001). Therefore, firms are categorized in two groups with $200,000 as the sales

boundary. Table 29 shows the estimates of the three regressions using respectively the entire

sample, the sub-sample comprising small firms and the sub-sample comprising large firms.

Table 29: Estimates of the Chow test regression model

	Entire sample		Less than $200,000		$200,000 and more	
Media marketing hours	42.7232	*	0.0561		62.9765	**
	(25.6631)		(3.6881)		(30.8187)	
Marketing expenditures	2.7139	**	4.9022	**	2.7038	**
	1.0961		(2.3226)		(1.2161)	
Years in operation	9.2703	**	2.9	***	2.0129	
	4.4251		(0.7183)		(5.3158)	
Number of employees	11.2548	***	2.7599		9.5752	***
	2.0824		(7.4398)		(2.4273)	
Period open	128.7479	***	4.5068		78.5831	
	38.762		(2.9742)		(74.9441)	
Population	96.95708		28.7083		73.696	
	78.5253		(51.9725)		(89.0385)	
Population squared	-0.0632	***	-0.0971		-0.0573	**
	0.02335		(0.1376)		(0.0263)	
Northeast	58.32419		-12.1582		-195.917	
	317.4545		(32.1921)		(381.333)	
South	573.119		-69.7968		552.3562	
	364.6837		(53.0291)		(427.555)	
West	-532.1705		-23.1853		-636.89	
	352.2979		(41.7441)		(415.211)	
Intercept	-775.4289		-14.3847		462.325	
	414.0062		(32.3125)		(910.958)	
Adjusted R^2	0.54		0.46		0.41	
N	132		39		95	

***,**,* denote significance at the 1, 5, 10 percent significance levels, respectively

Table 30: Estimates of the sales model for different cut-off values

	Less than $100,000	$100,000 and more	Less than $200,000	$200,000 and more	Less than $500,000	$500,000 and more	Less than $1,000,000	$1,000,000 and more
Media marketing hours	**4.0329** **	**70.8163** **	**0.0561**	**62.9765** **	**-5.5387**	**57.2015** *	**-8.7682**	**60.8912** **
	(1.4644)	(29.5503)	(3.6881)	(30.8187)	(5.2548)	(29.9017)	(7.2711)	(27.4639)
Marketing expenditures	-0.65	2.5916 **	4.9022 **	2.7038 **	8.5296 ***	3.0265 **	11.96 ***	1.8763 *
	(3.3442)	(1.1578)	(2.3226)	(1.2161)	(3.0353)	(1.1839)	(2.877)	(0.956)
Years in operation	2.085 ***	4.7134	2.9 ***	2.0129	3.4915 ***	-0.1264	3.4451 **	-1.409
	(0.4658)	(4.9228)	(0.7183)	(5.3158)	(1.2109)	(5.1823)	(1.5262)	(4.7329)
Number of employees	7.152 *	10.689 ***	2.7599	9.5752 ***	0.9303	7.1863 ***	-2.4608	5.2689 ***
	(3.4851)	(2.2387)	(7.4398)	(2.4273)	(4.5095)	(2.4457)	(2.9762)	(1.9804)
Period open	-0.086	127.5317 **	4.5068	78.5831	3.1107	-31.7357	31.0803 ***	4.5013
	(1.2303)	(56.0464)	(2.9742)	(74.9441)	(5.2649)	(85.8576)	(8.2093)	(71.1642)
Population	-63.0789 **	91.2745	28.7083	73.696	126.3292 **	45.118	-34.8996	-15.5579
	(23.4469)	(85.2993)	(51.9725)	(89.0385)	(62.4755)	(90.1384)	(41.5768)	(80.5877)
Population squared	0.146 **	-0.0642 **	-0.0971	-0.0573 **	-0.3176 **	-0.0491 *	0.0377	-0.0274
	(0.0605)	(0.0251)	(0.1376)	(0.0263)	(0.1523)	(0.0262)	(0.0356)	(0.0229)
Northeast	16.733	-23.7563	-12.1582	-195.917	37.0312	-345.2134	63.3557	-598.1369 *
	(17.9408)	(352.6424)	(32.1921)	(381.3334)	(56.9876)	(376.7804)	(82.1758)	(343.0333)
South	-17.3244	769.6589 *	-69.7968	552.3562	79.7861	825.285 *	-18.3557	358.1901
	(21.4479)	(405.4103)	(53.0291)	(427.5546)	(64.3419)	(434.918)	(103.6488)	(370.2026)
West	16.1785	-556.5173	-23.1853	-636.8897	88.05	-142.1714	-47.2435	-312.8058
	(14.0894)	(399.0826)	(41.7441)	(415.2109)	(55.4751)	(461.8919)	(89.5778)	(388.8137)
Intercept	-1.7881	-537.781	-14.3847	462.325	-5.1832	2202.338 **	-139.2838 *	2691.458 ***
	(15.5987)	(649.3487)	(32.3125)	(910.9577)	(53.5527)	(1100.96)	(81.455)	(934.4451)
Adjusted R2	0.6239	0.4844	0.4618	0.4103	0.4392	0.3979	0.5317	0.4078
N	22	110	37	95	50	82	70	62

***,**,* denote significance at the 1, 5, 10 percent significance levels, respectively

5.2.2. Endogeneity test

The sales model is based on nursery owners allocating their resources to marketing campaigns in order to maximize profit. Because they adjust their advertisement strategy depending on the previous level of sales, one may suspect a reverse causality between social media hours and sales. A test is conducted to verify whether the time spent on social media marketing is endogenous.

The endogeneity test is performed using instrument that are supposed to be correlated with the use of new-media marketing by the business, but not correlated to the dependent variable nor the error term. Two instrumental variables were include in the model: the percentage of household with high speed Internet connection in each state and the perception of the respondent to whether social media helped build a positive community or not. The estimates of the IV regression (equation 4.5) are presented in Table 31.

Table 31: Estimates of the 2SLS regression

	Less than $200,000		$200,000 and more	
Media marketing hours (predicted)	5.8527		79.6642	
	(13.2671)		(93.1771)	
Marketing expenditures	4.4801	**	2.6691	**
	(2.2425)		(1.1602)	
Years in operation	2.9944	***	2.0418	
	(0.664)		(5.0097)	
Number of employees	6.1433		9.4191	***
	(9.9494)		(2.4318)	
Period open	5.8311		76.4207	
	(3.9303)		(71.5208)	
Population	-0.0301		-0.0567	**
	(0.1915)		(0.025)	
Population squared	-5.9708		66.8569	
	(89.4643)		(91.3839)	
Northeast	-17.7788		-248.5872	
	(30.8719)		(455.1027)	
South	-121.9653		558.4646	
	(124.7914)		(404.0431)	
West	-38.3178		-662.9746	
	(49.6899)		(414.8783)	
Intercept	-38.2534		447.2687	
	(60.0865)		(861.8)	
R^2	0.57		0.47	
N	37		95	

***,**,* denote significance at the 1, 5, 10 percent significance levels, respectively.

The estimates of the instrument for media marketing hours are not significant for either size category of nurseries while the OLS estimate of marketing hours is statistically significant at the 5% level in the model including large firms (Table 31). All other exogenous variables do not differ in sign and statistical significance. The estimates of marketing expenditures are statistically significant in both models 2SLS and OLS with a slight difference between values. The 2SLS estimates of marketing expenditures are respectively 4.48 for small firms and 2.67 for large firms while the OLS estimates of the same variable are 4.90 for small firms and 2.70 for large firms. The number of employees is also statically significant at the 1% level in both models for large firms. The number of years in operation is statistically significant at the 5% level in both models for small firms. The number of employees is positive and statistically significant in the 2SLS and OLS models for large firms while the population squared is negative and statistically significant for large nurseries.

The Hausman test was performed to see if there were a significant difference between the OLS and IV estimates of media marketing hours. Both OLS and IV are consistent when the null is true, whereas only the IV is consistent if the null is false. To conduct the test, the predicted value of the error term in (4.6), $\hat{\epsilon}_i$ is included into the structural equation (4.5). After the OLS regression, the significance of $\hat{\epsilon}_i$ is tested using a t statistic. Because $\hat{\epsilon}_i$ is not statistically significant, we fail to reject null hypothesis that the OLS and IV estimates are equal for and large firms. Therefore the time spent on media marketing is exogenous based on the instrument which is a combination of the rate of household with high Internet speed and the perception of social media impact of the community.

5.2.3. OLS results

To respond to the third proposition that Sales increase with social media use, a regression was performed by firm size category. Small firms are firms making less than $200,000 sales and large firms make $200,000 or more. The results of the OLS regression are presented in Table 32. Fitting the 3 models to the data gives the higher adjusted R^2 for Model 3, with the hours spent on social media marketing as the measure of social media use. For the same model, the time spent on social media is positive and statistically significant for firms making $200,000 or more. The results indicate that an additional hour per week spent on social media marketing increases sales by $62,977 a year for firms grossing $200,000 or more, all else equal. The social media use coefficient estimate is positive for all other models except for the frequency of online marketing use for businesses making less than $200,000. None of these coefficients is statistically significant. Although the social media hours estimate was statistically significant at the 5% level, the size of the coefficient was highly sensitive to the cut off value that distinguished big firm from small firms across models and the mid-values of social media hour's intervals. Moreover, different cut-off values led to changes in the significance of the estimate. The results revealed that big firms were likely to allocate more hours to social media but the causal effect of social media hours on sales was not clearly determined, certainly due to the small size of the sample.

Table 32: Estimation of the sales model

	Frequency of online marketing use		Frequency of social media use		Hours of media marketing	
	Less than $200,000	$200,000 and more	Less than $200,000	$200,000 and more	Less than $200,000	$200,000 and more
Variable of interest	-6.0973	50.9716	2.1369	35.4917	0.0561	62.9765 **
	(3.0532)	(51.5177)	(3.1746)	(53.5122)	(3.6881)	(30.8187)
Marketing expenditures	4.3241 **	2.9770 **	4.6256	2.7779 **	4.9022 **	2.7038 **
	(2.0361)	(1.2584)	(2.3121)	(1.2687)	(2.3226)	(1.2161)
Years in operation	2.4912 ***	2.1249	3.0229 ***	0.4927	2.9000 ***	2.0129
	(0.6268)	(5.4346)	(0.7266)	(5.565)	(0.7183)	(5.3158)
Number of employees	6.2960	9.9502 ***	3.4329	10.7245 ***	2.7599	9.5752 ***
	(6.1953)	(2.549)	(6.9455)	(2.5203)	(7.4398)	(2.4273)
Period open	3.3250	66.9625	5.3545	96.8301	4.5068	78.5831
	(2.527)	(76.743)	(3.2237)	(78.7394)	(2.9742)	(74.9441)
Population	6.3106	99.1032	24.5433	112.6434	28.7083	73.6960
	(40.5515)	(89.6672)	(46.9496)	(91.8213)	(51.9725)	(89.0385)
Population squared	-0.0230	-0.0590 **	-0.0873	-0.06274 **	-0.0971	-0.0573 **
	(0.1061)	(0.0268)	(0.1297)	(0.0276)	(0.1376)	(0.0263)
Northeast	4.2116	102.9262	-12.1781	26.9904	-12.1582	-195.9170
	(30.3053)	(375.0617)	(31.4874)	(384.2757)	(32.1921)	(381.3334)
South	-47.8320	360.6379	-76.2773	391.3479	-69.7968	552.3562
	(33.6646)	(401.542)	(42.5221)	(413.0739)	(53.0291)	(427.5546)
West	6.5813	-489.3380	-22.5862	-594.9321	-23.1853	-636.8897
	(30.7058)	(425.7469)	(39.9074)	(434.8961)	(41.7441)	(415.2109)
Intercept	15.8836	482.8889	-33.8536	307.0322	-14.3847	462.3250
	(28.0222)	(952.2729)	(39.4163)	(964.0128)	(32.3125)	(910.9577)
Adjusted R^2	0.56	0.37	0.47	0.37	0.46	0.41
N	44	104	39	101	39	95

***,**,* denote significance at the 1, 5, 10 percent significance levels, respectively.

A variance ratio test was used to compare the distribution of hours spent on social media across two categories of nurseries, ranging from small firms making less than $200,000 in sales to big firm making $200,000 and more. The null hypothesis formulated posited that the value of the variances ratio was equal to 1meaning equality of variances. The test yielded a significant difference in the variance of the two groups. The computed F was higher than the critical F value ($F(40, 101) = 1.51$, $p = 0.0211$). Social media hours were allocated differently between big and small firms. There was a higher variability of social media hours' allocation among big firms, supporting differences between smaller and bigger firms in the patterns of new media marketing use. Table 33 also shows than smaller firms spend on average less time conducting a new media marketing (2.84 hours/week) than bigger firms (4.22 hours/week).

**Table 33: Summary statistics of social media hours by firms' category**

Group	Observations	Mean	Std. Err.	Std. Dev.	95% Confidence interval	
Less than $200,000	41	2.8415	0.5528	3.5398	1.7241	3.9588
$200,000 and more	102	4.2206	0.4672	4.7181	3.2939	5.1474
Combined	143	3.8252	0.3717	4.4446	3.0904	4.5599

The marketing expenditures variable is positive and statistically significant at the 5% level for all models, except for the model using the frequency of online marketing use reported for firms making less than $200,000. The return on investment of a dollar amount of marketing expenditures ranges from $4.32 to $4.9 in small firms and from $2.70 to $2.97 for large firms, holding all else constant. This greater measure in smaller firms seems inconsistent with the theory of economy of scale on advertising expenditures. This theory predicts a higher return on advertising investment as firms increase their expenditures up to an optimal level where the

marginal return on investment decreases. One of the main hypothesis that this theory is built upon is the principle of brand recognition. Once a brand is known by a target audience, it takes less marketing effort to a given firm to draw sales up relative to a newer brand. In addition larger firms have more resources to invest up to the optimal level than smaller firms, which contradicts the results of $4.32 to $4.9 for small firms and $2.70 to $2.97 for large firms. Despite the previous arguments, there are many reasons to think that these results have some consistency.

A closer look at the frequency of use of different marketing venues (Figure 17) shows that on average, bigger firms use a larger mix of marketing venues and put more emphasis on mass media in advertising their products. This result is in line with Palma et al. (2012) who state that large firms seek to reach a larger audience by advertising through mass media (television) and online marketing which are cost effective at a large scale. In contrast smaller firms leverage more direct marketing methods such as fairs and trade shows. By participating more in fairs and trade shows, smaller firms establish a direct contact with their customers including the possibility of selling directly parts of their products. Hence, because the model covers just one marketing year, it should capture more accurately the marginal effect of marketing expenditures in small firms. Mass media advertisement may have an indirect impact on customers and their results may take longer or need monthly data to observe. Panel data may be more appropriate to capture the effect of mass media advertisement on sales. In this case, the model may capture just part of the impact of a television advertisement campaign.

Figure 17: Monthly frequency of use of selected advertisement channels for small and large firms
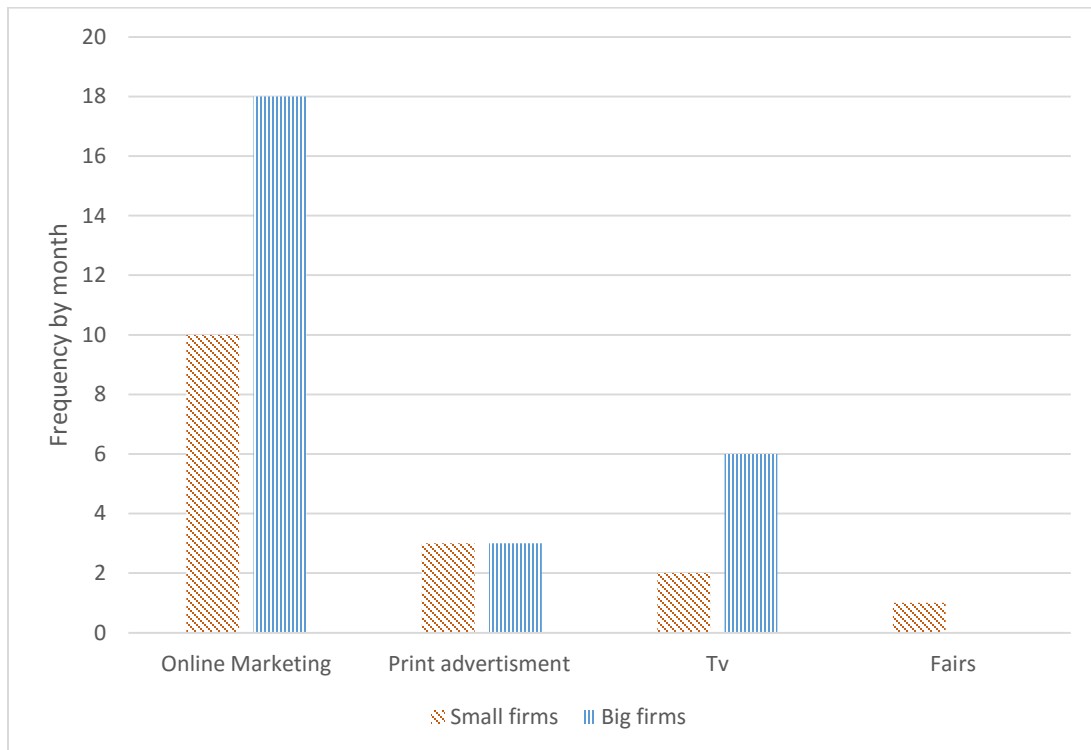
Regarding brand recognition, many small nurseries in rural areas have been operating for decades and well known within their communities. The bigger size of a nursery does not imply necessarily a higher brand recognition by its target audience. Palma et al. (2012) also found that for smaller nurseries, the advertisements methods that emphasized building relationships with potential customers (e.g. internet and printed material) were found to have larger effects compared to the larger firms. Moreover, the effect of the brand recognition on sales may already be captured by the number of years in operations included in the model.

The number of years in operation impacted sales positively in all models. Its coefficient estimate is statistically significant at the 1% level for small firms (business age). Among smaller firms, the nursery with one additional year of operation generated $2,491 to $3,023 additional sales, holding everything else the same. This result is consistent with experience providing a

noticeable comparative advantage to older firms over more recently established firms. Reasons for this comparative advantage may include brand recognition and establishment of customer loyalty benefiting older firms. The size of the business, captured by the number of employees was positive and statistically significant at the 1% level in all three models for large firms. An additional employee hired results in an increase in sales by $9.57 to $10.72 depending on the model.

The number of months of operation in a year is not statistically significant in all models. This may seem surprising since businesses open all year round are expected to make more sales than business open just a few month in the year. However, the summary descriptive (Figure 8) shows that most respondents are open at least 9 months a year (77.43%, n = 155), with just 10.97% of the respondents open less than 6 months a year. Due to the high proportion of all year round businesses, the impact of the period of operation on sales may not be captured with statistical significance. The period of operation is positive in all models, ranging from $3,320 to $5,550 additional sales for one additional month of operation for small firms and from $66,962 to $96,830 for bigger firms. The population is not statistically significant in all models while the population squared is negative and statistically significant at the 5% for Models 1 and 3, and at the 1% for Model 2 for large firms. The size of the population has a positive impact on sales. The squared term suggests that this effect is decreases progressively as the city population increases. None of the regional variables are statistically significant suggesting the level of sales were not statistically different across regions.

Chapter 6 - Conclusion

Nurseries and garden centers experience difficulties in marketing their products, especially in rural areas. The number of nurseries in the U.S. has increased by 3.9% over the period 2007 to 2012 whereas the total value of sales has decreased by 12.7% over the same period, indicating a decrease in performance by an average nursery. New-media marketing appears to be a low cost opportunity that has proven to be successful in other industries. Previous studies have analyzed agricultural technology adoption and social media adoption, but no known study has investigated social media adoption in the green industry. This research contributes to the gap in the existing social media adoption literature.

The objectives of the study were to describe the extent of use of social media in the green industry, to analyze the factors impacting adoption of new-media marketing and to determine the impact of new-media marketing use on sales. The methodology used to study adoption is based on the key adoption factors identified by the literature, particularly network effect in agricultural technology adoption and the perceived usefulness stressed in the technology acceptance model (Bandiera and Rasul, 2006; Baerenklau, 2005; Davis, 1989; Lorenzo-Romero et al., 2014). The impact of social media on sales is analyzed based on the assumption that firms allocate their resources to maximize profit. Data were collected through a survey sent to 539 nurseries and 83 association and magazines of the green industry, with 161 complete responses.

Results indicate that new media is widely used for marketing purposes among the green industry businesses in the sample, with a particularly high rate of adoption among large firms. The network effect has a positive impact on new-media marketing adoption by nurseries and garden centers. The percentage of sales made through direct retail to customers, the perceived

usefulness and the city population were also identified to be key adoption factors. As it pertains to the impact of new-media marketing on sales, nurseries were categorized into large (sales of $200,000 or more) and small firms (less than $200,000 sales). The hypothesis that social media use increases sales could not be rejected for large firms, if social media use was measured by the time spent on social media marketing. Nonetheless, the magnitude of this positive effect could not be determined robustly due to the small size of the sample. Other measures of the social media use were not significantly related to sales. On the other hand, marketing expenditures were found to be significant in all models. While the size of the nursery and the city population impacted sales positively for large nurseries, the number of years in operation was more relevant for small businesses. Grounded on the assumption that nurseries choose their marketing strategy depending on the previous sales level, an endogeneity test was performed to determine whether there was reverse causality between sales and media marketing hours. The variable of interest, media marketing hours was found exogenous, suggesting no evidence of reverse causality.

By providing evidence of the positive impact of new-media marketing on sales, this study supports the need for new-media marketing efforts by practitioners. The effect of an additional hour spent on social media can serve as a basis to determine the time allocated to alternative marketing strategies. Nurseries may include new media in their marketing strategy. However, the positive effect of marketing expenditures on sales suggests that all marketing strategies, including traditional methods are important in achieving ROI. These results are confirmed by Onishi and Machanda (2012) who reported that new media and traditional marketing strategies acted in synergy on business performance. In addition, the results of the study can serve as a ROI benchmark that can be used by nurseries to assess the effectiveness of their new-media

marketing strategy. Spending a long time on social media advertising with few results may require to revise the media marketing strategy.

The identified key factors of adoption can help nurseries' owners understand the motives justifying their current level of use of social media and envision the efforts needed to improve their new-media marketing strategy. For example, individual experiences where new-media marketing were not profitable may reduce the odds for adoption. Therefore, actions such as training could help develop more confidence in using of this marketing venue.

On the other hand, Extension agents and policy makers can leverage the network effect to increase adoption of social media among nurseries and garden centers. Trainings targeting pilot nurseries in different networks can contribute to reducing the barrier to adoption. Also, emphasis must be placed on nurseries less likely to adopt social media, notably firms with lower perception of social media ROI and low percentage of retail sales.

6.1. Limitations and future research

Although this research has provided meaningful information on social media use, the sample size could be increased to more accurately reflect the nursery and garden center population. Given the low rate of responses from social-media non users and smaller businesses, the results of this study fell short of offering profound explanation of adoption patterns in this segment of the green industry. This limitation could be attributed to the distribution method which was mostly online. In addition, the survey was sent after the slow season of February/March for most nurseries and garden centers, missing the opportunity to obtain a higher rate of responses particularly from businesses with little interest in social media and online marketing. Most respondents were nurseries enthusiastic to learn about the impact of their social

media activity on their business performance. Also, the study does not explicitly capture the learning-by-doing effect, which has been recognized as important factor of adoption by the literature. High similarities among responses for the question related to the learning-by-doing precluded to include this factor in the adoption models estimated. Further, the frequency of social media and online marketing use were assessed by the respondent, allowing for measurement errors.

Future research could include a more accurate measure of the social media use by collecting data on respondent social media platforms using data mining techniques. An alternative method to collect use data could consist of writing a code based on Facebook or Twitter's Application Protocol Interface (API) that will automatically count the number of posts made by garden center over a given period of time. The data collected would be more accurate and free from assessment errors. Additional variables capturing owner's risk aversion, the presence of a marketing service in charge of social media, and the firm's level of information technology resources could provide a better assessment of new-media marketing use. The research conducted in this study could be further developed to account for the contribution of alternative marketing venue such as print advertisement, television or radio advertisement in sales increase. Including additional characteristics of social media use (nature of content posted, consistency in the strategy) could improve the model. The method developed in this model can be applied to other agricultural fields such as other specialty crops or farming in general. Farms practicing agritourism or involved in community supported agriculture would benefit from a study on social media use and impact on sales. They are more likely to use new-media marketing to reach their diverse customers than conventional crop producers.

References

Ayu, A.R. & A. Abrizah. (2011). "Do You Facebook? Usage and Applications of Facebook Page among Academic Libraries in Malaysia." *International Information and Library Review* 43(4): 239-249. *http://dx.doi.org/10.1016/j.iilr.2011.10.005.*

Aldana, U. J. D. Foltz, B. L. Barham, P. Useche (2011). "Sequential Adoption of Package Technologies: The Dynamics of Stacked Trait Corn Adoption." *American Journal of Agricultural Economics*, 93(1): 130-143.

Andriole, S. J. (2010). "Business impact of Web 2.0 Technologies." *Communications of the ACM*, 53(12): 67-79.

Baerenklau, K. A. (2005). "Toward an Understanding of Technology Adoption: Risk, Learning, and Neighborhood Effects." *Land Economics* 81 (1): 1-19.

Bandiera, O. and I. Rasul. (2006). "Social Networks and Technology Adoption in Northern Mozambique." *The Economic Journal* 116 (514): 869-902.

Banerjee, A. V. (1992). "A Simple Model of Herd Behavior." *The Quarterly Journal of Economics* 107(3): 797-817. Retrieved from: http://economics.mit.edu/files/8869.

Barham, B. L., J. D. Foltz, D. Jackson-Smith, and S. Moon (2004). "The dynamics of agricultural biotechnology adoption: Lessons from rbst use in Wisconsin, 1994-2001." *American Journal of Agricultural Economics*, 86(1):61-72.

Behe, B.K., B.L. Campbell, C.R. Hall, H. Khachatryan, J.H. Dennis, and C.Yue. (2013). "Smartphone use and online search and purchase behavior of North Americans: Gardening and non-gardening information and products." *HortScience* 48(2):209–215.

Behe, B. K., B. L. Campbell, C. R. Hall, H. Khachatryan, J. H. Dennis, and C. Yue, (2013). "Consumer preferences for local and sustainable plant production characteristics." *HortScience,* 48(2), 200-208.

Behe, B. K., J. H. Dennis, C. R. Hall, A. W. Hodges, and R. G. Brumfield. (2008). "Regional Marketing Practices in U.S. Nursery Production." *HortScience,* 43 (7): 2070-2075.

Besley, T. and A. Case. (1994). "Diffusion as a Learning Process: Evidence from HYV Cotton." Research Program in Development, Woodrow Wilson School of Public and International Affairs Studies, Princeton University. Discussion paper 174.

Bikhchandani, S. and S. Sharma. (2000). "Herd Behavior in Financial Markets: A Review." IMF Working Paper No. 00/48. Retrieved from: ssrn.com/abstract=228343

Breen, J. (2012). zipcode: U.S. ZIP Code database for geocoding. R package version 1.0. http://CRAN.R-project.org/package=zipcode

Brown, L. (2010). "Social Media Are Coming of Age in the Business World: Companies Here and Nationally Are Beefing Up Their Networking Staffs," *St. Louis Post-Dispatch*, September 22, 2010.

Cameron, L. A. (1999). "The importance of learning in the adoption of high-yielding variety seeds." *American Journal of Agricultural Economics*, 81(1): 83-94.

Campbell, B. L. and C. R. Hall. (2010). "Effects of Pricing Influences and Selling Characteristics on Plant Sales." HortScience, 45 (4): 575-582.

Chiu, Y.B., C.P. Lin, and L.L. Tang (2005). "Gender differs: Assessing a model of online purchase intentions in e-tail service." *International Journal of Service Industry Management*, 16(5): 416-435.

CIMMYT. (1993). *The Adoption of Agricultural Technology: A Guide for Survey Design*. Mexico, D.F.: CIMMYT.

Cohen H. (2013). "Hidden Social Media Costs." Retrieved from: http://heidicohen.com/hidden-social-media-costs/

Conley, T. G. and C. R. Udry. (2010). "Learning About a New Technology: Pineapple in Ghana." *American Economic Review*. 100(1): 35-69. Retrieved from: www.aeaweb.org/articles.php?doi=10.1257/aer.100.1.35

Couper, M.P., R. Baker, J. Melchling (2011). Placement and design of navigation button in web-surveys." *Survey Practice*, 4(1).

Crespi, J. M. (2007). "Generic Advertising and Product Differentiation Revisited." *Journal of Agricultural & Food Industrial Organization*, 5(1): 1-21.

Curtis A. (2013). "The Brief History of Social Media", University of North Carolina at Pembroke, Mass Communication Department. Retrieved from www2.uncp.edu/home/acurtis/

David, P. A. (1975). "Technical Choice, Innovation and Economic Growth." Cambridge, UK: Cambridge University Press.

Davis, F. D. (1986). *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results*, Cambridge, MA: MIT Sloan School of Management.

Davis, F. D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." *MIS Quarterly,* 13(3): 319–339.

Dillman, D. A., J. D. Smyth, L. M. Christian (2014). *Internet, Phone, Mail, and Mixed-Mode*. Hoboken, NJ: John Wiley & Sons.

Dishaw, M.T. and D.M. Strong (1999). "Extending the Technology Acceptance Model with Task-Technology Fit Constructs." *Information and Management* 36(1): 9-21.

Duncan, S. (2010). "Using web analytics to measure the impact of earned online media on business outcomes: A methodological approach." *Institute for Public Relations*, Retrieved from http://www.instituteforpr.org/topics/using-web-analytics/

El-Gohary, H. (2012). "Factors affecting E-Marketing adoption and implementation in tourism firms: An empirical investigation of Egyptian small tourism organizations." *Tourism Management,* 33(5): 1256-1269.

Feder G., R. E. Just and D. Zilberman. (1985). "Adoption of Agricultural Innovations in Developing Countries: A Survey." *Economic Development and Cultural Change* 33(2): 255-298

Federal Deposit Insurance Corporation. (2014). "FDIC Quarterly 44 2014", Volume 8, No. 2. Retrieved from: www.fdic.gov/bank/analytical/quarterly

Fisher T. (2009). "ROI in social media: A look at the arguments." *Journal of Database Marketing & Customer Strategy Management*, 16: 189-195.

Fitzgerald, B. (2012, July 9). "More Women On Facebook, Twitter And Pinterest Than Men." *The Huffington Post*. Retrieved from: www.huffingtonpost.com/2012/07/09/women-facebook-twitter-pinterest_n_1655164.html

Foster, A. D. and M. R. Rosenzweig. (1995). "Learning by Doing and Learning from Others: Human Capital and Technical Change in Agriculture." *Journal of Political Economy* 103 (6): 1176-1209.

Grandon E. E. and J. M. Pearson. (2004). "Electronic commerce adoption: an empirical study of small and medium U.S. businesses." *Information & Management* 42(1): 197–216. Retrieved from : dx.doi.org/10.1016/j.im.2003.12.010

Griliches Z. (1957). "Hybrid Corn: An Exploration in the Economics of Technological Change." *Econometrica* 25(4): 501-522.

Gupta, S., V. Zeithaml. (2006). "Customer metrics and their impact on financial performance." *Marketing Science*, 25(6): 718–739.

Hall C. R., A. W. Hodges, J. J. Haydu (2005). "Economic Impacts of the Green Industry in the United States." HortTechnology, 16(2): 345-353.

Hall T. J., J.H. Dennis, R. G. Lopez, M. I. Marshall. (2009). "Factors Affecting Growers' Willingness to Adopt Sustainable Floriculture Practices." *HortScience* 44(5): 1346-1351.

Hampton, W. (2001) Trade flows and marketing practices of Louisiana and Gulf states nurseries. MS thesis. Louisiana State University. Retrieved from: http://ageconsearch.umn.edu/bitstream/6727/2/sp08ve14.pdf

Harvard Business Review Analytic Services. (2010). "The New Conversation: Taking Social Media from Talk to Action". Retrieved from: hbr.org/hbr-analytic-services

Hausman, J. A. (1978). "Specification Tests in Econometrics." *Econometrica,* 46(6):1251-1271.

Hiebert, L. D. (1974). "Risk, Learning, and the Adoption of Fertilizer Responsive Seed Varieties." *American Journal of Agricultural Economics* 56(4): 64–768. Retrieved from http://www.jstor.org/stable/1239305

Hodges, A. W., Hall, C. R., & Palma, M. A. (2011). "Economic contributions of the green industry in the United States in 2007–08." HortTechnology, 21(5): 628-638.

International Advertising Bureau (2008). "User Generated Content, Social Media, and Advertising — An Overview." IAB Platform Status Report: April 2008.

International Advertising Bureau (2009). "Social Media Ad Metrics Definitions." Retrieved from: http://www.iab.net/media/file/SocialMediaMetricsDefinitionsFinal.pdf

Jensen, R. (1982). "Adoption and diffusion of an innovation of uncertain profitability." *Journal of Economic Theory* 27(1):182-193

Junco, R. (2012). "The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement." *Computers & Education* 58 (1): 162–171

Kaplan A. M. and M. Haenlein (2010): "Users of the world, unite! The challenges and opportunities of Social Media.", *Business Horizons*, 53(1): 59-68.

Katz, E., Haas, H., & Gurevitch, M. (1973). "On the use of the mass media for important things." *American Sociological Review*, 38, 164-181.

Kennedy P. (2008). *A guide to econometrics* (6th ed.). Malden, MA: Blackwell Publishing.

Krosnick, J. A. (1991). "Response strategies for coping with the cognitive demands of attitude measures in surveys." *Applied cognitive psychology*, 5(3): 213–236.

Lee, M.C. (2009). "Factors influencing the adoption of Internet banking: An integration of TAM and TPB with perceived risk and perceived benefit." *Electronic Commerce Research and Applications*, 8(3): 130-141.

Lin, C.H., H.Y., Shih, P.J., Sher (2007), "Integrating technology readiness into technology acceptance: The TRAM model", *Psychology and Marketing*, 24(7): 641-657

Lindner, R., A. Fischer, P. Pardy (1979). "The time to adoption." *Economics Letters* 2:187-190

Liu Y., R. A. Lopez. (2013). "The Impact of Social Media on Consumer Demand: The Case of Carbonated Soft Drink Market." Selected Paper prepared for presentation at the Agricultural & Applied Economics Association's 2013 AAEA & CAES Joint Annual Meeting, Washington, DC, August 4-6, 2013. Retrieved from: purl.umn.edu/148913

Lorenzo-Romero, C., M. Alarcón-del-Amo and C. Efthymios (2014). "Determinants of Use of Social Media Tools in Retailing Sector." *Journal of Theoretical and Applied Electronic Commerce Research,* 9(1):44-55.

Ma, X., and G. Shi. 2014. "A dynamic adoption model with Bayesian learning: an application to U.S. soybean farmers." *Agricultural Economics* 46(1):25–38.

Mansfield E. (1961). "Technical change and the rate of imitation." *Econometrica* 29:741-66

Marketing in a Digital World SMB & Consumer Survey 2011. Retrieved from www.marketingtechblog.com

Merrill T., K. Latham, R. Santalesa and D. Navetta. (2011). "Social Media: The Business Benefits May Be Enormous, But Can the Risks - Reputational, Legal, Operational - Be Mitigated?" ACE Group, Retrieved from: www.acegroup.com

Munshi, K. (2004). "Social Learning in a Heterogeneous Population: Technology Diffusion in the Indian Green Revolution." *Journal of Development Economics*, 73(1): 185-215.

Nah, S., G. D. Saxton (2013). "Modeling the adoption and use of social media by nonprofit organizations." *New Media & Society*, 15(2): 294-313.

O'Mara G. T. "A decision-theoretic view of the microeconomics of technique diffusion in a developing country." (1971). Ph.D. dissertation, Stanford University, Department of Economics

Onishi H., P. Manchanda (2012): "Marketing activity, blogging and sales." *International Journal of Research in Marketing* 29(3): 221-334.

Palma, M.A., C.R. Hall, B. Campbell, H. Khachatryan, B.Behe and S. Barton (2012). "Measuring the Effects of Firm Promotion Expenditures on Green Industry Sales." *Journal of Environmental Horticulture*, 30(2):83-88.

Park, S. Y. (2009). "An Analysis of the Technology Acceptance Model in Understanding University Students' Behavioral Intention to Use e-Learning." *Educational Technology & Society*, 12 (3): 150–162.

Pew Research Center. (2015, October 8). Social Media Usage: 2005-2015. Retrieved from http://www.pewInternet.org/2015/10/08/social-networking-usage-2005-2015/

Pew Research Center. (2013, September 25). *Who's Not Online and Why*. Retrieved from
http://www.pewInternet.org/2013/09/25/whos-not-online-and-why/

Pew Research Center. (2013, September 16). *Cell Internet Use 2013.* Retrieved from
http://www.pewInternet.org/2013/09/16/cell-Internet-use-2013/

Pew Research Center. (2013, September 16). *Home Broadband 2013.* Retrieved from
http://www.pewInternet.org/2013/08/26/home-broadband-2013/

Revat, R. (2005). "La rédaction du questionnaire: Quelques expériences." Quatrieme Colloque
Francophone Sur Les Sondages 2005, Quebec, Canada. Retrieved from:
www.researchgate.net/publication/251302144_La_rdaction_du_questionnaire__quelques
_expriences

Rimal, A. and R. W. Ward (1998). "Effect Of Generic Promotion Of Flowers On The Use Of
Retail Flower Outlets," 1998 Annual meeting, August 2-5, Salt Lake City, UT 21005,
American Agricultural Economics Association.

Rogers, E.M. (2003). Diffusion of innovations (5th Ed.). Free Press, New York.

Russel, M. A. (2014). *Mining the Social Web*. Sebastopol, CA: O'Reilly Media.

Sago, B. (2013). "Factors Influencing Social Media Adoption and Frequency of Use: An
Examination of Facebook, Twitter, Pinterest and Google+." *International Journal of
Business and Commerce*, 3(1): 01-14

Shaw, K. E. (2013). *Competencies, Importance, and Motivations for Agricultural Producers'
Use of Online Communications*. Master's thesis, Texas Tech University. Retrieved from:
repositories.tdl.org/ttu-ir/handle/2346/48912

Social Media [Def. 1]. (n. d.). In *Merriam Webster Online.* Retrieved September 12 2014, from
http://www.merriam-webster.com/dictionary/socialmedia.

Social Media [Def]. (n. d.). In *Personal computing glossary*, Retrieved September 12 2014, from
http://whatis.techtarget.com/definition/social-media

Social media (n.d.). In *WhatIs.com online*. Retrieved September 12 2014 from:
whatis.techtarget.com/definition/social-media

Stebner, S. (2015). "Green growth: an exploratory study of metro and nonmetro garden centers
use of new-media marketing." Master's thesis. Kansas State University, Retrieved from
krex.k-state.edu/dspace/handle/2097/19028

Stelzner, M. A. (2015): "2014 Social Media Marketing Industry report: How Marketers Are Using Social Media to Grow Their Businesses." Social Media Examiner. Retrieved from www.socialmediaexaminer.com

Stelzner, M. A. (2014): "2013 Social Media Marketing Industry report: How Marketers Are Using Social Media to Grow Their Businesses." Social Media Examiner. Retrieved from www.socialmediaexaminer.com

Stoneman P. (1983.): *The Economic Analysis of Technological Change*. Oxford, UK: Oxford University Press.

Taylor, S., and P. A. Todd. (1995). "Understanding Information Technology Usage: A Test of Competing Models," *Information Systems Research* 6(4): 144-176.

Teo, T. (2009). "Is there an attitude problem? Reconsidering the role of attitude in the TAM." *British Journal of Educational Technology*, 40(6):1139-1141.

The CMO Survey. (2014). *CMO Survey Report: Highlights and Insights Aug. 2014* Durham, NC: Moorman C.

Topp, J., S. Stebner, L. A. Barkman and L. Baker (2014). "Productive Pinning: A Quantitative Content Analysis Determining the Use of Pinterest by Agricultural Businesses and Organizations." *Journal of Applied Communications*, 98(4): 6-14.

U.S. Census Bureau (2013). American Community Survey, Retrieved from https://www.census.gov/history/pdf/2013computeruse.pdf

USDA (2014). "2012 Census of Agriculture, United States." Summary and State Data Volume 1 • Geographic Area Series • Part 51 AC-12-A-51 Issued May 2014

Useche, P., B. L. Barham, and J. D. Foltz (2009). "Integrating technology traits and producer heterogeneity: A mixed-multinomial model of genetically modified corn adoption." *American Journal of Agricultural Economics*, 91(2):444-461.

Van ittersum, K., W. A. Rogers, M. Capar, K. E. Caine, M. A. O'Brien, L. J. Parsons, A. D. Fisk (2006) "Understanding Technology Acceptance: Phase 1 – Literature Review and Qualitative Model Development." Technical Report HFA-TR-0602, Georgia Institute of Technology, Atlanta, GA

Venkatesh, V., M. Morris, G.B. Davis, and F.D. Davis (2003). "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly* 27(3): 425-78.

Venkatesh, V. and F. D. Davis (2000). "A theoretical extension of the technology acceptance model: Four longitudinal filed studies." *Management Science*, 46(2): 186–204. Retrieved from: www.jstor.org/stable/2634758

Wamba S. F., L. Carter (2014). "Social Media Tools Adoption and Use by SMEs: An Empirical Study," *Journal of End User and Organizational Computing* 26(1):1-16.

Williams, R. (2015). *Heteroscedasticity*. Notre Dame, IN: University of Notre Dame

Wooldridge, J. M. (2012). *Introductory Econometrics A Modern Approach* (5th ed.). Mason, OH: South-Western.

Zheka, V. (2006). *Does Corporate Governance Causally Predict Firm Performance? Panel Data and Instrumental Variables Evidence.* CERT Discussion Paper No. DP06/05. Retrieved from: ssrn.com/abstract=877913 or http://dx.doi.org/10.2139/ssrn.877913

Zilberman D., S. Kaplan (2014). "What the Adoption Literature can teach us about Social Media and Network Effects on Food Choices.", Selected Paper prepared for presentation at the 2014 AAEA/EAAE/CAES Joint Symposium: Social Networks, Social Media and the Economics of Food, Montreal, Canada, 29-30 May 2014. purl.umn.edu/173076

Appendix A - Survey data summary

The following table summarize select survey data and presents the conversions performed on sales and frequencies. Sales ranges were converted using the mid values.

Dependent variables						

		Frequency of use : Online marketing (websites, blogs, social media, e-newsletters)				

Variable	Description		Average			
A1	ordinal, from 1 to 7		2.47058824			
A2	continuous, mid value of weekly frequencies		3.61891739			

Frequency	Weekly basis (mid values)	Code	Count	Percentage	Recode
Daily	7	1	52	32.30%	7
2 to 6 times a week	4	2	49	30.43%	6
1 to 4 times a month	0.625	3	35	21.74%	5
Once a quarter	0.083	4	6	3.73%	4
1-3 times a year	0.042	5	6	3.73%	3
Less than once a year (once every 3 years for example)	0.0069	6	3	1.86%	2
Never	0.000000001	7	10	6.21%	1
Total			161	100.00%	

Frequency of use :
Social media

Variable	Description	Average
B1	ordinal, from 1 to 7	1.662252
B2	continuous, mid value of weekly frequencies	0.79317682

Frequency	Weekly basis (mid values)	Code	Count	Percentage	Recode
Once a week or more	1	1	115	71.43%	7
Once a month	0.25	2	15	9.32%	6
4-6 times a year	0.104166667	4	6	3.73%	5
Once a quarter	0.083	3	4	2.48%	4
1-3 times a year	0.042	5	1	0.62%	3
Less than once a year	0.0069	6	3	1.86%	2
Never	0.000000001	7	7	4.35%	1
Total			151	93.79%	

B3 : ***mediamkt_time*** ***Time per week spent on social media marketing***

	Mid-values	Freq.	Percent	Code
Less than 1 hour	0.5	35	24.48%	3
1 to 2 hours	1.5	43	30.07%	4
3 to 4 hours	3.5	28	19.58%	5
5 to 9 hours	7	26	18.18%	6
10 to 19 hours	15	7	4.90%	7
20 hours and more	20	4	2.80%	8
Total		143	100.00%	

Sales 2014

Variable	Description	Average
C1	ordinal, from 1 to 7	8.25465839
C2	continuous, mid values	1633027.95

Sales ranges	Mid value	Code	Count	Percentage
Less than $2,500	1250	1	8	4.97%
$2,500 to $4,999	3750	2	0	0.00%
$5,000 to $9,999	7500	3	1	0.62%
$10,000 to $24,999	17500	4	5	3.11%
$25,000 to $49,999	37500	5	11	6.83%
$50,000 to $99,999	75000	6	6	3.73%
$100,000 to $249,999	175000	7	19	11.80%
$250,000 to $499,999	375000	8	19	11.80%
$500,000 to $999,999	750000	9	22	13.66%
$1 million to $4,999,999	2500000	10	46	28.57%
$5 million or greater	5000000	11	24	14.91%
Total			161	

*Number of businesses
monitored online*

Number of businesses	Percentage	Response	%
0	11.19%	17	11.19%
1	4.90%	8	4.90%
2	10.49%	16	10.49%
3	13.29%	20	13.29%
4	10.49%	16	10.49%
5	9.09%	14	9.09%
6	7.69%	11	7.69%
7	1.40%	2	1.40%
8	2.80%	4	2.80%
9	0.70%	1	0.70%
10+	27.97%	42	27.97%
Total	0.00%	151	100.00%

Membership in professional associations, societies

Number of professional associations	Count	Percentage
0	31	19.25%
1	36	22.36%
2	32	19.88%
3	31	19.25%
4	12	7.45%
5+	19	11.80%
Total	161	

Online networks (Facebook or LinkedIn groups, forums)

Number of online networks	Count	Percentage
0	32	19.88%
1	30	18.63%
2	42	26.09%
3	24	14.91%
4	8	4.97%
5+	25	15.53%
Total	161	

Number of facebook friends of the respondent

Answer	Mid-values	Response	%
0	0	27	15.03%
1-10	5	24	15.69%
11-50	30	24	15.03%
51-100	75	21	13.07%
101-500	300	41	26.14%
Over 500	500	24	15.03%
Total		161	

Early adopter or not

Answer	Values	Response	%
Trial and error	1	121	75.16%
From a relative, professional or other	0	40	24.84%
Total		161	

*Frequency of social
media use at the
personal level*

Answer	Weekly Mid-values	Response	%
At least once a day	7	94	58.39%
2-6 times a week	4	25	15.53%
Once a week to 2 times a month	0.75	11	6.83%
Once a month	0.25	5	3.11%
Less than once a month	0.00001	8	4.97%
Do not use	0	18	11.18%
Total		161	

Control variables

Demographics

*Population of the city where
the main business is located*

Answer	Values	Count
Rural	1	31
Semi-urban	2	74
Urban	3	48
Total		153

Dummy1	Urban vs rural
Dummy2	Semi_urban vs rural

*Population of the city where
the main business is located
(census, estimate 2012)*

Obs	Mean	Std. Dev.	Min	Max
153	114216.8	361787.9	105	3857799

Census bureau regions

Region	Freq.	Percent	Cum.
No data	8	4.97%	4.97
Midwest	93	57.76%	62.73
Northeast	21	13.04%	75.78
South	20	12.42%	88.2
West	19	11.80%	100
Total	161	100.00%	

Marketing practices

Percentage of sales made through retail to direct customers (not wholesalers nor landscapers ...)

Variable	# observations	Mean	Std. Dev.	Min	Max
sales_retail	161	69.63602	36.93468	0	100

Percentage of sales made under contract

contract	Mid-values	Code	Freq.	Percent
0%	0	1	95	59.75%
1% to 10%	0.05	2	33	20.75%
11% to 25%	0.175	3	12	7.55%
26% to 50%	0.375	4	7	4.40%
51% to 90%	0.7	5	5	3.14%
More than 90%	0.95	6	7	4.40%
Total			159	100.00%

Opinion about whether social media use improves sales(scale : from 1 to 5, with 5 = extremely important)

Response	Freq.	Percent
1	5	3.47%
2	14	9.72%
3	25	17.36%
4	42	29.17%
5	58	40.28%
Total	144	100%

Number of years since the business has started using social media

Number of years	Freq.	Percent
1	6	4.23%
2	15	10.56%
3	28	19.72%
4	15	10.56%
5	32	22.54%
6	16	11.27%
7	5	3.52%
8	11	7.75%
9	1	0.70%
10	8	5.63%
14	1	0.70%
15	4	2.82%
Total	142	100%

2014 total marketing expenses

Variable	Obs	Mean	Std. Dev.	Min	Max
mktg_expenses	161	53049.91	122382.4	0	1000000

Other characteristics

Number of full time employees during peak season

Variable	Obs	Mean	Std. Dev.	Min	Max
fulltimepeak	161	30.63	71.74	0	500

Year of business establishment

Variable	Obs	Mean	Std. Dev.	Min	Max
establishment	161		1980	26.11099	1885	2015

124

respondent's age

age	Mid-values	Freq.	Percent
18 to 24 (1)	21	3	1.86%
25 to 34 (2)	29.5	23	14.29%
35 to 44 (3)	39.5	22	13.66%
45 to 54 (4)	49.5	46	28.57%
55 to 64 (5)	59.5	51	31.68%
65 to 74 (6)	69.5	15	9.32%
75 and over (7)	75	1	0.62%
Total		161	100.00%

Appendix B - Survey instrument

Welcome to the Nurseries and Garden Centers Marketing Survey.

This survey is designed to understand how online marketing is being used by nurseries and garden centers in the U.S. and Canada. The results will benefit nurseries and garden centers by collecting the typical marketing practices used in the industry and suggesting ways to improve marketing practices.   The survey may take 10-20 minutes. We hope you will take the time to complete it. The more responses we get, the stronger recommendations we can draw. The survey covers: business characteristics, marketing practices and demographic characteristics of the respondent. Please collaborate with your colleagues, if needed, to complete the survey.   Your participation is voluntary, and your responses will be kept confidential. The focus of the survey is on the business practices of your company. Any personal-level questions are designed to understand decisions made by the business. As a token of appreciation of your time, you will be given an opportunity to enter into a drawing for one of two $50 Amazon.com gift cards at the end of the survey.   If you have questions about the rights of research subjects or about the manner in which the study is conducted, please contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.   The results from the survey will be available from the project team. You will be given the opportunity to request a copy of the results. For more information about this project, you may contact any of the team members below.   Many thanks for your time, in advance.   Sincerely,   Becatien Yao, M.S. student in Agricultural Economics at Kansas State University (byao@k-state.edu)   Dr. Cheryl Boyer, Horticulture at Kansas State University (crboyer@k-state.edu)   Dr. Lauri Baker, Agricultural Communication at Kansas State University (lmbaker@k-state.edu)   Dr. Hikaru Peterson, Agricultural Economics at Kansas State University (hhp@k-state.edu)

Q1. What is your role in the business operation?

- ○ Owner/Operator
- ○ Owner/Non-operator
- ○ Manager
- ○ Marketing Manager
- ○ Other (please specify) _____

Q2. How long have you been working for this current firm?

- ○ Less than 1 year
- ○ 1 to 4 years
- ○ 5 to 9 years
- ○ 10 years and more

Q3. What is the scope of your business? Select all the services and products offered by your business.

- ❑ Greenhouse / annuals
- ❑ Lawn & garden equipment
- ❑ Nursery container and field
- ❑ Landscape architecture/design
- ❑ Landscape services/build
- ❑ Retail bedding & nursery stock
- ❑ Retail lawn & garden products
- ❑ Retail general merchandise
- ❑ Retail florist and florist supplies
- ❑ Retail food & beverage
- ❑ Retail garden equipment
- ❑ Retail landscape materials
- ❑ Wholesale bedding & nursery stock
- ❑ Wholesale lawn & garden products
- ❑ Wholesale florist and florist supplies
- ❑ Wholesale garden equipment
- ❑ Wholesale landscape materials
- ❑ Other (specify) _____

Q4. How many months out of a year is your business open?

- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7
- ○ 8
- ○ 9
- ○ 10
- ○ 11
- ○ 12

Q5. How were total sales for your business in 2014 distributed across various clienteles? Please write in the percentage of sales for each channel.

_____ Retail (direct to consumers) (%)

_____ Other garden centers (%)

_____ Landscapers (%)

_____ Mass merchandisers (%)

_____ Rewholesalers (%)

_____ Other(%)

Q6. What percentage of your total sales in 2014 was sold under contract? Select the answer that is closest to your situation.

- ○ 0%
- ○ 1% to 10%
- ○ 11% to 25%
- ○ 26% to 50%
- ○ 51% to 90%
- ○ More than 90%

Q7. If your business has a website, what is the URL? If you do not have a website, write in your business name.

Q8. What type of Internet connection does your business have? Select all that apply.

- ❑ There is no Internet access on site
- ❑ Dial up
- ❑ Wireless
- ❑ Mobile
- ❑ Broadband
- ❑ DSL
- ❑ Cable
- ❑ Satellite
- ❑ ISDN
- ❑ Other _____

Q9. What were your total marketing expenses in 2014? (Print advertisement, phone calls, television/radio, fairs/trade shows, websites, social media, newsletters, etc.)

$

Q10. How often do you use the following marketing venues to reach your customers? For each venue, select the frequency that is closest to your situation in 2014.

	Daily	2 to 6 times a week	1 to 4 times a month	Once a quarter	1-3 times a year	Less than once a year	Never
Print advertisements (newspapers, store circulars, postal mailings)	○	○	○	○	○	○	○
Personal interactions (phone calls, emails, visits)	○	○	○	○	○	○	○
Television/radio	○	○	○	○	○	○	○
Fairs/trade shows/garden shows	○	○	○	○	○	○	○
Online marketing (websites, blogs, social media, e-newsletters)	○	○	○	○	○	○	○

Q11. What device(s) do you use for online marketing of your business? Select all that apply.

❑ Laptop
❑ Desktop
❑ Smart phone
❑ Tablet
❑ Other mobile device _____

Q12. How would you rank the impact of the following online marketing activities on your business sales? Drag and drop to reorder the activities according to your ranking.

_____ Websites

_____ HTML newsletters (e.g. Constant Contact, MailChimp)

_____ Blogs

_____ Social media platforms (Facebook, Twitter, etc.)

_____ Other

Q13. How many businesses do you follow online on a regular basis? (by liking or visiting their Facebook, Twitter, blog, LinkedIn page, receiving e-newsletters from them or any other online activity).

❍ 0
❍ 1
❍ 2
❍ 3
❍ 4
❍ 5
❍ 6
❍ 7
❍ 8
❍ 9
❍ 10+

Q14. Does your business use the following online marketing platforms? For each platform, select one answer.

	I am currently using it	I had an account but no longer active	I never signed up
Facebook	○	○	○
Twitter	○	○	○
HTML Newsletters	○	○	○
Websites	○	○	○
Blogs	○	○	○

Q15. How frequently do you reach your customers through these online marketing tools. For each tool, select the frequency of use that is the closest to your situation in 2014.

	Once a week or more	Once a month	Once a quarter	4-6 times a year	1-3 times a year	Less than once a year	Never
Websites	○	○	○	○	○	○	○
HTML newsletters (e.g., Constant Contact, MailChimp)	○	○	○	○	○	○	○
Blogs	○	○	○	○	○	○	○
Social media platforms (e.g., Facebook, Twitter)	○	○	○	○	○	○	○

Q16. For about how many years has your business been using social media? (facebook, twitter, linkedIn,etc.)

Q17. How was your business' first social media account open? Select one the following answers.

- ○ The owner, manager or one employee opened the account
- ○ I got free help from friends or family
- ○ We hired a consultant/third party company
- ○ Other _____

Q18. How important is social media (Facebook, Twitter, Pinterest, etc.) for your business in the following areas? For each area, select one level of importance.

	Not at all important	Slightly important	Moderately important	Quite important	Extremely important
To have an active online presence	○	○	○	○	○
To build a positive community with customers	○	○	○	○	○
To learn about marketplace	○	○	○	○	○
To improve sales	○	○	○	○	○
To increase customer traffic into the store	○	○	○	○	○
To educate customers	○	○	○	○	○

Q19. On average, how much time per week do your employees (including yourself) spend on social media marketing? (posting on social media, responding, monitoring, etc.)

○ Less than 1 hour
○ 1 to 2 hours
○ 3 to 4 hours
○ 5 to 9 hours
○ 10 to 19 hours
○ 20 hours and more

Q20. Did you hire a third party firm/consultant to conduct your social media activities in 2014?
○ Yes
○ No

Q21. What was your expense in 2014 for their social media consulting services? Write in an approximate dollar amount.

$

Q22. Could you share specific strategies you are following to make your social media marketing plan more effective?

Q23. How applicable are the following reasons why your business is not using social media marketing at this time?

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
I don't know how to get started.	○	○	○	○	○
I don't have time.	○	○	○	○	○
Technology changes so quickly that I can't keep up with it.	○	○	○	○	○
It is a costly investment.	○	○	○	○	○
I don't think it's important.	○	○	○	○	○
My customers don't think it's important.	○	○	○	○	○
I would prefer face-to-face interactions with my customers	○	○	○	○	○

Returns from social media marketing are uncertain.	○	○	○	○	○
Returns from social media marketing are low.	○	○	○	○	○

Q24. There are workshops and training available for online marketing strategies. If there were one tailored to your specific industry and business needs, how much would you be willing to pay for a:

	$ Amount
a. One time training for you or your employee to carry out social media marketing for your business? Write in a dollar amount.	
b. Monthly membership that includes access to latest research findings on online marketing specific to the green industry? Write in a dollar amount you are willing to pay for monthly subscription fee.	
c. Consulting service that carries out social media marketing on behalf of your business? Write in a dollar amount you are willing to pay for monthly fee for services.	

Q25. Where is your business located?
❍ United States
❍ Canada
❍ Other _____

Q26. What is the zip code of your business?

	U.S. zip code
Main operations	
Branch location 1 (If applicable)	
Branch location 2 (if applicable)	

Q27. What is the zip code of your business?

	Canada zip code
Main operations	
Branch location 1 (If applicable)	
Branch location 2 (if applicable)	

Q28. When was your business established?

Date of establishment [YYYY]

First year under current ownership (if different) [YYYY]

First year under current management (if different) [YYYY]

Q29. How much was the annual gross sales for your business in 2014?

❍ Less than $2,500
❍ $2,500 to $4,999
❍ $5,000 to $9,999
❍ $10,000 to $24,999
❍ $25,000 to $49,999
❍ $50,000 to $99,999
❍ $100,000 to $249,999
❍ $250,000 to $499,999
❍ $500,000 to $999,999
❍ $1 million to $4,999,999
❍ $5 million or greater

Q30. How many employees do you have?

	Peak season (average)	Non-peak season (average)
Full time		
Part time		

Q31. On average, how much time per week do your employees (including yourself) spend on overall marketing (calling or emailing customers, preparing content, advertising, organizing shows, social media, etc.)?

Hours

Minutes

Q32. How many professional networks are you involved in?

	0	1	2	3	4	5+
Membership in professional associations/ societies	○	○	○	○	○	○
Online networks (Facebook or LinkedIn groups, forums)	○	○	○	○	○	○
Other	○	○	○	○	○	○

Q33. How frequently do you use social media for personal purposes? Select the closest frequency of use.

○ At least once a day
○ 2-6 times a week
○ Once a week to 2 times a month
○ Once a month
○ Less than once a month
○ Do not use

Q34. How did you learn to use social media? Select all that apply.

❑ I have never tried to use social media
❑ Trial and error
❑ From a relative or friend
❑ From a professional
❑ I had a formal training
❑ Other _____

Q35. How many people (likes or friends on Facebook, Twitter, LinkedIn, etc.) are you personally following on a regular basis? Please select the total number of people across all platforms.

❍ 0
❍ 1-10
❍ 11-50
❍ 51-100
❍ 101-500
❍ Over 500

Q36. What is your age?

❍ 18 to 24
❍ 25 to 34
❍ 35 to 44
❍ 45 to 54
❍ 55 to 64
❍ 65 to 74
❍ 75 and over

Q37. What is your gender?

❍ Male
❍ Female

Q38. What is the highest level of school you have completed?

- ○ Less than high school graduate
- ○ High school graduate - diploma or GED
- ○ Technical, trade, or vocational school
- ○ Some college (no degree)
- ○ Bachelor's degree
- ○ Master's, doctorate, or professional degree

Q39. Please indicate your preferred future involvement with this project team. If you select any,

you will be asked to provide your email address on the next page.

- ❑ I'd like to enter into the drawing for a $50 Amazon.com gift card
- ❑ I'd like to receive results from this survey
- ❑ I'd like to receive more information about new-media marketing in the future

Q40. Please enter your email address:

Appendix C - Postal card

K-State Nursery and Garden Center
Retail Marketing Study
Complete the survey by
September 30th and get a chance to win a
$50 Amazon gift card.

SURVEY LINK: tinyurl.com/KSUsurveys

"Here's an opportunity for you to get some marketing answers by participating in a research project with investigators at Kansas State University."

Dr. Cheryl Boyer
Nursery and Garden Center Specialist
Kansas State University

KANSAS STATE UNIVERSITY | Center for Rural Enterprise Engagement

ruralengagement.org

Appendix D - Survey distribution networks

 1 National Nursery Extension Specialist listserv
 2 KSRE Hort Newsletter
 3 Kansas Nursery and Landscape Association
 4 Wichita Area Nurserymen's Association
 5 Kansas Greenhouse Growers Association
 6 The Western Nursery and Landscape Association
 7 Hort NetWork (Kansas City) Susan Mertz
 8 Oklahoma Nursery and Landscape Association
 9 Missouri Landscape and Nursery Association
10 High Plains Journal
11 Acres Online (GrowerTalks)
12 PolanzGreenProfit
13 Green Profit
14 Buzz (GreenProfit)
15 American Nurseryman Magazine
16 Nursery Management Magazine
17 Garden Center Magazine
18 Greenhouse Management Magazine
19 Lawn and Landscape Magazine
20 Greenhouse Grower Magazine
21 Today's Garden Center Magazine
22 Lawn and Garden Retailer
23 Sprout (AmericanHort)
24 Southern Nursery Association mail@sna.org
25 International Plant Propagator's Society (Southern Region)
26 International Plant Propagator's Society (Eastern Region)
27 International Plant Propagator's Society (Western Region)
28 Frannie Miller's pesticide safety trainee list
29 Alabama Nursery and Landscape Association James Harwell
30 Alaska none
31 Arizona Nursery Association
32 Arkansas Green Industry Association
33 California Association of Nurseries and Garden Centers
34 Nursery Growers Association of California,
35 Colorado Nursery and Greenhouse Association
36 Associated Landscape Contractors of Colorado
37 Connecticut Nursery & Landscape Association
38 Delaware Nursery and Landscape Association
39 Florida Nursery, Growers and Landscape Association
40 Georgia Green Industry Association
41 Big Island Association of Nurserymen
42 Idaho Nursery & Landscape Association

43	Illinois Green Industry Association
44	Indiana Nursery and Landscape Association
45	Iowa Nursery and Landscape Association
46	Kentucky Nursery and Landscape Association
47	Louisiana Nursery and Landscape Association
48	Maine Landscape and Nursery Association
49	New England Nursery Association
50	Maryland Nursery, Landscape and Greenhouse Association
51	Massachusetts Nursery and Landscape Association
52	Michigan Nursery and Landscape Association
53	West Michigan Nursery and Landscape Association
54	Minnesota Nursery & Landscape Association
55	Mississippi Nursery & Landscape Association
56	Montana Nursery & Landscape Association
57	Nebraska Nursery & Landscape Association
58	Nevada Landscape Association
59	New Hampshire Landscape Association
60	New Jersey Nursery and Landscape Association
61	New Mexico—supported by the Colorado nursery & grnhs assoc
62	New York State Nursery and Landscape Association
63	North Carolina Nursery & Landscape Association
64	North Dakota Nursery and Greenhouse Association
65	Ohio Nursery and Landscape Association
66	Oregon Association of Nurseries
67	Pennsylvania Landscape and Nursery Association
68	Rhode Island Nursery and Landscape Association
69	South Carolina
70	South Dakota Nursery and Landscape Association
71	Tennessee Nursery and Landscape Association
72	Middle Tennessee Nursery Association
73	Texas Nursery & Landscape Association
74	Utah Nursery and Landscape Association
75	GreenWorks: Vermont Nursery & Landscape Association
76	Virginia Nursery and Landscape Association
77	Central Virginia Nursery and Landscape Association
78	Washington State Nursery & Landscape Association
79	West Virginia Nursery and Landscaping Association
80	Wisconsin Nursery and Landscape Association
81	Wisconsin Green Industry Federation,
82	Wyoming Groundskeepers & Growers Association, Inc.
83	Nursery & Landscape Association Executives of North America