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Journal of Applied Communications

The Journal of Applied Communications

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The *Journal of Applied Communications* is a quarterly, refereed journal published by the Association for Communication Excellence in Agriculture, Natural Resources, and Life and Human Sciences (ACE).

The *Journal of Applied Communications* is:

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- Peer-reviewed to ensure accuracy and quality.

- Indexed selectively in AGRICOLA; listed in Ulrich's International Periodicals Directory and ARL's Directory of Scholarly Electronic Journals and Academic Discussion Lists.

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- Acknowledgement of any funding source.

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While every effort is made to maintain an interval of no more than nine months from submission to publication, authors should be aware that publication dates are contingent on the number and scope of reviewer comments as well as response times during the review process.

All submissions are peer-reviewed (blind).

Book Review

Research

Journal of
Applied Communications

The Backchannel

Kelsey Fletcher Shaw

Book Title
The Backchannel

Author
Cliff Atkinson

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Summary

In contrast to the thousands of teachers chastising students for texting or tweeting during class, communicators and presenters across the globe are now considering encouraging audience members to tweet and have discussions during presentations. The Backchannel, written by writer, keynote speaker and consultant Cliff Atkinson, analyzes the rules for navigating the backchannel in a professional environment.

Initially, this book peaked my curiosity because of its unique tagline – "How Audiences are using Twitter and Social Media and Changing Presentations Forever." As an agricultural communicator, I research and examine the use of social media in a marketing or social context, so it seems only logical to connect these tools to an educational or presentation-centered environment. Flipping through the book's pages showcased a spectrum of colors and illustrative graphics, which only furthered my interest to delve into the content.

As suggested by the book's title, the content focuses on best practices for using a "backchannel," which the author defines as "a line of communication created by people in an audience to connect with other outside or inside the room, with or without the knowledge of the speaker at the front of the room" (p. 17). Although Atkinson does recognize that a backchannel can manifest itself in many forms of interpersonal communication, he does primarily focus on forms rooted in some sort of online or electronic forum.

The first two chapters are integrated with a fairly elaborate anecdote from a discussion panel gone sour at the 2009 South by Southwest Interactive Festival in Austin, Texas. The story details accounts of the presentation from a discussion panel member, the discussion facilitator, and an audience member chronicling her thoughts of the discussion on Twitter. Eventually, the audience member becomes critical of the previously mentioned discussion panel member in her tweets, and because that panel member is monitoring the conference hashtag, a confrontation and discussion ensues

regarding the appropriateness of the backchannel in a presentation setting.

Following the conclusion of the narrative, the author pulls back and examines the foundation for facilitating or participating in a backchannel. Though Atkinson primarily addresses Twitter as his tool of choice for communicating in a backchannel, he also discusses some drawbacks to the platform and suggests some alternate programs, including chat rooms, to host discussions before, during, and after a presentation. The author provides a helpful chart on page 36 that provides suggestions for how to choose the best backchannel tool. Also included is basically an instruction guide for how to set up and manage a twitter account, as well as tips for using the platform to monitor backchannel conversations, including third-party applications.

The next two chapters are devoted to examining the positives and negatives that can accompany the use of a backchannel and there are several mental models and graphics provided to help illustrate discussion points. Here, the author overviews many basic techniques and styles currently used by communicators and educators. It is in these two chapters that Atkinson introduces the "Two Feet Rule." Atkinson suggests implementing this rule in conferences to encourage participant engagement. Basically, it states that if an audience member is unsatisfied with a presentation, he or she can use his or her own "two feet" to go join another session. Likewise, someone monitoring conference backchannels may simply choose to join another session audience members are positively reviewing via the backchannel.

The final four chapters of the book are what I would consider the real "meat." Atkinson provides helpful information on how to best prepare for a presentation utilizing the backchannel. Suggestions include making sure you make it easy for audience members to find information related to your presentation on your website and helping to facilitate a backchannel before, during, and after your presentation. As the author of another book on making good presentations, Atkinson does not miss an opportunity to promote his other publication in this book. He integrates material related to his other publication, including tips on how to design and give a presentation, with his suggestions for planning backchannel information.

Worksheets are even provided in the book's appendices to facilitate preparation using Atkinson's "Four Tweet Rule," where the presenter would formulate four tweets ahead of time – a summary tweet as well as three main point tweets from separate sections in the presentation material. The presenter could then integrate the four tweets into his or her presentation to hopefully increase audience understanding and engagement. Additionally, a large portion of the final chapter is devoted to handling instant feedback from audience participants, as well as how to manage potentially unruly participant tweets. Several practice scenarios are provided, without any sort of "answer key," to help readers practice reactions in these improvisational backchannel situations.

As a trained communicator, I experienced mixed reactions to the content in this book. For someone working in an industry unrelated to education or communications, the first half of the book would be instructional, interesting, and informative in nature. However, because I was coming from a perspective having already mastered the basics of Twitter, these sections were elementary and somewhat uninteresting. However, the second half of the book really provided more of the content I was hoping to read. Though it is strange to actually encourage audience members in a conference presentation to pull out their smartphones to hold side conversations, I know it is a reality that presenters, communicators, and even teachers to some degree must be ready to embrace. In this book, Atkinson provides some insightful suggestions for how to best prepare for a presentation while encouraging use of a backchannel. By utilizing his four tweets method, a presenter can help audience members understand and retain presentation information.

The only major issue I had with the book was that two interesting appendix items – "Negotiating a Backchannel Agreement" and "How Open Space Transforms Meetings" are repeatedly referenced as being available at the end of the book. However, when I tried to find these materials, they simply do not exist. After scouring, I finally found that these are considered "bonus content" and can only be found in the web appendix for the book. Though I do see the value in providing bonus content to readers online and driving readers to a book's website, the only place I could find that mentioned these materials were only available online was at the bottom of a four-page table of contents, which as a reader, I typically only skim in favor of diving into the text. For the longest time, I thought my copy of the book was simply missing content. I don't think it is good practice not to include materials that have been explicitly referenced.

Overall, Atkinson's book is a valuable read for anyone who might be presenting or attending any sort of conference presentation. The author works to provide information for both novice and experienced presenters and users. Though most of the concepts presented are illustrated in the setting of some sort of technologically-friendly conference, the principles presented here would be great for any sort of presentation, whether it be to stakeholders, a board of directors, or even students. Teachers open to embracing a backchannel in the classroom could use the suggestions presented to enhance the learning experience. The concepts discussed in this book are only going to become more useful as the social media culture grows and evolves in the future.

An Integrated Approach to Teach Communication Skills Using Educational Technologies

Dr. Shannon Arnold and Suzi Taylor

Abstract

The purpose of this pre-experimental pre-test/post-test design was to identify a group of agricultural education students' knowledge and perceptions towards the use of integrated educational technologies in the classroom.   The population was 17 agricultural education students enrolled in an agricultural communications course over a two-year period. A multimedia content development touch screen resource was integrated into the course as a capstone project. Pretest and posttest evaluations showed 6% to 57% changes in knowledge as a result of the digital capstone project. The most significant changes were seen in storyboarding, multimedia project development, and graphic design principles, indicating that students require additional education in these areas. The lowest percentage changes were seen in the same three competencies each year; revealing that students were most knowledgeable in interviewing, technical writing, and giving public presentations. The findings revealed that students gained the most knowledge in technology development, integration and application, rather than interpersonal skill building. This integrated course provides an example of how educators can design courses that not only increase students' communications knowledge and skills, but also gain realistic experience by creating their own multimedia content for public communication.

Keywords

Introduction, Literature Review, and Conceptual Framework

Technology is changing the face of traditional and online instruction at colleges and universities (Lowerison et al., 2006). George (2000) stated, "Technology can play a vital role in helping students meet higher standards and perform at increased levels by promoting alternative, innovative approaches to teaching and learning" (p. 57). The U.S. Department of Education (2009) reported an increasing amount of evidence related to the beneficial opportunities of using technology to improve education. This meta-analysis study found that mixed instruction of using online and face-to-face elements was more effective on student achievement over face-to-face instruction alone. The report further stated that instructors must look for innovative ways to integrate digital content into courses to increase teaching effectiveness (U.S. Department of Education, 2009).

Allen and Seaman (2008) reported about 67% of colleges and universities now offer online courses and programs to fill student needs. As a result of these changes, more faculty are taking advantage of new techniques and opportunities to incorporate technology into all courses and deliver information in a new way (Ertmer, 2005). The Chronicle of Higher Education (2007) challenged

educators to utilize a variety of teaching and learning resources, especially technology, to reach a new generation of "millennial" students. Educators must engage students in an education that properly prepares them for a future career that will more than likely involve working with online and emerging technologies.

Today, 98.4% of college students now own a personal computer (Salaway, et al., 2007). Research promotes the integration of technology into agricultural college courses. Alston and Warren (2007) specifically stated the importance of using more web-enhanced instruction and technology assignments in agricultural education courses to better prepare future agricultural leaders. Rhoades, Friedel, and Irani (2008) reported that educators must continually be aware of how agricultural students adopt and use new technologies. Jones, Johnson-Yale, Millermaier, and Perez (2009) found that 94% of college students spend considerably more time online, at least one hour each day, than Internet users in the general population. Students in the study reported high rates of online social activity, use of Web 2.0 tools, and view technology as part of college life. Jones and Madden (2002) found that 68% of college students used technologies to gain research information in their academic and professional fields. Kotrlik et al. (2003) found that agricultural education teachers spend the majority of their effort on exploring and adopting the use of teaching technologies, but are not as actively involved in the integration of these technologies into the classroom. Factors of inexperience with technologies, teaching effectiveness, and anxiety tend to be barriers to this integration. However, educators must recognize this widespread use of technologies by students and discover new teaching techniques to engage them in building their professional skills using familiar media. Infusion of these new technologies into agricultural courses will not only assist current students in refining a variety of communication skills, but can also attract potential students looking for educational programs that teach current technologies (Rhoades et al., 2008). Furthermore, multimedia can create high-quality learning environments for enhanced instruction. Research suggests that using technology and multimedia tools to teach science content can enhance student learning outcomes (Roschelle et al., 2000). The key elements of "multiple media, user control over the delivery of information, and interactivity" can be used to improve the integrated learning environment (Cairncross & Mannion, 2001, p. 156).

The Kotrlik-Redmann Technology Integration Model © (Kotrlik & Redmann, 2002) was used as the conceptual framework for the study. This model was developed based on theories and research concerning the integration of technologies into teaching and learning and has four distinct and independent phases of technology integration: "Exploration, Experimentation, Adoption, and Advanced Integration". The Exploration phase involves teachers seeking information about technologies and how to use them; the Experimentation phase focuses on teachers beginning to utilize technologies in classroom instruction; the Adoption phase reveals evident physical changes in the classroom with technology as a focal point of teaching and learning; and the Advanced Integration phase centers on instructors who seek new and unique ways to use technology to enhance teaching and learning beyond traditional activities. Additional research is needed to explore new ways for teachers to integrate technologies into the classroom setting and move through each of these phases. As research suggests (Kotrlik et al., 2002), the more confident and experienced teachers feel about using technologies, the more these technologies will be integrated into new ways of teaching and learning.

A unique multimedia resource, the BTC Studio 1080, was integrated into an agricultural communications course to educate students on how to apply these skills into a digital storytelling and educational context. The goal was not only to engage students in learning a variety of technical skills, but to provide them with the opportunity to use rich media technologies to showcase course

projects. The Studio offered a venue for students to publicize their accomplishments and share ideas through the creation of a touch-screen exhibit. Development of a research-based agricultural education module within the course allowed students to conduct research, design educational content, utilize multimedia software, integrate technologies, and build digital exhibits that were then presented to the public. Use of this integrated teaching approach inspired students to apply agricultural communication skills, including written, oral, digital media, and research, in a new way. The digital exhibits remain in Studio 1080 beyond the completion of the course.

Purpose and Objectives

The purpose of this pre-experimental pre-test/post-test design one group research study was to determine changes in agricultural education students' knowledge of using integrated educational technologies in the classroom. The objectives of this study were: (1) To determine the amount of changes in agricultural education students' knowledge regarding multimedia technologies, and (2) To assess agricultural education students' perceptions of the use and application of multimedia technologies.

Methods

The course in this study offered an overview of communications strategies important in the agricultural industry. Focus was placed on developing basic competencies in the areas of public relations, technical writing, qualitative research, video production, photography, storyboarding, scriptwriting, and graphic design. Various multimedia technology skills were emphasized in different assignments throughout the course and then compiled in the capstone project: a 24-screen interactive multimedia exhibit available to the public in the BTC Studio 1080 multimedia center. In groups, students used the BTC Studio 1080 software to create a research-based touch-screen exhibit that communicates agriculture, helps solve a "real-world" agricultural problem, teaches an agricultural education lesson, highlights agricultural research, or promotes an agricultural education program. The goal for students' final digital exhibits was to effectively communicate agricultural research or education for a public audience. The module was uploaded to the BTC Studio 1080 multimedia center for public viewing. Each group created a 24-screen exhibit using information from course assignments including: an interview with an expert, a video, photographs, and educational content based on primary and secondary research. The module also included the following components: a map, graphics, music/audio clip, an interactive quiz, or a slideshow of pictures.

The Montana State University Institutional Review Board approved the study protocol, deemed it exempt, and all participants provided written informed consent prior to participation in the study. To measure changes in knowledge, the study design utilized a single group pretest/posttest design of non-randomized students enrolled in an upper division, entry-level agricultural communications course over a two-year period. To assess students' perceptions of the application of multimedia technologies, a separate post-evaluation questionnaire was also completed related specifically to the capstone project assignments. Questions included training needs, program difficulties, applications of the system, required technological skills, user challenges, compatible external software and programs, communication strategies, the importance of technology, and future recommendations. All participants completed the instrument. Two separate classes participated in the research study. Groups were assessed for equivalence before the treatment based on the similar characteristics- all participants were upper level agricultural education students (Leedy & Omrod, 2010). The independent

variable was the instructional methods, while the dependent variable was the change in knowledge and perceptions towards using integrated multimedia technologies. The treatment was the capstone project assignment and there was no control group, which is a limitation to the study. It must be noted that caution must be used in drawing conclusions because there was no comparison group and there may be other confounding variables accounting for changes, such as other courses in which students were enrolled. However, the use of single group pretest/posttest designs can be supported if situational factors are taken into account and in this case, all students were exposed to the same coursework and took an identical pretest and posttest during the enrolled semester (Eckert, 2000).

The population was 17 agricultural education students who were enrolled in an upper division, entry-level agricultural communications course over a two-year period (N=17, n=8 in year 1 and n=9 in year 2). The response rate was 100%. Student knowledge and perceptions were determined using a researcher developed content knowledge achievement pretest and posttest instrument based on the following competencies in Table 1. To address construct validity, the instrument was developed from a review of literature regarding integration of technologies into courses and foundational agricultural communication competencies (Akers et al., 2001). The pretest and posttest contained the same 17 questions to measure changes in knowledge; however, nine additional open-ended questions were added to the posttest to obtain student perceptions of the technologies following their use. Content and face validity of the instrument were determined by a panel of four agricultural university faculty (Ary et al., 2002). A pilot test with 10 agricultural education upper division undergraduate students not in the study was conducted and a Cronbach's alpha was calculated on the instrument and revealed a reliability coefficient of 0.72. SPSS 18 software package was used in analyzing the data. Descriptive statistics, including means, standard deviations, and percentages were calculated.

Results/Findings

Objective 1: To determine the amount of change in agricultural education students' knowledge using multimedia technologies

A pretest and posttest evaluation instrument was given to all students regarding course competencies. Knowledge in the following areas were evaluated: agricultural education research, interviewing, news writing, photography, multimedia project development, photo editing, video production, graphic design, technical writing, public presentations, poster development and design, storyboarding, and research methods. Mean scores, standard deviations, percentages changes for each year are presented in Tables 1 and 2. All evaluation scores were based on a Likert five-point scale with 1=No Knowledge, 2=Little Knowledge, 3=Moderate Knowledge, 4=Knowledgeable, 5=Very Knowledgeable.

In year one, students' pretest scores ranged from M=1.50 to M=3.63 in all competency areas. Posttest scores ranged from M=3.50 to M=4.50. Percentage changes from pretest to posttest ranged from 6% to 57%. Highest knowledge increases were in the following areas: storyboarding (+2.0, +57%), graphic design principles (+1.62, +46%), video production (+1.50, +43%), multimedia project development (+1.62, +36%), and poster development and design (+1.50, +36%). Lowest changes in mean scores were in the following areas: public presentations (+0.87, +19%), interviewing skills (+0.62, +15%), and technical writing skills (+.25, +6%) (Table 1). In year two, students' pretest scores ranged from M=2.11 to M=3.67 in all competency areas. Posttest scores ranged from M=3.56 to M=4.22. Percentage changes from pretest to posttest ranged from 8% to 41%. Highest knowledge increases were in the following areas: press release writing (+1.45, +41%), research methods (+1.33,

Research

Table 1
Change in students' competencies from pre to post-test course evaluations: Year 1 (n=8)

Competency	Pre-test M(SD)	Post-test M(SD)	Change (%)
Storyboarding	1.50 (0.76)	3.50 (0.53)	57
Graphic Design	1.88 (0.84)	3.50 (0.93)	46
Video Production	2.00 (1.31)	3.50 (0.53)	43
Multimedia Project Development	2.88 (1.25)	4.50 (0.53)	36
Poster Development and Design	2.63 (1.06)	4.13 (0.64)	36
Feature Story Writing	2.88 (1.00)	4.25 (0.71)	32
Research Methods	2.63 (1.06)	3.63 (0.92)	31
Press Release Writing	2.75 (1.04)	4.00 (0.76)	31
Photography	3.13 (0.84)	4.25 (0.89)	26
Photo Editing	3.00 (1.07)	4.25 (0.46)	29
Awareness of Ag Ed Research	3.13 (0.83)	4.25 (0.71)	26
Public Presentations	3.63 (0.92)	4.50 (0.53)	19
Interviewing Skills	3.38 (0.52)	4.00 (0.53)	15
Technical Writing	3.63 (0.74)	3.88 (0.83)	6

Note: Likert Scale 1=No Knowledge, 2=Little Knowledge, 3=Moderate Knowledge, 4=Knowledgeable, 5=Very Knowledgeable

+39%), storyboarding (+1.34, +38%), graphic design principles (+1.45, +38%), and multimedia project development (+1.44, +34%). Lowest changes in mean scores were in public presentations (+1.10, +24%), interviewing skills (+1.0, +25%), and technical writing (+.48, +12%) (Table 2).

Objective 2: To assess agricultural education students' perceptions of the use and application of multimedia technologies

Table 2
Change in students' competencies from pre to post-test course evaluations: Year 2 (n=9)

Competency	Pre-test M(SD)	Post-test M(SD)	Change (%)
Press Release Writing	2.11 (1.36)	3.56 (1.41)	41
Research Methods	2.11 (0.78)	3.44 (1.01)	39
Storyboarding	2.22 (1.30)	3.56 (1.01)	38
Graphic Design	2.33 (1.41)	3.78 (0.97)	38
Multimedia Project Development	2.78 (1.10)	4.22 (1.09)	34
Feature Story Writing	2.33 (0.87)	3.44 (1.41)	32
Photography	2.89 (1.05)	4.22 (0.67)	32
Video Production	2.89 (1.17)	3.78 (0.97)	24
Poster Development and Design	2.56 (1.13)	3.67 (0.87)	30
Photo Editing	3.22 (0.97)	3.67 (0.87)	12
Technical Writing	2.78 (0.67)	3.56 (0.88)	22
Interviewing Skills	3.11 (0.60)	3.78 (1.89)	18
Awareness of Ag Ed Research	3.00 (0.60)	3.56 (1.71)	16
Public Presentations	3.67 (1.12)	4.00 (1.00)	8

The posttest contained nine additional open-ended questions specifically related to the use and application of multimedia technologies for the capstone project. Questions included training needs, program difficulties, applications of the system, required technological skills, user challenges, compatible external software and programs, communication strategies, the importance of technology, and future recommendations. Difficulties encountered were sizing photos, software restrictions, file format conversions, applying graphic design principles, multimedia software problems, convergence of media, uploading media and materials to the program database, and limitation of web templates. Students learned to work with unfamiliar software programs such as Photoshop, iMovie, iPhoto, Google Picassa, PowerPoint, a Scrapbook program, Microsoft Paint, Microsoft Works, Windows Movie Maker, and Audacity to develop competencies. Specific skills learned included photo editing, interviewing, video production, audio recording, design principles, graphics creation, summarizing and organizing information, storyboarding, file conversions, and creative ways to communicate information. The following quotes in the post-evaluation revealed the perceptions of students about the importance of multimedia technologies in agriculture.

- "In an ever growing age of technology, it is important to stay current with new technology programs,"
- "To make us more well-rounded professionals and help us communicate agriculture to the general public in various ways,"
- "This is the direction that technology is taking and it is important for us to be prepared to use it,"
- "There is a lot of agricultural information to showcase and this a good way to reach larger audiences,"
- "It is the future,"
- "We always say we want to communicate agriculture better and we have to be technology savvy to accomplish this. It enables us to reach more people and bigger audiences,"
- "Because as agriculture becomes more technologically advanced, this is a good way to understand and learn about those advancements."

Throughout the digital exhibit development process, students reported that they learned how to use the technology tools and about the process of organizing content in a non-linear (user-driven) setting. Students presented their work on the touch-screens in a professional and well-organized manner, and their exhibits remain on permanent display for the public. As a result of integrating assignments with a capstone project, students increased communications knowledge, while also gaining realistic experience through the application of skills to a specific multimedia program.

Conclusions, Implications, and Recommendations

It is thought that many of today's students are familiar with using modern online multimedia tools for personal use. However, not all students in agricultural education have the opportunity to experiment with professional quality multimedia development software that directly incorporates these tools into coursework. Course assignments were designed to teach the students not only about technologies, but allowed them to develop their own touch-screen educational module through integration of these technologies. As a result of this course, students learned to improve technical skills and how to integrate technologies that can be used to showcase communications work.

Many college students embrace the value of multimedia and user-generated content (Cotton &

Jelenewicz, 2006), but the visual appeal and public access of Studio 1080 has escalated interest in using new educational technologies within the classroom. This course has initiated inter-disciplinary projects and sparked discussions of the significant role of technology in higher education classrooms. The type of assignment not only gives students the opportunity to contribute their own work in a high-tech creative environment, but also enables educators to include key elements of an integrated learning environment into courses (Cairncross & Mannion, 2001). Although many college students are accustomed to sharing their work through websites like YouTube and Flickr, the studio allows them to combine video, text, images and animations into richer non-linear presentations, much like those found in a museum or science center.

As reported in the posttest open-ended questions, students understand the value of learning new technologies and want to be prepared for future careers. These findings specifically reflect Alston and Warren's (2007) research of the importance of using more web-enhanced instruction and technology assignments to better prepare future agricultural leaders. Using an integrated approach to teach specific skills and then having students apply these can enhance learning outcomes as seen in the positive changes in knowledge. The most significant changes in mean knowledge scores during both years were seen in storyboarding, multimedia project development, and graphic design principles, which indicates that students need more education in these communication competencies. Many topics could teach use of storyboarding as a graphic organizer for planning purposes, including campaign development, educational proposals, web development, and instructional design. Graphic design principles and theories may also be taught to complement development of many e-learning tools, such as blogs, podcasts, and video recording software, some of the most widely used e-tools as reported by Thomas, Davis, and Moss (2008). The lowest percentage changes in mean knowledge scores were seen in the same three competencies each year revealing that students were most knowledgeable in interviewing, technical writing, and giving public presentations. Specifically, these results provide evidence that agricultural education students perceive that they are being effectively prepared with knowledge, skills, and attitudes important in multimedia development. Findings also revealed that more focus should be placed on technology development, integration and application in this course, rather than interpersonal skill building. Instructors should continually survey students in order to determine the emphasis of teaching material, assignments, and student needs.

Integrated course assignments should be made so students can use new technologies and software programs, as well as experiment with innovative multimedia development systems. Students not only learned to produce educational research-based content, but to do it in a way that encouraged critical and creative thinking due to the non-linear program structure. Students learned to incorporate various media into a non-linear module that communicated agricultural information to the public in an enticing way. This project also allowed students to capitalize on their strengths and interests in using multimedia tools within an exciting learning atmosphere.

The students' work has become part of a permanent digital exhibit available to the general public, thus contributing to the university's outreach mission. Because the students' exhibits are permanently located in a public multimedia center, their work has more reach than a traditional capstone course project. The projects have been viewed by visiting high school students during the State FFA Convention and 4-H Congress; by Chamber of Commerce groups and international delegations; and by faculty as an example of how they, too, can incorporate technology into the classroom. Studio 1080 and its student-produced digital content has become an integral component of the orientation program and campus tours for prospective students. In this regard, the students' work goes beyond their classroom learning and helps to fulfill a community outreach mission.

This study revealed one way that educational technologies can be integrated into courses, but supports the continual need for research on the adoption and use of new technologies in the classroom (Rhoades et al., 2008). Although this technology studio is available to all instructors on the campus, the agricultural communications course is one of only three courses currently using the resource. As Kotrlik et al. (2002) stated, one possible reason for this is due to the lack of confidence and experience that teachers have with integrating technologies into teaching. To improve this confidence, teachers must move through the four phases of the Kotrlik-Redmann Technology Integration Model. They must first seek to learn about technologies, utilize them, adopt them in teaching, and continually pursue new educational technologies such as Studio 1080. Therefore, more emphasis on professional development of faculty on the use of educational technologies can help them to move through these stages © (Kotrlik & Redmann, 2002) more effectively.

Although the small sample size was a limitation to the study and that many campuses do not have access to a multimedia development software package and high-tech facility such as Studio 1080, the idea of integrating new educational technologies into comprehensive course projects can significantly enhance student learning as seen in this study and reported by Roschelle et al. (2000). While students had the advantage of using a state-of-the-art museum-style software package and presentation facility, the skills learned and applied—multimedia development and non-linear presentation — can translate to any learning environment. Multimedia skills can be practiced in any classroom where students have access to still and/or video cameras and editing software, much of which is free online, and most agricultural communications programs are likely offering some level of this training. Non-linear presentation complements multimedia and is another skill set that will be valuable to students, particularly as mass communication becomes increasingly dependent on the Web and other digital platforms. The most common example of a linear presentation is a Powerpoint slide show presented by its creator and delivered, with little deviation, from start to finish. A "non-linear presentation," conversely, allows a user—rather than the creator— to direct his or her individual experience. A Web site with hyperlinks is a great example, as are touch-screen kiosks, museum exhibits and many mobile phone applications. The communicator creates the platform but has less control over how the story is experienced; thus, the communicator must practice a different skill set, which includes storyboarding and site organization.

Non-linear presentations eliminate the inverted pyramid structure from journalism or the introduction-body-conclusion story flow; the user is now in control. A user might experience a story by starting at its end, skip pieces of information, or follow a trail to a new story. Giving the user such freedom can be a challenge for the developer, and students working in this environment learned to consider work as discrete "chunks" of information rather than a path to be followed from start to finish. The skill of non-linear presentation development has application in everything from exhibit development to Web design. Even "traditional" media are now often experienced in an online format, where hyperlinks can take a reader to another story, sidebar or media asset in the blink of an eye. Although most institutions do not have access to a Studio 1080-style software package and presentation facility, students can still learn and practice both multimedia development and non-linear presentation in several ways. They can create basic Web sites with internal and external links (with particular emphasis on site organization and user experience); they can go beyond the traditional Powerpoint slide show and use the tool's hyperlinks feature; and they can access an array of free software tools such as Prezi, a highly visual Web-based application that allows viewers to zoom in on a topic in any order; Glogster, which allows users to create interactive graphic posters; SpeakFlow, another non-linear presentation suite of tools; or Wix, a Flash-driven Web site tool similar to the

Studio 1080 MMaPS software. Even on-line photo books now allow the creator to share a digital version with others, who can then create their own experience as they view it.

Educators must utilize modern technological applications and innovative teaching techniques that allow for the application of skills. There are many software programs that can assist with the integration of educational technologies which can significantly improve learning as evidenced in this study. Teaching students using the media with which they are already comfortable will improve gains in learning and stimulate interest in the subject matter. There is an increasing student demand for teachers to utilize these new technologies; therefore, educators must respond to this call and seek original ways of teaching the material and incorporating student-produced multimedia into courses.

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Research

Internal Communication and Morale in a Natural Resources Public Organization

Quisto Settle, Ricky Telg, Hannah Carter, and Tracy Irani

Abstract

This research examined perceptions of employees of a natural resources public organization. The employees had positive perceptions of the organization and the importance of internal communications, but evaluations were not high for morale, awareness of issues in the organization, and internal communications effectiveness and consistency. There were positive correlations between the constructs related to internal communications and the constructs related to morale. It was recommended that an organizational structure that fosters positive internal communications be promoted. It was also recommended that promoting informal relationships between organizational units to improve communications. For research, it was recommended that the link between internal communications and organizational climate continue to be studied to unravel the relationship between the constructs. Interventions to improve internal communications of intact groups and organizations should occur. Research should also address how being a public organization affects the ability to foster positive internal communications and organizational climate.

Keywords

Internal communication, morale, public organizations, employees

Introduction & Literature Review
Effects of Internal Communications in Organizations

Internal communications are important to organizations. Schein (2010) considered a "commitment to full and open task-relevant communication" (p. 369) a central component of learning organizations. Organization members have to be able to communicate with each other effectively in order for the organization to operate effectively and efficiently (Bolman & Deal, 2008; Schein, 2010).

This ability to communicate and share information is considered a key component of organizational success (Clifton et al., 2004; Smith, 2008). Kraut, Fish, Root, and Chalfonte (1990) stated that informal communications are necessary for coordination in organizations. Members of an organization need to use a common language in order to communicate effectively and reduce uncertainty and anxiety within the organization, which helps the organization work toward its goals (Schein, 2010).

In the case of internal communications, it is perception of communication effectiveness that matters. Taylor (1984) suggested that employee perceptions of internal communications were more important than objective measures of communication quality. If there is not an environment of open communications, individuals might resist sharing critical information, adversely affecting the organization (Bolman & Deal, 2008).

Along with these broader impacts on the organization, internal communications can be particu-

larly important for the effective leadership of organizations. Pichault (1993; as cited in Bolman & Deal, 2008) stated understanding of an organization's internal communication structure is necessary to understand the internal politics of the organization. Bolman and Deal (2008) consider it necessary for leaders to be effective politically within organizations.

Another aspect of internal communications that is important to organizational leaders is the effects of what they are communicating to other employees. Leaders' own actions within an organization communicate their expectations for employees (Moore, 1995). Communication behaviors are a significant component of how leaders embed and transmit organizational culture (Schein, 2010). Internal communications also offer an avenue for organizations' leaders to "communicate their strong belief in people" (Bolman & Deal, 2008, p. 362) to improve morale.

Affecting Internal Communications of Organizations

Internal communications are, of course, not static within organizations. Boyle and Kochinda (2004) found that an intervention targeted toward collaborative communication was able to improve the communication skills of leaders, with the leaders also reporting that their leadership skills improved at the same time. The intervention lasted 23.5 hours, spread out over an 8-month time period in 2- to 4-hour sessions.

Wood (1999) made suggestions to improve internal communications of organizations: ensure that communications are two-way, use face-to-face communication when practical, address the clarity of communications, "understand how your employees listen" (p. 148), and create a climate of trust so information can be shared freely.

Beyond recommendations for specific actions, such as those made by Wood (1999), organizational structure can affect internal communications (McPhee, 1985). It is important to understand the effects of organizational structure on internal communications because the advent of written communications has allowed the effects of structure to last longer and reach further (McPhee, 1985). How focused organizations are on structure versus achievement can affect the impact of internal communications. Garnett, Marlowe, and Pandey (2008) found that increasing communications in organizations focused on achievement increased performance. On the other hand, increasing communications in organizations focused on structure did not improve performance.

The structure that is in place can improve or hurt communications through the implicit and explicit limitations made on what individuals do and how they interact with each other (McPhee, 1985). Tourish and Robson (2006) stated that formal and informal mechanisms were in place to limit critical upward communications (CUC) within organizations. Leadership in organizations create reasons why CUC is not occurring, such as justification that things are going well or deferring blame to non-leaders (Tourish & Robson, 2006). Non-leaders, in turn, justify not providing CUC by stating leaders do not really want the feedback and not want to be punished for CUC (Tourish & Robson, 2006). Non-leaders may also not engage in CUC because they want to please leaders (McPhee, 1985). Tourish and Robson recommended increasing informal communications between members of different levels of the organization to improve CUC.

This recommendation to increase informal communications within organizations is supported by other research. Krackhardt and Stern (1988) stated friendships, a type of informal communication, do not naturally occur between organizational units, but these between-unit friendships can have a positive benefit in the event of organizational crises. For organizations that depend on different units to work together, friendships that cross between the units benefit the organization. Similarly, Hinds

and Mortenson (2005) found that spontaneous communications, another type of informal and unplanned communication between organizational members, mediated the conflicts caused because of geographically distributed units an organization. Spontaneous communications reduced conflict because it improved shared identity and shared context of organizational members in the different units. If the organization's members have a shared identity, the organization can be more confident in its actions (de Chernatony, 2001).

Creating shared vision and identity are important components of transformational leadership (Bass, 1990). Bass reported that the outcomes of transformational leadership lead to higher outcomes from the leaders themselves and the employees they oversee. An important consideration in the development of transformational leaders is that the employees will emulate leaders: if the leader exhibits transformational qualities, the employees will be more likely to exhibit transformational qualities, leading to more transformational leadership within the organization (Bass, 1990).

Along with these examples of the benefits of informal communications between different organizational units, there is work showing that organizational members perceive benefits of informal communications. Johnson, Donohue, Atkin, and Johnson (1994) reported differences between employee perceptions of formal and informal communications. Compared to formal communication, informal communications were reported as more salient and more useful, but formal communications were evaluated more highly in terms of comprehension and credibility. Organizational members are adopting technology to reduce communication formality. Cameron and Webster (2005) found that instant messaging was being adopted because organizational members viewed other communication channels, such as the telephone, as too formal. Instant messaging was also viewed as more private when compared to conversations that could be heard by others nearby.

Internal Communications & Morale

Morale affects organizational success. Parker et al. (2003) showed that overall work climate, which morale is a component of (Churchill, Ford, & Walker, 1976), is related to individual attitudes and performance. The importance of employee morale is also evident in the fact that employees are often the face of organizations because they are the ones interacting with members of the public (Franzen & Moriarty, 2009). The public can perceive when employees are not satisfied (Schneider & Bowen, 1985). The organization benefits from satisfied employees through the positive interactions the employees have with members of the public (Franzen & Moriarty, 2009).

Organizational climate and internal communications are related. Hinds and Mortenson's (2005) work showing that spontaneous communication mediated conflict through increasing shared identity and context is an example of this. Carrière and Bourque (2009) showed the communication satisfaction mediated the relationship between communication practices and organizational satisfaction. Similarly, Gould-Williams (2007) showed negative communication exchanges increased stress, reduced motivation, and increased employee attrition, whereas positive exchanges were linked to improved attitudes and improved the likelihood that employees were engaged in work-related activities that benefited the organization without providing immediate benefits to the employees.

Quality of information being shared has been shown to be a predictor for an employee's trust in coworkers and leaders (Thomas, Zolin, & Hartman, 2009). The researchers stated that the relationship between trust and communications was complex because trust is necessary for open communications to be possible, and if employees do not perceive open communications within the organization, it could hurt their trust in the organization. This effect of the organizational environment on internal

communications is evident in work by Smith (2008), who showed that defensive environments hindered internal communications, while supportive environments improved internal communications.

Public Organizations

Public organizations are funded by the public and mandated through government and political processes (Moore, 1995). Public organizations are legitimized by providing public value, which occurs when the public is satisfied with the product or service provided by the organization (Hoggett, 2006; Moore, 1995). Because of accountability through the political process, public organizations need to be successful in creating public value to ensure they continue to be supported (Butler & Collins, 1995).

Public organizations can face more difficulties than private organizations because public organizations are generally considered more complicated. Because public organizations depend on political support, the first of these complications is that public organizations must have approval from everyone, not only those who are immediately served by the organization (Hoggett, 2006; Moore, 1995). Second, public organizations often have multiple roles and identities (Hoggett, 2006; Wæraas, 2008). Public organizations risk the losing credibility if they do not represent the multiplicity of their roles (Wæraas, 2010). Given that organizations are more effective when members have a shared identity (de Chernatony, 2001; Hinds & Mortenson, 2005; Schein, 2010), having multiple roles could hinder public organizations' ability to create this shared identity.

Purpose & Hypotheses

Internal communications are important for organizational success because they help organizations operate more effectively and efficiently, help organizations avoid and deal with difficulties, and are a central component of how expectations and organizational culture are shared (Bolman & Deal, 2008; Clifton et al., 2004; Schein, 2010). Internal communications, though, can vary between organizations based on the structure of the organization and organizational climate (Krackhardt & Stern, 1988; McPhee, 1985; Tourish & Robson, 2006). It is important to understand how perceptions of communication interact with perceptions of the organization and morale within the organization. This study seeks to help understand the implications of internal communications in the broader environment of the organization.

The organization in this study was a state public organization with geographically distributed units. The purpose of this study was to address employee perceptions of the organization, internal communications, awareness of issues within the organization, and employee morale. Based on the literature, four hypotheses were tested:

*   H1: A positive relationship exists between perceptions of internal communications and perceptions of the organization.
*   H2: A positive relationship exists between perceptions of internal communications and perceptions of morale.
*   H3: A positive relationship exists between perceptions of awareness of issues within the organization and perceptions of the organization.
*   H4: A positive relationship exists between perceptions of awareness of issues within the organization and perceptions of morale.

Methods

Survey methodology was used for this study. The target population for the study was all full-time employees of the organization (N = 1175). The director of the organization sent the employees an e-mail soliciting their participation in the study. A reminder e-mail was also sent. The final sample size was 593 (50.4%), which does not include incomplete responses. Because the e-mails soliciting participation were sent from the director of the organization, it was not possible to ensure contacts completely adhered to the recommendations of Dillman, Smyth, and Christian (2009) to send successive e-mail waves until the number of new responses was no longer great enough to warrant further contacts.

To address the potential for non-response error, early respondents were compared to late respondents (Lindner, Murphy, & Briers, 2001). Early respondents were operationally defined as participants who completed the questionnaire before the reminder e-mail was sent, and late respondents were participants who completed the questionnaire after the reminder e-mail was sent. There was not a statistically significant difference between responses of early and late respondents, indicating the results can be generalized beyond the sample to the entire sampling frame, which included all full-time employees of the organization.

A researcher-developed questionnaire was used to address the purpose and hypotheses of this study. The questionnaire addressed employee perceptions of the organization, employee morale within the organization, the internal communications of the organization, and awareness of issues within the organization. Five-point scales were used for all four sections. The instrument was evaluated by researchers familiar with survey methodology and individuals within the organization for face and content validity. Reliability was assessed post hoc using Cronbach's alpha. Reliability scores were as follows: employee perceptions of the organization was .90, perceptions of morale was .83, perceptions of internal communications was .68, and perceptions of awareness of issues within the organization was .77. A .80 reliability score is more ideal (Norcini, 1999), but .70 is considered acceptable (Kline, 1998).

Grand means were calculated for each construct. Pearson product-moment correlations were used to analyze the relationships between constructs. These correlations were used to test the hypotheses with statistical significance set at .05, a priori. Davis's (1971) conventions were used to describe the correlations (as cited in Miller, 1998): negligible was .01-.09, low was .10-.29, moderate was .30-.49, substantial was .50-.69, .70-.99 was very high, and 1.0 was perfect.

Findings

The employees had favorable perceptions of the organization (Table 1). In particular, the employees believed the organization was important (M = 4.56) and beneficial (M = 4.51). Though still favorable, the employees' evaluation of the organization was lower in regards to the organization being ethical (M = 3.97), positive (M = 4.09), and good (M = 4.19). The employees' self-reported morale was relatively neutral (M = 2.89), but their perceptions of overall morale in the organization were slightly low (M = 2.21; Table 2). The employees perceived that internal communications were important for the organization (M = 4.78), but they had neutral evaluations of the effectiveness (M = 3.30) and consistency (M = 3.33) of the organization's internal communications (Table 3). The employees believed they were aware of issues within their own organizational units (M = 3.58) and that their supervisors were aware of state-level organizational issues (M = 3.70), but they did not believe they were aware of issues outside of their organizational units (M = 2.61) or that state-level employees were aware of issues within the organizational units (M = 2.56; Table 4).

Table 1
Employee perceptions of the organization.

	Scale					
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	M
Bad-Good[a]	3.0	4.7	12.7	30.0	49.7	4.19
Unethical-Ethical[b]	4.2	6.9	18.2	29.1	41.6	3.97
Unimportant-Important[c]	1.2	1.9	6.6	19.7	70.5	4.56
Not Beneficial-Beneficial[d]	1.1	2.5	8.1	20.9	67.5	4.51
Negative-Positive[e]	3.1	5.6	16.7	28.6	46.0	4.09
Grand Mean						4.26

Note. Due to rounding, totals may be slightly above or below 100%.
[a]Scale ranged from 1 = Bad to 5 = Good.
[b]Scale ranged from 1 = Unethical to 5 = Ethical.
[c]Scale ranged from 1 = Unimportant to 5 = Important.
[d]Scale ranged from 1 = Not Beneficial to 5 = Beneficial.
[e]Scale ranged from 1= Negative to 5 = Positive.

Table 2
Self-reported employee morale and perceptions of overall morale.

	Scale					
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	M
Your morale	22.0	20.0	20.3	21.9	15.8	2.89
Overall morale	32.4	32.6	18.8	13.9	2.2	2.21
Grand Mean						2.55

Note. Morale coded as 1 = Low, 2 = Slightly Low, 3 = Neutral, 4 = Slightly High, 5 = High.
Due to rounding, totals may be slightly above or below 100%.

Table 3
Employee perceptions of the organization's internal communications.

	Scale					
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	M
Effectiveness[a]	13.1	17.9	12.2	39.1	17.7	3.30
Consistency[b]	11.1	18.6	15.7	35.5	19.1	3.33
Importance[c]	0.7	1.5	2.6	9.5	85.7	4.78
Grand Mean						3.80

Note. Due to rounding, totals may be slightly above or below 100%.
[a]Coded as 1 = Ineffective, 2 = Slightly Ineffective, 3 = Neither Ineffective nor Effective, 4 = Slightly Effective, and 5 = Effective.
[b]Coded as 1 = Inconsistent, 2 = Slightly Inconsistent, 3 = Neither Inconsistent nor Consistent, 4 = Slightly Consistent, and 5 = Consistent.
[c]Coded as 1 = Unimportant, 2 = Slightly Unimportant, 3 = Neither Unimportant nor Important, 4 = Slightly Important, and 5 = Important.

Table 4
Employee perceptions of awareness of issues within the organization.

	Scale					
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	*M*
How aware are you of organization issues in your unit?	8.7	17.3	9.5	35.9	28.6	3.58
How aware are you of organization issues outside your unit?	27.1	22.7	18.9	25.2	6.1	2.61
How aware do you believe your supervisor is of state-level organization issues?	8.5	13.7	12.5	30.1	35.2	3.70
How aware do you believe state-level employees are of unit issues?	29.4	26.0	13.1	21.6	9.9	2.56
Grand Mean						3.11

Note. Awareness coded as 1 = Unaware, 2 = Slightly Unaware, 3 = Neutral, 4 = Slightly Aware, and 5 = Aware. Due to rounding, totals may be slightly above or below 100%.

Table 5 shows the correlations between the perceptions of internal communications and perceptions of the organization and morale, and between perceptions of awareness of issues within the organization and perceptions of the organization and morale. There were substantial correlations between perceptions of internal communications and perceptions of the organization (r = .55) and between perceptions of awareness of issues within the organization and perceptions of morale (r = .51). There were moderate correlations between perceptions of internal communications and perceptions of morale (r = .48) and perceptions of awareness of issues within the organization and perceptions of the organization (r = .48). All of the correlations were statistically significant, therefore all null hypotheses were rejected. This indicates there are positive relationships between perceptions of internal communications and perceptions of the organization and morale, and it indicates there are positive relationships between perceptions of awareness within the organization and perceptions of the organization and morale.

Table 5
The relationship between perceptions of internal communications and morale and overall organizational perceptions.

	Perceptions of the Organization	Perceptions of Morale
Perceptions of Internal Communications	.55*	.48*
Perceptions of Awareness of Issues	.48*	.51*

Note. Correlations are based on the grand means calculated in Tables 1, 2, 3, and 4.
*p < .05

Conclusions

The employees had positive perceptions of the organization, particularly for the organization being important and beneficial. Despite these positive perceptions of the organization, the participants had slightly below neutral levels of self-reported morale. Of particular interest was the difference between the employees' perceptions of their own morale and their perceptions of overall morale. The employees perceived overall morale to be lower than it actually was when looking at self-reported

morale. This lack of positive morale could be hurting the organization's ability to be successful (Parker et al., 2003). In particular, the lack of positive morale could spill over into employees' interactions with members of the public, harming the organization through poor interactions (Franzen & Moriarty, 2009; Schneider & Bowen, 1985).

The employees believed internal communications were important, but they did not view the current internal communications of the organization as effective or consistent. These poor evaluations of internal communication could be detrimental to the organization because perceptions of internal communication could be more important than objective evaluations of internal communication (Taylor, 1984). Given internal communication's importance to organizational success, the lack of positive perceptions could be hurting the organization and its effectiveness (Bolman & Deal, 2008; Clifton et al., 2004; Kraut et al., 1990; Schein, 2010).

Awareness of organizational issues also led to discrepancies. While the employees believed they were aware of issues within their organizational units, they did not believe they were aware of issues outside of their organizational unit. They also did not believe that state-level employees were aware of unit-level issues, but they did believe that their supervisors were aware of state-level issues. This lack of between-unit awareness of issues could be caused by a lack of informal communications between units. If this is the case, it could harm the organization, given the positive benefits between-unit informal communications have on mitigating problems of shared identity and context for geographically distributed organizations, as well as aiding during organizational crises (Hinds & Mortenson, 2005; Krackhardt & Stern, 1988).

The results of the study also indicated there were positive relationships between perceptions of internal communications and perceptions of the organization and morale, as well as positive relationships between perceptions of awareness of issues and perceptions of the organization and morale. These results are in line with past research linking internal communications to overall organizational climate and leadership skills (Bass, 1990; Boyle & Kochinda, 2004; Carriére & Bourque, 2009; Hinds & Mortenson, 2005; Ricketts & Rudd, 2002; Smith, 2008; Thomas et al., 2009).

There are limitations to the study. The first is the correlational nature of the study. While the correlations indicate there is a relationship between the constructs, the direction of the relationships cannot be determined in this study. The second limitation is that this study looked at employees of one state public organization. Because of this results may not be applicable to other organizations.

Recommendations

An environment promoting quality internal communications should be promoted. Internal communications are an important component of organizational success, and the results of this study and prior research indicate that internal communications are linked to organizational climate, which is also an important component of organizational success, and leadership skills (Boyle & Kochinda, 2004; Bolman & Deal, 2008; Clifton et al., 2004; Kraut et al., 1990; Ricketts & Rudd, 2002; Schein, 2010; Smith, 2008).

As for specific actions for organizations to take, Wood's (1999) recommendations would be a good starting point: ensuring two-way communication, use face-to-face communications when feasible, address clarity of communications, "understand how your employees listen" (p. 148), and create a climate of trust so information can be shared freely. More broadly, the following should be assessed: organizational structure, organizational climate, and informal communications. The example set by Boyle and Kochinda (2004) of utilizing an intervention to improve the leadership skills of organiza-

tional leaders could be advantageous for organizations to implement to help improve internal communications and morale in organizations.

Organizational structure affects internal communications by impacting how employees interact with each other, and organizational structure can have lasting effects due to the ability of current communication means to be stored (McPhee, 1985). In particular, organizational structure has the possibility to explicitly or implicitly limit the ability of employees to share critical information with organizational leaders (McPhee, 1985; Tourish & Robson, 2006). For public organizations, it is important to remember the results of Garnett et al. (2008) that showed increasing internal communications could be positive or detrimental depending on whether or not the organization focused on achievement or maintaining structure. Though internal communications were considered important, they were not positively evaluated by employees in the current study. Increasing internal communications may be a solution, but it might not be if the organization is more focused on maintaining structure than it is on achievement. Considering the importance of open communications for organizational success (Bolman & Deal, 2008; Schein, 2010), a structure that fosters task-relevant communications should be promoted.

This study specifically addressed morale, but morale is a component of organizational climate (Churchill et al., 1976). Awareness should be present for the organizational climate's effects on organizational success (Hinds & Mortenson, 2005; Parker et al., 2003). Awareness should also be present for the effects organizational climate and internal communications have on each other (Carriére & Bourque, 2009; Gould-Williams, 2007; Hinds & Mortenson, 2005; Smith, 2008; Thomas et al., 2009). More specifically, it is necessary to be mindful that there could be a reciprocal relationship between internal communications and organizational climate. While positive internal communications could aid organizational climate (Gould-Williams, 2007; Thomas et al., 2009), a poor organizational climate can limit open internal communications (Smith, 2008). For organizations that have employees who interact directly with the public, organizational climate becomes especially important. If the employees are not satisfied, employees' dissatisfaction could spill over to interactions with the public, adversely affecting the organization (Franzen & Moriarty, 2009; Schneider, 1985)

Informal communications is another area that should be considered to aid organizations. For the current organization, it is geographically distributed, which can hurt in developing shared identity and context for employees (Hinds & Mortenson, 2005). Increasing informal communications could mitigate the detrimental effects of being a geographically distributed organization (Hinds & Mortenson, 2005). An issue indicated by this study was a lack of awareness of issues between organizational units. If the success of the organization is dependent on between-unit cooperation, increases in the informal communications between units could be advantageous (Krackhardt & Stern, 1988).

For researchers, the links between internal communications and organizational climate should continue to be studied. While it is clear that internal communications and organizational climate are related, that relationship is complex (Carriére & Borque, 2009; Gould-Williams, 2007; Hinds & Mortenson, 2005; Smith, 2008; Thomas et al., 2009). It is also clear that both constructs are related to organizational success (Bolman & Deal, 2008; Clifton et al., 2004; Kraut et al., 1990; Parker et al., 2003; Schein, 2010). Given the complexity of the relationship between the two constructs and the importance of the constructs to organizational success, research should continue to be conducted to unravel how the constructs can be improved within organizations. With the ability of leaders to affect organizations through internal communications, research should address how organizational leaders can foster both positive internal communications and organizational climate (Bolman & Deal, 2008; Moore, 1995; Schein, 2010).

A specific line of research that should be pursued relates to the positive outcomes in the Boyle and Kochinda (2004) study. Research should be conducted in other organizational contexts to better understand and improve internal communications of intact groups and organizations considering the implications an intervention could have on organizational success and the improvement of leaders' skills.

Research should also continue in this area to address implications for public organizations, given that public organizations can be considered more complex than private organizations (Hoggett, 2006; Moore, 1995; Wæraas, 2008). The complication from the multiplicity of roles could be hurting the ability to foster shared identities among employees in public organizations (de Chernatony, 2001; Hinds & Mortenson, 2005; Schein, 2010). Another added complexity is that public organizations are often geographically distributed, which can lead to more conflicts than organizations with members in the same location (Hinds & Mortenson, 2005). It needs to be understood how these complexities affect the ability to foster positive internal communications and organizational climates in public organizations.

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Research

An Exploration of Consumer Perceptions of Plants and Plant Characteristics: A Qualitative Study of Florida Plant and Garden Consumers

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Abstract

When planning and developing a state-specific agricultural product brand and marketing campaign, it is important to consider potential consumers' perceptions of terminology, messages, and attitudes toward the product. This qualitative study explores Florida consumer perceptions of green industry terminology, such as "plant," "garden," "landscape," and "home landscape" as well as plant characteristics important to consumer purchase. Participants in all six of the Florida-based focus groups utilized in this study did not feel that a brand was important to plant purchase. Given the findings in of the study, recommendations for marketing an agricultural product of this nature include using the word "plant" over "garden;" achieving the plant characteristics deemed to be the most important to plant purchases (healthy-looking, quality, and "makes me feel good') with the product; and emphasizing these characteristics in a well-targeted marketing campaign.

Keywords

Florida gardening, Florida plant/garden consumers, branding, plant characteristics

Introduction

Agriculture can be a difficult market for American growers and producers. Given appreciating land values, high input costs, the need to harvest at the peak of ripeness, and strict industry regulations, farmers can easily incur financial losses (Adelaja, 1996). Policymakers and industry representatives are constantly looking for a way to help growers and producers to remain economically viable businesses in the agriculture sector (Govindasamy & Nayga, 1996). In response, many states have turned to state-specific marketing campaigns for their agricultural products. For example, many state's Department of Agriculture agencies have sponsored or supported the development of state-specific brands to boost sales and consumer recognition. State-specific agricultural products promoted throughout the United States commonly include meat, dairy, produce, and aquaculture, as well as non-consumable goods such as horticultural products.

When considering marketing an agricultural product, there are many important considerations. Agricultural products are primarily marketed as commodities. Commodities, defined as economic goods, have a demand but a general lack of qualitative differentiation, such as a brand. In horticulture, the branding of products is rather rare. However, the branding of agricultural and horticultural products enables consumers to identify a specific product, especially if it offers the buyer added value in the form of a quality guarantee; consumer loyalty and price premiums could be expanded with the

implementation of successfully marketed brands (Koelemeijer, Luetscher, & Stoeken, 1993). Once a brand is well established, it has the ability to provide a differentiated product that increases the added value for the producer (Bagnara, 1996).

Given that there is such a low proportion of the American public directly engaged in agriculture as well as the tendency of agricultural products not easily lending to branding, consumers are crucial to a successful marketing campaign. Testing potential consumers' perceptions of words, phrases, designs, and communication materials before engaging in a marketing campaign helps ensure that consumers will respond favorably and have a clear understanding of the product.

The Florida Nursery, Growers and Landscape Association (FNGLA), a large state commodity member organization, began developing plants to market a state-specific plant brand in 2009. The Florida Garden Select brand is a program designed to encourage the use of "superior and proven" Florida plants (FNGLA, 2011). Florida Garden Select plants are promoted as being ideal plants for most Florida gardens. Many of the selected plants are marketed outside Florida and into most Southern States. A hardiness zone feature is emphasized to locate plants specific to each growing zone (FNGLA, 2011).

Several Southern states, including Georgia, Kentucky, Louisiana, Mississippi, Oklahoma, and Texas, have implemented state-specific plant promotion programs with the goals of identifying specific plants and generating awareness of these plants through a state-wide promotional marketing campaign to increase sales through price premiums (Steglin, Turner, & Knight, 2001). Though there are many similarities between the programs in regard to creation, funding, governance, and marketing strategies, there are also many differences, and there has been very little formal monitoring and/or oversight to evaluate if the programs actually achieve their goals (Stegelin et al., 2001).

While some state plant branding programs have conducted consumer recognition and satisfaction surveys after the fact, most have not utilized message or communication material testing prior to launching the brand (Dr. Charlie Hall, Ellison Chair in International Floriculture at Texas A&M University, personal communication, 11/15/2010). This study, conducted prior to launching a campaign, could have great implications for organizations interested in state branding and marketing campaigns.

Understanding potential consumers' perceptions of plants and gardening, as well as plant purchase patterns, can assist green industry companies in more effectively marketing their products. Based on the above, the purpose of this study is to explore the significance of a plant brand by utilizing focus groups comprised of Florida consumers of home and garden products. Objectives included exploring consumer perceptions of words, terms, and phrases associated with plants and gardening and determining the plant characteristics most important to consumers' decisions to purchase.

State plant promotional programs

New Jersey implemented the first state-funded marketing program for agricultural products in 1984 with its Jersey Fresh campaign. This program was designed to generate consumer awareness of agricultural products in New Jersey, as well as to promote Jersey Fresh products among food retailers (Govindasamy, 2003). In a 2003 study, 77.5 percent of randomly selected consumers in New Jersey recognized the Jersey Fresh logo, as well as 50 percent of randomly selected consumers in New York and 30 percent in Pennsylvania (2003). Over its 26-year campaign period, Jersey Fresh has utilized several taglines and a variety of advertising mediums (2003). Research indicates that for every dollar contributed to the Jersey Fresh program through 2000, agricultural fruit and vegetable revenues

increased by \$31.54. The Jersey Fresh program is estimated to contribute \$63.2 million to the state economy (2003).

Florida also implements a statewide agricultural marketing campaign, *Fresh from Florida*, through its Florida Agricultural Promotional Campaign (FAPC). The FAPC is described as "an identification and promotional program designed to boost the image of Florida agriculture and increase sales by helping consumers easily identify Florida agricultural products" (Florida Department of Agriculture and Consumer Services, 2004). Members of Florida's agriculture industry can join the FAPC campaign and have access to the *Fresh from Florida* logos, be listed on the state's Agricultural Product Search website, receive graphic assistance, and other benefits of membership (2004). The *Fresh from Florida* logo and campaign is used across the department's divisions, and is included on communications materials and websites (2004). The logo and campaign has also been extended to commodity groups, such as the *Fresh from Florida* Seafood campaign (Florida Department of Agriculture and Consumer Services Division of Marketing, 2004).

In addition to statewide agricultural marketing campaigns, some states have implemented statewide marketing campaigns specific to the plant and horticulture industry. Florida is not the only state to implement a plant promotion program. Many states have introduced horticulture product brands programs that feature varieties either native or beneficial to the area, or at least known to thrive in the specific climate. State and regional branding has also allowed consumers to associate ornamental products to a particular geographical region (Lillywhite et al., 2005).

Steglin, Turner, and Knight (2001) conducted an evaluation of state plant promotion programs in Southern states that indicates that most states employ a brand for a plant promotion program, such as Georgia's *Georgia Gold Medal Winner*™ and Mississippi's *Mississippi Medallion*™. The development of these state programs included university program sponsorship, plant selection committees and criteria, goals for promotion, and coordination with the industry.

Texas's *Texas Superstar*™ plant branding program is an example of a long-term plant brand that is meeting its objectives of increasing producer profits, but has only recently been evaluated for customer awareness and willingness to pay. This brand was initially locally and regionally promoted by a popular Extension horticulturist known in the San Antonio area before Texas A&M University encouraged participants to develop a statewide promotional program (Dr. Charlie Hall, Ellison Chair in International Floriculture at Texas A&M University, personal communication, 11/15/2010).

Despite the significant investments in research and marketing, no message testing or consumer awareness research was conducted prior to launching the Texas program (Collart, Palma, & Hall, 2010). A recently published evaluation of the *Texas Superstar* program in relation to consumer behavior demonstrated that though the consumer awareness of the brand is low, the level of satisfaction among consumers is high (Collart et al., 2010). Consumers who frequently shopped for plants or previously knew of the brand were more likely to purchase a *Texas Superstar* plant; the products were successful at creating a price premium and the willingness to pay for a *Texas Superstar* was found to be 10 percent higher than an unbranded plant (Collart et al., 2010).

Theoretical Framework

The theories guiding this study include those relevant to branding a commodity. These theoretical frameworks include Schema Theory, the Model of Causality in Social Learning, the Theory of Planned Behavior, and the Elaboration Likelihood Model.

Schema Theory

Schema theory explains the linkages between symbols and meaning by taking in the totality of an individual's life experiences (Reichel, 2009). "Because schemata are anticipations, they are the medium by which the past affects the future; information already acquired determines what will be picked up next" (Neisser, 1976, p. 74). Rumelhart refers to schemata as the "building blocks of cognition" (1980, p. 33) and argues that schemata are used in interpreting both linguistic and nonlinguistic sensory data.

Neisser's (1976) concept of pattern recognition involves assigning categories to objects or other stimuli and the higher levels of comprehension and processing can be explained by schema theory (Reichel, 2009). Rumelhart (1980) describes schemata as "the fundamental elements upon which all information processing depends" (p. 33). Therefore, schema theory can be utilized to understand the importance of a purchaser's past life experiences to the purchaser's attitude toward buying a product and their decision to purchase. The cognitive information ascribed to objects or stimuli based on an individual's past experiences could influence purchasing decisions in terms of the individual's schemata associated with a product, brand, or message. For example, in this study, participants were asked to rate what was most important when making plant purchases, and utilized various schemas, or cognitive shortcuts, to identify what plant characteristics were most essential to purchase decisions.

Model of Causality in Social Learning

The Model of Causality in social learning explores the relationships between human behavior, cognitive and internal activities, and the external environment (Bandura, 1985). The favored concept of interaction in social learning theory is triadic reciprocality, in which behavior, cognitive and internal activities or personal factors, and external environmental influences are viewed as interdependent determinants that influence each other bidrectionally (Bandura, 1985). In terms of marketing and branding horticultural products, the Model of Causality in Social Learning can be utilized to understand the influence of the purchaser's previous knowledge and perceptions of the product on the purchaser's decision to buy a product, as well as the influence of the external environment on the purchaser's cognitive and internal activities, or the purchaser's thoughts or attitude toward buying a particular product.

Theory of Planned Behavior

Regarding desired consumer changes in attitude or behavior, the Theory of Planned Behavior addresses behavior intent, normative influences, perceived behavioral control, and sense of efficacy as the primary influences upon behavior (Ajzen, 1991). In this theory, human behavior is guided by behavioral, normative, and subjective beliefs (Ajzen, 2002). If the objective is to encourage consumers to purchase a state plant brand, consumers should have the intention to support the brand, know other people who think it is important and/or a good product, know that the product is available, and think that the purchase will benefit them personally, or help their community or state's economy in a significant way.

Elaboration Likelihood Model

The Elaboration Likelihood Model (ELM) is a general theory of attitude that posits that there are basically two routes to persuading a target audience: the central route, through carefully and thoughtfully assessing the merits of contrived arguments and information, or the peripheral route,

which entails some kind of cognitive or behavioral cue that infers the argument without the complex processing of information, which is more of an "attractive source" (Petty & Cacioppo, 1986). The more complex central route is known to be the least preferred information processing activity as it requires more exertion and attention, but this is dependent on individual and situational factors (Frewer, Howard, Hedderley, & Shepherd, 1997). Also, the degree to which the information is salient or relevant to the individual determines whether they will use the central or peripheral routes. If it is highly personal, the individual will be more likely to spend the time and energy required to determine the merits of the information; if the information is relatively salient and the source is thought to be credible, the peripheral route may be deemed adequate (Frewer et al., 1997). In the case of marketing a state-specific plant brand, messages will be more likely to be retained and trusted if they are made to seem relevant to potential consumers and they come from a trusted source.

Purpose and Objectives

The purpose of this study was to better understand Florida consumers' perceptions of plant brands in relation to plants selected for purchase. In order to test messages and communication materials developed for "Florida Garden Select," a Florida-specific plant brand, FNGLA partnered with the University of Florida/Institute of Food and Agricultural Sciences' (UF/IFAS) Center for Public Issues Education in Agriculture and Natural Resources (PIE Center) to conduct focus groups with potential consumers around the state.

The objectives that were used to guide the research were to: 1) explore consumers' perceptions of terms related to plants, gardening, and landscaping, and to 2) determine what types of messages and plant characteristics consumers' best respond to in relation to purchasing plants.

Methods

Focus group research has been used extensively in marketing studies, as this kind of qualitative group interviewing enables researchers to gain valuable insight into public opinion and perceptions (Morgan, 1997). It is possible to obtain in-depth information about perceptions and attitudes. Focus groups encourage group interaction and discussion; moderators are able to ask clarifying questions to seek a deeper understanding – a feature not possible in traditional surveys (Merriam, 1998).

Focus group research is based on facilitating a guided discussion on a particular topic with a group of individuals in an effort to listen and learn from their perceptions and opinions. The researcher develops the protocol and questions to guide discussion, organizes the logistics of the focus groups, and later analyzes the data for themes and patterns (Morgan, 1998).

This kind of study is concerned more with process and "probing the phenomena for a deeper understanding" than qualitative research methods (McMillan & Schumacher, 2010). Because FNGLA had already invested in an outreach campaign with the creation of a brand name, logo, website, and select print materials, and because there were specific existing messages to test, it was deemed most appropriate to utilize a research methodology that allowed more in-depth explorations of individual response, attitudes, and knowledge. In order to test outreach messages, interviews are often found to be more effective because participants are able to explore concepts and messages more thoroughly (Kruger, 1994).

This study used a set of three focus groups comprised of representative members of the target audience of plant product consumers (six in total). A set of two focus groups were held in three geographically and demographically different regions of Florida in March 2010. These focus groups

were held in Jacksonville, Orlando, and Miami; all sessions were conducted by graduate students and staff at the University of Florida PIE Center in Gainesville, Florida.

A market research firm in Gainesville was hired and used Computer Assisted Telephone Interviewing (CATI) telephone random digit dialing (RDD) sampling to qualify potential participants. Criteria used to select potential participants were a general interest in gardening, plants, or home improvement projects. Probability samples were generated using a predetermined sampling frame based on demographic variables for all participant groups.

In qualitative studies, addressing reliability and validity is much different than in quantitative studies, and requires a kind of redefinition (Golafshani, 2003). To ensure consistency (reliability) and accuracy (validity) of a qualitative study, the highest care must be taken when interacting with participants. When utilizing focus groups, it is necessary to be clear, open, and consistent during all of the sessions—the same moderator should be used, the same moderator's guide and prompts, the same technological tools, the same recording devices, and even the same note-takers if possible. For this study, all of these steps were taken to ensure consistency.

The moderator's guide was drafted and vetted through multiple parties to ensure clarity and relevance of questions. The researcher who authored the moderator's guide served as an assistant moderator and note-taker during the sessions. An unaided/aided technique was utilized during sessions, with directive questions that followed in order to prompt participants and encourage them to interact with each other to explore each specific topic.

In order to explore consumer awareness and usage of plants, participants were asked for what purpose they usually purchased plants (e.g. garden, gifts, beauty, as a replacement plant). To determine participants' opinions of plant characteristics most important to plant purchases, an interactive "Turning Point" exercise with visuals and scales was utilized. On a scale of 1-5 (1 being low and 5 being high), participants were asked to rate a series of plant characteristics. Responding to the question, "How do you select what plants you will purchase?" participants were given the following prompts: Quality, Healthy looking, Attractive/pretty, Native to the area, Affordable, Hearty, Fertilizer use, Pesticides use, Low maintenance, Recognizable or familiar, Not known to be invasive, Makes me feel good, Fits the landscape, Seasonal planting selection, Environmentally friendly, Colorful (leaves or flowers), and Brand. Participants were also asked about garden and landscape terms commonly used in the green industry in order to explore perceptions and cognitive shortcuts associated with the terms.

The data used in this study was derived from part of a larger study, which was sponsored by FNGLA and funded by the Florida Department of Agriculture and Consumer Services (FDACS). The focus of the larger study was message testing of a Florida-specific plant brand name, logo, website, and communication materials.

Results

Participants of six Florida focus groups were asked to articulate what they thought of when they heard certain words or terms. Demographically, the participants were very diverse. Occupations ranged from retired teachers, public relations/sales managers, stay-at-home-parents, students, builders, and even marketing professionals. All participants had an interest in gardening or home improvement, and were asked what came to mind when they heard the word "plant" and "garden"; where they most often hear these words; what they thought the actual meaning of these words were; and how the words made them feel. There were six groups total in the FNGLA sessions (in three different locations); results are reported on the basis of themes and patterns that emerged in at least

four or more of the six groups.

When asked about the word "plant," all six of the groups responded that it conjured images of something "living" or "growing." Participants in four of the six groups mentioned being outside, soil, or the earth. Participants in four of the six groups also stated that they hear the word "plant" most often at retail outlets (such as Lowes or Home Depot). Most groups responded that the meaning of the word "plant" depends on the context and use (verb, noun, place, thing). One said:

"[The word plant] could be taken a couple of different ways. I mean she said you've got to plant the field of vegetables or the plants on the table. Or there's harvest, you know. It could be interpreted a couple of different ways."

When presented with the word "garden," participants of all groups thought of food, vegetables, and flowers. One said:

"I would think that plants, most of the plants I see, they always grow something on them. It's cool, a lot of fruits and vegetables. Most of the ones I have in my yard are edible. It's solid."

Members of all groups mentioned work, resources or hobbies of the word "garden," such as, "something that's taken care of and paid a lot of attention to." Members of all six groups also brought up beauty, tranquility, or pride. One said:

"It's almost like looking at a page. You can look at someone's garden, and you can see the planning involved. That somebody's put flowers in a certain way, you know, the yard is perfect, the lawn is perfect, great level, and you look at it, and say, 'Hey, gee, this is a perfect garden.' Rather than looking at my yard, I call it a yard but there's spots here and spots there and I wouldn't even call it a garden. It's just a work in progress."

Participants in five of the six groups mentioned personal space or home. One participant articulated this by saying:

"I think of garden as my personal space. You come to my house and you say, 'Oh come look at my garden.' And so it's an extension of me, it's a place where I like to be. So the garden is very important to me."

Participants in five of the six groups hear "garden" most often while shopping or in advertisements. Participants in four groups hear "garden" most on television.

Of the word "landscape," all six groups felt the word depicted something that was large scale. One participant said:

"It's a lot of planning for landscape. It's not just cutting grass anymore. It's mulch and all the pretty stuff that they put in the yards."

Participants in all six groups thought of something manicured, designed, or very organized such as "expensive and constant maintenance." Participants of four groups mentioned the work or resources involved, and four of six groups thought of food or vegetables.

When presented with the term "home landscape," members of all six groups brought up aesthetic appeal or beauty, and said that planning, design, and/or organization was needed; home landscape is the "curb appeal of the home." One summed this up by saying:

> "Home landscaping seems a little bit larger scale. It seems like you're going to see something that's…in my garden, it's everything. You'll see orchids next to air plants; you'll see everything. But when you see home landscaping, you think that someone has actually made more structure."

Participants of five of the six groups thought of cost, resources or the work involved and mentioned residence or personal space, like "personal care of your property." Participants of four groups heard "home landscape" most often on advertisements, while shopping, or on the Internet.

Members in all six groups indicated that they most often purchase plants for beauty or decoration. Participants of five of the six groups had a specific function or purpose in mind when purchasing plants, such as vegetable plants for food or hedges for privacy. Participants of four of six groups brought up that they purchase plants for gifts or sentimental purposes.

In an interactive "Turning Point" exercise, participants are given an electronic "clicker" and asked to make individual decisions about how important certain plant attributes were to deciding whether or not they would purchase a particular plant. In this session, participants were asked to rate 17 different plant characteristics in regard to how important these characteristics are to plant purchases (see Table 1 below). Participants rated each characteristic on a Likert-type scale with the following choices: very important; important; neither important nor unimportant; somewhat unimportant; and not important.

Of the total participants, 72 percent selected a plant being "healthy looking" as a very important characteristic; 65 percent of participants thought a "quality" plant was very important. A plant "making me feel good" was very important to 57 percent of the participants, 52 percent of participants indicated that the plant being "durable" was very important, and 50 percent selected an "attractive or pretty" characteristics as very important to plant purchases.

When asked what plant characteristics are most important when selecting plants for purchase, plants being non-invasive came up often, and many groups discussed the importance of plants being "environmentally friendly." This was also reflected In the Turning Point exercise. One participant said:

> "They're not native to South Florida and they're everywhere. Certain plants just take over and kill the native plants."

Many of the participants indicated that the brand of a plant was not important (Sixty-five percent of the participants responded that it was "not important." Twenty-five percent of participants responded that it was neither "important nor unimportant"). One participant summed up this pattern by saying:

> "When I think of brands, it's more with clothing, and plants, it's more God's brand."

Many others were confused by the idea of a plant having a brand. Of those who identified with a plant brand, it was common for them to name a retail outlet (such as Lowe's or Home Depot), instead of the actual plant brand.

Table 1
Plant Characteristics Important to Consumer Purchase

Plant characteristics	Very Important	Important	Neither important nor unimportant	Somewhat unimportant	Not important
Healthy looking	72%	22%	2%	2%	0%
Quality	65%	30%	2%	0%	0%
Makes me feel good	57%	20%	12%	2%	7%
Durable	52%	27%	15%	5%	0%
Attractive/pretty	50%	40%	5%	5%	0%
Seasonal	47%	12%	25%	2%	5%
Non-invasive	45%	22%	25%	5%	0%
Fits landscape	45%	25%	12%	0%	5%
Low maintenance	42%	22%	22%	2%	10%
Environmentally Friendly	42%	17%	12%	5%	5%
Affordable	42%	27%	17%	5%	7%
Native to area	37%	22%	22%	10%	7%
Pesticide use	35%	22%	20%	10%	12%
Fertilizer use	32%	12%	25%	12%	15%
Colorful	25%	27%	22%	10%	15%
Familiar/recognizable	5%	7%	30%	12%	45%
Brand	2%	7%	25%	5%	65%

Note: Percentages are based on total participants from all six focus groups

Conclusion, Discussion, and Recommendations

Regarding objective one, "exploring consumers' perceptions of plants, gardening, and landscaping," focus group participants for this study tended to have a more diverse perception of "plant" than "garden," so long as the context was clear. The terms "landscape" and "home landscape" were understood by participants to denote a "larger scale" than a garden or inclusive property care.

For the purposes of marketing a plant brand that includes many varieties of plants, the use of the word "plant" may be more effective than the word "garden," as participants tended to think of "garden" as vegetables and/or flowers only, and the word was perceived as non-indicative of other kinds of plants sold. Because the Florida Garden Select brand would market a wide variety of plants, it may be more effective to utilize the word "plant" in the brand. It is not recommended that the terms "landscape" or "home landscape" for marketing be used in this case, as participants in every group were reminded of the work or resources involved or required. These terms did not elicit the same cheerful qualities as "plant" or "garden" did.

For those marketing state-specific brands, it is important that schema theory and the Model of Causality be understood and utilized in regard to language selection and focus group participants' perceptions of "plant," "garden," "landscape," and "home landscape," as the potential purchaser's previous knowledge, perceptions of the language and associated product, and influence of the external environment has a large impact on the decision to buy the product. If consumers do not understand

that by "garden" Florida Garden Select means a wide variety of plants, the brand may not be successful unless the perception or cognitive shortcut can be altered.

Regarding objective two, "determining what types of messages consumers' best respond to in relation to purchasing plants," the majority of participants did not think that the brand of a plant was important at all. The target audience of potential consumers chose healthy-looking, quality, and "makes me feel good" as the most important characteristics for purchasing plants. Potential consumers also felt that a plant being durable, attractive, non-invasive, and "environmentally friendly" was important.

Yue, Hurley, and Anderson (2009) found that consumers' willingness to pay for plants decreases when the plants are labeled as invasive and increases when plants are labeled as native. Since a plant's being "non-invasive" was a significant finding, it is recommended that this issue be addressed up front by demonstrating that the selected plants have been selected using specific criteria that include their thoroughly studied lack of invasive qualities.

Because so many of the participants alluded to the brand of a plant as being "not important" when selecting plants for purchase, it will be essential to successful marketing to showcase the brand in more unconventional ways than merely putting a sticker or tag on the pot of the plant. Participants rarely remembered the name of a brand of a plant, and many thought only of the store where they were purchased.

The Theory of Planned Behavior has great applicability for the marketing of a state-specific plant brand. If potential consumers are knowledgeable about the Florida Garden Select branded plant being tested specifically for their home state and are motivated to support it, know that it is a desired social norm (to support local/state products), know where the products are available, and think that their purchase will benefit them or their community, they will be more likely to purchase a Florida Garden Select branded plant.

The Elaboration Likelihood Model can also prove to be a relevant addition to a state-specific plant brand marketing campaign. If the FNGLA (or any other agricultural commodity organization aiming to market a state specific brand) can ensure that marketing messages and communications make clear the relevance of the brand upon the product, perhaps by emphasizing the importance of supporting locally grown products, it may be more salient, and thus become more important to potential consumers. Also, consumers will be more likely to utilize the "shortcut" peripheral route of processing the information if it came from a trusted source, so the credibility of the organization and its members should also be accentuated. Credibility is most often built over time, though participants in this study regarded the University of Florida, landscape professionals, horticulturalists, and commodity groups as "very credible," so that may be indicative of an existing high level of trust in the industry.

In conclusion, in order for plant brand marketing campaign to be successful, the organization should consider the plant characteristics mentioned above (healthy-looking, quality, and "makes me feel good'") and 1) strive to achieve these characteristics with the products they are marketing, and 2) emphasize these plant characteristics in a marketing campaign. From the results of this study, it seems that the product (plants) may not easily lend itself to a marketable brand in the eyes of potential consumers. For this reason, it is recommended that the marketing campaign focus on the special attributes of the plants that ensure consumer satisfaction and potential brand loyalty due to a quality product.

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CONSUMER PERCEPTIONS OF THE U.S. AGRICULTURE INDUSTRY BEFORE AND AFTER WATCHING THE FILM *FOOD, INC.*

Jessica Holt and Dr. Dwayne Cartmell

Abstract

As the divide between consumers and producers in the agricultural industry increases, consumers are becoming less connected with the food they purchase. Without first-hand knowledge about the agricultural industry, consumers are relying more on the media to inform them about how their food is produced and processed. A growing form of media available to consumers is entertainment media, including documentary films. This research focuses on the ability of entertainment media to impact consumer perceptions about the agricultural industry, using the documentary film *Food, Inc.* The film *Food, Inc.* highlights aspects of the agricultural industry, including animal husbandry practices, governmental regulation of food production, and working conditions in food processing plants. This research uses a pretest and posttest to compare respondents' perceptions about the agricultural industry before and after watching the film. Findings indicate that consumers' perceptions were altered about the agricultural industry by watching the film. Based on this research it is recommended that future researchers and professionals in the agricultural industry work to positively influence and educate consumers about the agricultural industry through entertainment media.

Keywords

consumer perceptions, U.S. agricultural documentaries, *Food, Inc.*, entertainment media, and entertainment documentaries

Introduction

With the increased technology and availability of various types of media, including entertainment and social media, consumers have nearly unlimited access to information (Brandtzaeg, Heim, & Karahasanovic, 2011). Along with increased access to media, consumers are relying more on media to help inform them about agricultural issues (Verbeke, 2005), and in turn form perceptions and opinions about those issues. One agricultural issue of importance to consumers is food safety. Food safety is of primary concern for most consumers (Verbeke, 2005) because "food consumption is a negotiation about what a person will, and will not, let into his or her body" (Vermeir & Verbeke, 2006, p. 170). With the growing distance between the consumer and those who produce their food, consumers rely on the media to inform them about food safety (Verbeke, 2005).

Ten Eyck (2000) revealed that media coverage of the agricultural industry tend to focus on stories involving crisis situations. When consumers are only exposed to the agricultural industry as a result of a crisis or negative event, the relationship between consumer and producer can become strained. If the consumer is only informed about the agricultural industry when a crisis is happening,

Ten Eyck posited that consumers will tend to view the industry in a negative manner.

As the ever-widening gap between consumers and producers of agriculture continues to expand, the media's role in linking the two groups will become more significant (Thomson & Kelvin, 1996). Unlike prior generations, consumers of today are not as connected with the land, the food grown on the land or the food they consume on a daily basis (Ten Eyck, 2000). Consequently, with the shift away from understanding production within the agricultural industry, consumers are uninformed or misinformed about their relationship with the food system (Thomson & Kelvin). Most importantly, "how the media covers agriculture is important because it can influence consumers' perceptions of how food is produced, handled, or processed" (Meyers & Abrams, 2010, p. 22).

The perceptions consumers hold regarding the food system are not always in agreement with reality, as shown by scientists and researchers in the field (Shank, 1991). Consumers expect food to be risk-free when their food is touted as "safe food." However, scientists and others in the field know that 100 percent safe food is unattainable, but expect food to have the least amount of risk to public health as possible (Shank & Carson, 1992). Food safety crises have led to individuals being more concerned and interested in learning about the safety of the food supply (Verbeke, 2005). If consumers become interested in an issue, they are more likely to search for more information to educate themselves about the topic (Thomson & Kelvin, 1996). Consumers are concerned enough about their food safety to abstain from buying questionable foods, and their willingness to buy products believed to be "safer" has increased (Brewer & Rojas, 2007). In the end, consumers will ultimately form their perceptions about the food supply based on situational and environmental factors (Verbeke).

Consumers rely on the media to inform them about the happenings in the agricultural industry through a variety of mediums, including entertainment media (Lundy, Ruth, & Park, 2007; Meyers, Irlbeck, & Fletcher, 2011). The American Association for Agricultural Education's National Research Agenda considers research related to technology usage and practices to be a priority in the field (Doerfert, 2011). It is imperative for communication professionals, in research and in practice, to understand how the media impacts consumer perceptions of the agricultural industry to enhance future marketing and education programs in the agricultural industry, and offset any inaccurate information presented to consumers (Meyers, Irlbeck, & Fletcher).

Literature Review
Entertainment Mediums and the U.S. Agricultural Industry

Television offers viewers many different types of entertainment to choose from, including talk shows and reality television. As consumers become less attached to the agrarian way of life and more dependent on the media to stay informed about agricultural issues, it is of the utmost importance to understand entertainment media's impact on the formation of consumer perceptions about the agricultural industry (Ruth, Lundy, & Park, 2005; Lundy, Ruth, & Park, 2007). Lundy, et al. (2007) conducted a study to determine if a reality television show, featuring a view into an agricultural lifestyle, would alter viewers' perceptions of agriculture. Lundy, et al. found their participants "agreed that media shape their opinions and perceptions and even influence their behaviors regarding various issues," (p. 72). The study also revealed some individuals who do not have any first-hand knowledge or experience about an agricultural issue may rely in part, or entirely, on the media to form their perceptions.

The Day After Tomorrow is a film released in 2004, depicting the catastrophic impacts of severe climate change as a result of global warming (Leiserowitz, 2004). Leiserowitz found that after

watching the film, viewers perceived climate change and its associated risks as a potential threat to their lives. This change in perception impacted the intentions of the viewers related to global warming and their anxiety associated with the idea of climate change, and Leiserowitz concluded films "in popular culture can influence public attitudes and behaviors," (p. 34).

The film *Food, Inc.* was produced by Kenner and Pearlstein in 2007 and 2008 and was released to select theaters in 2008. (Kenner & Pearlstein, 2008). The film "lifts the veil on our nation's food industry, exposing the highly mechanized underbelly that's been hidden from the American consumer with the consent of our government's regulatory agencies, USDA and FDA" (Kenner & Pearlstein, 2008, p. 2). The film discusses laws and regulations related to food safety, working conditions in processing plants, animal husbandry practices and other agricultural industry topics (Kenner & Pearlstein). This study uses the film to understand if consumers will change their perceptions of the agricultural industry after watching *Food, Inc.*

The theory of media dependency is rooted in the understanding that an individual's relationship with the media system, wherein the individual receives information from the media through a variety of channels, allows the individual to "(a) create and gather, (b) process, and (c) disseminate information" (Ball-Rokeach, 1985, p. 487). In turn, there is a direct correlation between the dependency of the individual's reliance on the media to fulfill his or her goals and needs, and the significance that individual places on the media system (Whaley & Tucker, 2004). Individuals and consumers use the media system in multiple ways. As Ball-Rokeach and DeFleur (1976) described, people rely on media for multiple facets of their lives; from information gathering to shopping, and from connectedness to the world to the "need for fantasy-escape from daily problems" (p. 6).

Ball-Rokeach and DeFleur (1976) foretold a transition in the ways in which individuals rely and use the media system. As technology progresses and expands the ways in which individuals can gather information, digest the gathered information, and then disseminate this new information through various realms of technology, individuals can and will serve as a fourth estate, monitoring the information and actions of the government (Ball-Rokeach & DeFleur). Whaley and Tucker (2004) found trust to be the primary indicator of an individual's dependency on the media system. With this understanding, it is of utmost importance that the media continues to uphold the highest standards when conveying information to the public, to continue a strong relationship with the public, and to gain their trust and reliance upon the disseminated information.

Personal perceptions and opinions about a concept or idea can be formed in several different ways (Hoffman, Glynn, Huge, Sietman, & Thomson, 2007). Hoffman et al. identified three primary components of understanding how public perceptions and opinions are formed as (1) understand how individuals construct their perceptions or opinion, (2) adapt to the pressure of the general public, and (3) are impacted by the messages of the media. Understanding the mass media's overarching-role in disseminating information to the public, Hoffman et al. suggested the media, consciously or unconsciously, implement filters of information that can alter the public's exposure and knowledge of an issue, and in the long term, potentially, an individual's created perception of the topic.

How persuasive the messages are delivered through the media system can impact the perceptions and, ultimately, the attitudes of individuals (Petty & Cacioppo, 1986). When forming attitudes, individuals generally use one of two methods. In the first method, the individual thoughtfully processes the information and perceives it to be worthy of merit. The second method is derived from a persuasive message that is usually associated with social superiority and intended to appeal to an individual's perception of social acceptability rather than rationality (Petty & Cacioppo).

Festinger (1954), in his theory of social comparison processes, evaluated how individuals assessed the appropriateness of their opinions to that of their peers. Perceptions and opinions are subjected to many forms of judgment and individuals are concerned with holding values and opinions approved by of others (Festinger, 1950). In an attempt to conform to group unity, individuals can and will alter their opinions and attitudes (Festinger, 1950). Understanding that individuals are motivated to hold similar perceptions and opinions about issues within society is imperative when attempting to understand how media messages are perceived and interpreted. It is important to understand current consumer perceptions of the agricultural industry because consumers will base their purchases of agricultural products on their perceptions (Brewer & Rojas, 2007; Verbeke, 2005) and will support legislation and guidelines that coincide with their beliefs (Burstein, 2003).

Purpose

Understanding how entertainment media effect consumers' perceptions of the agricultural industry is a vital component for research and communication professionals. As consumers form perceptions about the industry based on what they perceive to be reality from the media, professionals and researchers must understand the methods and practices for educating the public about the true happenings within the agricultural industry, and not those derived from the media and entertainment. Research is needed to understand how film entertainment impacts consumer perceptions about the agricultural industry.

aThe purpose of this study was to assess the immediate effect the film *Food, Inc.* had on the perceptions of the agricultural industry by those in attendance at the showing of the movie on the campus of a large southwestern university. The following research questions guided this study:

1. What are the attendees' perceptions of the agricultural industry prior to viewing the film *Food, Inc.*?
2. What are the attendees' perceptions of the agricultural industry after viewing the film *Food, Inc.*?
3. Do the attendees' perceptions of the agricultural industry differ after watching the film *Food, Inc.* and the follow-up discussion of the film, as compared to their perceptions prior to watching the film?

Methods

The film *Food, Inc.* was offered as a free show through the University Cineculture organization. The organization recruited people from the university's campus, including students, faculty, and staff, and local citizens in the surrounding areas of the university. Advertisements were posted throughout the public areas of the university, and in the local newspapers to encourage people to attend the film. For this study, a convenient sample of the attendees of the film was used.

The survey was administered to all attendees of the film event. The participants were given a self-administered survey. This method was selected because it would reduce the risk of participants answering in a socially desirable way, which is a concern with personal interviews, and for the scope and size of the study (Dillman, Smyth, & Christian, 2009). Participants were given a pretest prior to beginning of the film, and a posttest to complete after the completion of the post-film discussion. Both surveys were given to the participants with a pre-determined code to ensure anonymity. Upon the conclusion of the film, all attendees of the film were asked to participate in a group discussion,

led by a panel of experts. The panel of experts was chosen by the University Cineculture organization and the University College of Education. The experts represented the poultry industry, animal welfare, and sociology.

Upon the conclusion of the discussion, 110 pretest and posttest surveys were returned by the participants. Of the 110 surveys returned, 15 were found to be incomplete and were removed from the data set, leaving 95 usable surveys.

The instrument was designed to measure the participants' perceptions about the U.S. agricultural industry in relation to the film *Food, Inc.* The instrument was adapted from several existing instruments, including Frick, Birkenholz, & Machtmes, 1995; Pense & Leising, 2004; and Robertson, 2009. The survey used questions from Frick, et al. (1995) to determine agricultural literacy and perceptions. The survey also used questions from Pense and Leising's (2004) instrument, measuring an individual's literacy of agriculture in relation to the food and fiber system. These instruments were used due to their proven reliability in relation to the agricultural industry. The instrument was also reviewed by a panel of experts for face and content validity. It is important to note the research presented is part of a larger body of study.

The survey consisted of demographic questions and questions related to perceptions of agricultural production, processing, and purchases. The question construction remained the same for both the pretest and posttest; however, the order of the questions was not identical to help mitigate the respondents' likelihood of learning from the previous test, and enhance the internal validity of design. Also, the posttest survey included questions to determine the participants' reactions to the film and the follow-up discussion.

The data from the surveys was coded using a 5-point Likert scale; with one representing "strongly disagree," two representing "disagree," three representing "unsure," four representing "agree," and five representing "strongly agree." Seven of the survey questions were reversed coded to accurately portray the opinions of the participants. Those reverse-coded questions implied the participants did not agree with current agricultural industry practices, while the remainder of the questions implied the participants agreed with current industry practices.

A reliability analysis was calculated, post-data collection, for the pretest and posttest. The pretest survey had a Cronbach's alpha coefficient of 0.722, and the posttest survey was found to have a Cronbach's alpha coefficient of 0.779.

The data was then analyzed to determine any change in perceptions from the pretest to the posttest using mean, standard deviation and frequency using SPSS 16.0 for Windows (2007).

Results

The demographic questions on the survey revealed that 62.1 percent of the respondents (n = 59) were between the ages of 18 and 25 years old, while 17.9 percent of the respondents (n = 17) were between the ages of 26 and 35 years of age. The remaining 20 percent of the respondents (n = 34) were 36 years of age or older.

The first research question was to determine attendees' perceptions of the agricultural industry prior to viewing the film *Food, Inc.* To answer this research question, the participants were asked a series of questions related to the agricultural industry, including the production, processing, and purchasing of agricultural products.

The pretest showed that participants agreed most (see Table 1) with the statement, "Transportation and storage affects the supply of agricultural products" (M = 4.10). In the pretest, the partici-

pants most disagreed (see Table 1) with the statement, "Agricultural processing plants maintain a safe and clean working environment" (M = 2.54).

Table 1
Respondents Agreement Level with Statements prior to Viewing the Film Food, Inc.

Statements Participants Agreed With	M	SD
Transportation and storage affects the supply of agriculture products.	4.10	0.623
I cook meals, at home, regularly.	4.03	1.036
Country of origin labeling should be mandatory in the U.S.	3.90	1.068
An efficient food distribution system is essential to the agricultural industry.	3.84	0.859
Knowledge of a brand/company's production practices influences my food purchasing decisions.	3.77	1.106
Statements Participants Were Unsure About	**M**	**SD**
*Organic is a primary factor I consider when purchasing food.	3.37	1.158
The Environmental Protection Agency (EPA) regulated fertilizers, pesticides and herbicides used by producers.	3.31	0.900
I think super centers (Wal-mart, etc.) provide a necessary outlet for food purchases.	3.20	1.199
New technology has helped ensure the safety of agricultural processing.	3.17	1.028
*Organic products require less processing than other modified products.	3.08	0.912
Statements Participants Disagreed With	**M**	**SD**
Agricultural processing plants maintain a safe and clean working environment.	2.54	1.104
Confinement is an acceptable practice when raising livestock.	2.52	1.161
*Production of organic foods is better for the environment.	2.50	1.003
*Food processing increases the cost of food products.	2.48	0.985
Food additives improve the nutrition of processed foods.	2.30	1.066
There are more farmers in the U.S. than there were 10 years ago	2.15	1.037
*Farmer's markets are a needed outlet for food purchases.	2.04	0.967

In the pretest, the participants expressed the most uncertainty (see Table 1) about the statement, "Organic is a primary factor I consider when purchasing food" (M = 3.37). It is important to note this question was reverse coded to better interpret the participants' response. The question did not follow a similar pattern in wording as other questions on the survey.

The second research question sought to determine attendees' perceptions of the agricultural industry after watching *Food, Inc.* To determine the participants' perceptions, attendees were given the same survey as the pretest survey. The order of the questions on the posttest survey was randomly changed from the pretest survey.

After watching the film *Food, Inc.* and completing the posttest survey, the participants agreed most (see Table 2) with the statement, "Country of origin labeling should be mandatory in the U.S." (M = 4.20).

When completing the posttest survey, the participants expressed the most uncertainty (see Table 2) about the statement, "I think super centers (Wal-mart, etc.) provide a necessary outlet for purchases" (M = 3.29) after watching *Food, Inc.*

After watching *Food, Inc.* and completing the posttest survey, the participants most disagreed (see Table 2) with the statement, "Organic products require less processing than other modified products" (M = 2.56). It is important to note this question was reverse coded to better interpret the participants'

Table 2
Statements respondents of the showing Food, Inc. after the film

Statements: Participants Agreed With	M	SD
**Country of origin labeling should be mandatory in the U.S.	4.20	0.774
Transportation and storage affects the supply of agriculture products.	4.04	0.624
Consumer preferences influence farmer/producer decisions about what type of product to grow and how it is processed.	3.95	0.977
I cook meals, at home, regularly.	3.88	1.135
Knowledge of a brand/company's production practices influences my food purchasing decisions.	3.87	0.981
An efficient food distribution system is essential to the agricultural industry.	3.77	0.886
The use of pesticides has increased the yield of crops.	3.73	0.870
Livestock/animal tracking systems should be mandatory in the U.S.	3.66	1.032
Price is a primary factor I consider when purchasing food.	3.61	1.055
Biotechnology has increased the pest resistance of plants	3.55	0.899
Statements Participants were Unsure about	M	SD
I think super centers (Wal-mart, etc.) provide a necessary outlet for food purchases.	3.29	1.151
The Environmental Protection Agency (EPA) regulated fertilizers, pesticides and herbicides used by producers.	3.09	0.996
U.S. citizens spend a higher percentage of their income on food than in other countries.	3.02	1.406
I purchase food based on a brand name.	3.01	1.122
The United States Department of Agriculture (USDA) regulates food handling, preparation and storage.	2.99	1.092
*Organic is a primary factor I consider when purchasing food.	2.96	1.138
Animal health and nutrition are important to farmers/producers.	2.93	1.333
Statements Participants Disagreed With	M	SD
*Organic products require less processing than other modified products.	2.56	1.037
Food safety is a major concern of the food processing industry.	2.55	1.367
Agricultural processing plants maintain a safe and clean working environment.	2.42	1.107
*If available, I prefer to buy organic food products.	2.33	1.101
*Organic production methods are a realistic alternative to using pesticides.	2.73	1.036
Local laws and regulations have little effect on farmers.	2.32	1.148
Food additives improve the nutrition of processed foods.	2.24	1.031
Confinement is an acceptable practice when raising livestock.	2.17	1.179
*Production of organic foods is better for the environment.	2.14	0.952
There are more farmers in the U.S. than there were 10 years ago	2.00	1.088

Note. Classification of statements based on scale: M = 4.20 or higher = Strongly Agree; 3.40 – 4.19 = Agree; 2.60 – 3.39 = Unsure; 1.80 – 2.59 = Disagree; and 1 – 1.79 = Strongly Disagree
Note. * Indicates a question that was reverse scored.

response. The question did not follow a similar pattern in wording as other questions on the survey.

The final research question sought to determine if the attendees' perceptions of the agricultural industry differed after watching *Food, Inc.* and participating in the follow-up discussion of the film, as compared to their perceptions prior to watching the film. The data from the pretest and posttest was analyzed for mean and standard deviation to determine if there was any significant change in the participants' perceptions of the U.S. agricultural industry after watching the film (see Table 3). Also, to further answer this question and determine if there was a significant difference in the participants' perceptions of the U.S. agricultural industry, a paired-samples t-test was performed on the mean of

Table 3
*Comparison of means of responses from the pretest and posttest
surveys with t-test significance*

Statement	Pretest	Posttest	99 % CI
	M	M	p
*Production of organic foods is better for the environment.	2.50	2.14	.000
Animal health and nutrition are important to farmers/producers.	3.45	2.93	.000
Confinement is an acceptable practice when raising livestock.	2.52	2.17	.000
There are more farmers in the U.S. than there were 10 years ago	2.15	2.00	.000
Local laws and regulations have little effect on farmers.	2.60	2.32	.000
Biotechnology has increased the pest resistance of plants	3.54	3.55	.000
An efficient food distribution system is essential to the agricultural industry.	3.84	3.77	.000
*Organic products require less processing than other modified products.	3.08	2.56	.000
Transportation and storage affects the supply of agriculture products.	4.10	4.04	.000
Agricultural processing plants maintain a safe and clean working environment.	2.54	2.42	.000
Knowledge of a brand/company's production practices influences my food purchasing decisions.	3.77	3.87	.000
Price is a primary factor I consider when purchasing food.	3.56	3.61	.000
I purchase food based on a brand name.	2.76	3.01	.000
*Farmer's markets are a needed outlet for food purchases.	2.04	1.80	.000
I think super centers (Wal-mart, etc.) provide a necessary outlet for food purchases.	3.20	3.29	.000
Food safety is a major concern of the food processing industry.	3.00	2.55	.001
*Organic is a primary factor I consider when purchasing food.	3.37	2.96	.001
U.S. citizens spend a higher percentage of their income on food than in other countries.	2.93	3.02	.003
The Environmental Protection Agency (EPA) regulated fertilizers, pesticides and herbicides used by producers.	3.31	3.09	.019
The United States Department of Agriculture (USDA) regulates food handling, preparation and storage.	3.44	2.99	.022
New technology has helped ensure the safety of agricultural processing.	3.17	2.77	.052
*Organic production methods are a realistic alternative to using pesticides.	2.73	2.33	.109
*If available, I prefer to buy organic food products.	2.71	2.33	.246
Country of origin labeling should be mandatory in the U.S.	3.90	4.20	.252
The use of pesticides has increased the yield of crops.	3.64	3.73	.485
Consumer preferences influence farmer/producer decisions about what type of product to grow and how it is processed.	3.72	3.95	.521
*Food processing increases the cost of food products.	2.48	2.65	.590
Livestock/animal tracking systems should be mandatory in the U.S.	3.50	3.66	.776
Food additives improve the nutrition of processed foods.	2.30	2.24	.908

Note. Classification of statements based on scale: M = 4.20 or higher = Strongly Agree; 3.40 – 4.19 = Agree; 2.60 – 3.39 = Unsure; 1.80 – 2.59 = Disagree; and 1 – 1.79 = Strongly Disagree
Note. * Indicates a question that was reverse scored

sums from the pretest and posttest data. The analysis revealed a 95 percent confidence level in the correlation of the mean of sums from the data on the pretest and posttest surveys. The analysis gave a significance of 0.000. Having a significance that is less than 0.001 revealed the difference in the sum of means of the pretest and posttest is statistically significant. Also, the Cohen's D for the treatment was 0.378, indicating a small to medium effect size.

Conclusions/Discussion

The film *Food, Inc.* did impact the perceptions of some individuals about the agricultural industry, as shown by the results from this research. The film had the greatest impact on participants' views of organic food production, farmers' concern with animal health and welfare, and confinement practices. After the film, participants' believed organic food was safer than traditionally produced food, that farmers are not as concerned with animal welfare as the participants thought prior to the film, and participants viewed confinement practices of livestock in a more negative light after the film. Similar to Leiserowtiz's (2004) findings, the perceptions of the participants in this study were impacted by watching a film. Professionals and researchers in the agricultural industry should understand that entertainment media does have an impact on consumer perceptions about the industry, and could ultimately impact their buying behaviors.

Food, Inc. primarily focused on areas of agriculture that have been linked to food crisis, such as food-borne illnesses and diseases related to food consumption. As Ten Eyck (2000) presented, when the agricultural industry is portrayed negatively by the media, this will strain the relationship between consumers and producers. This was shown by the participants' change in responses related to the agricultural industry after watching the film. Attendees were more likely to purchase products from companies which held similar values to their own. Future research should be conducted to determine how consumers research and decide which companies hold similar values and ethics to their own.

The respondents' perceived knowledge of the governmental regulation of the agricultural industry was impacted as a result of the film *Food, Inc.*, as demonstrated by the responses on the posttest survey related to the agricultural regulation questions. Whether the respondents understand the actual role of the governmental agencies in a positive or negative light, or their role in creating regulations is unknown. This change in perception is important for anyone associated with the agricultural industry because it illustrates the power of entertainment media to influence viewer perception of the government. As Ball-Rokeach and DeFleur (1976) predicted, consumers are becoming a fourth estate, with regards to the government monitoring and regulating of the agricultural industry. Burnstein (2003) also stated "public opinion influences public policy," (p. 29). If the film, *Food, Inc.* has the power to influence public opinion, it only stands to reason that public policy will also be influenced as well.

Also, the respondents indicated a significant change in perception, after the film, with the two questions related to animal welfare and the concern of farmers related to the care of livestock ("Animal health and nutrition are important to farmers/ producers" and "Confinement is an acceptable practice when raising livestock"). This change in perception could be attributed to the respondents' lack of knowledge and/or experience with farmers and producers. In turn, the respondents are relying upon the film *Food, Inc.* for their information in this area. As Thomson and Kelvin (1996) mentioned the divide between the consumer and producer is increasing at an exponential rate. This fissure between the consumer and the agrarian way of life can be detrimental to the relationship of the consumer and producer, as illustrated by the responses of the survey. How damaging this divide is

between the two groups should be explored in future research. Researchers and professionals should seek to better understand this relationship because of its effect on consumers' buying and consumption behavior.

As Meyers, Irlbeck, and Fletcher (2011) stated, researchers and professionals in the agricultural industry should explore potential methods to offset the negative impacts entertainment media can have on the industry. Marketing efforts should focus on counteracting misleading information presented to consumers through entertainment media. Results from this research further solidify the need for in-depth research in this area to better understand consumer behavior and perceptions. Also, future research should aim to understand if how the documentary presents the agricultural idea using imagery and sound effects plays a role in the consumers' perception of the documentary and the agricultural industry.

Consumers are interested and concerned enough with the agricultural industry to voluntarily attend a showing of a film related to agriculture. Thomson and Kelvin (1996) noted that consumers will become more engaged with an issue when it is of importance to them and their lives. Understanding that consumers are interested in knowing where their food comes from is empowering for agricultural professionals. Consumers are engaging with information being disseminated about the industry; therefore, professionals in agriculture should use this to their advantage in marketing educational programs aimed at consumer awareness.

This research is limited in its scope and generalizability. This study used a convenient sample, and therefore the findings from this research cannot be generalized to the entire public. Also, the instrument used to collect data gave participants the option of selecting "unsure." Due to the number of participants who selected "unsure" future studies should consider using a different term to measure participants' perceptions. The "unsure" selection did shed light on the areas these participants were most unfamiliar with; however, it is difficult to know if the participants' held a positive or negative perception of the issue.

This research has shown that entertainment media, at least in the form of a documentary film, can impact the immediate perceptions of consumers. Future research should seek to determine any long-term effects of documentary films and entertainment media on consumers' perceptions of the agricultural industry. Entertainment media has shown, in this research, to be a tool consumers use to form perceptions about the agricultural industry. Research should focus on how the agricultural industry can use this type of media to positively promote the agricultural industry.

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Research

Research

Narrowing the Farm-to-Plate Knowledge Gap through Semiotics and the Study of Consumer Responses Regarding Livestock Images

Dr. Joy N. Rumble and Dr. Emily B. Buck

Abstract

It has been suggested that a farm-to-plate knowledge gap exists between farmers and consumers. In addition, previous studies have concluded that U.S. citizens do not have accurate knowledge or perceptions about agriculture. It is thought that this absence of knowledge and existing misconceptions may be due to the images consumers see regularly through the media. In this research study, researchers used a directly administered questionnaire to evaluate consumers' responses regarding the comparison of two livestock images. The study was conducted at the 2009 Ohio State Fair. Through voluntary participation, research participants answered questions regarding their perceptions of traditional and conventional livestock housing methods by viewing two images. In addition, participants were asked to justify each of their responses through oral reasoning. Questionnaires were completed by 508 participants, of which 502 were deemed usable. Results indicate participants are somewhat knowledgeable about livestock housing methods, but the perceptions and justifications of the respondents are not always accurate. The results also indicate agricultural images, as well as images regularly seen in the media, may influence such perceptions. In order to narrow the farm-to-plate knowledge gap, it is important for the agriculture industry to effectively improve the knowledge and perceptions of agriculture amongst consumers.

Keywords

semiotics, directly administered questionnaire, agricultural knowledge, agricultural perceptions, images, knowledge gap theory

Introduction

"Just because you live in a rural area with a small town close by, don't assume the people on Main Street in that small town know what's happening out there in the fields," said Orion Samuelson a veteran farm broadcaster (American Farm Bureau, 2001, para. 2). The disconnect between farmers and non-farmers was further emphasized by Mayer and Mayer (1974) who said "…an enormous majority, even among well-educated Americans, are totally ignorant of an area of knowledge basic to their daily style of life, to their family economics, and indeed their survival" (p. 84). There is a need to explore the gap between agricultural consumers and producers (Higgins, 1991).

Today less than a fourth of the population lives on a farm, compared to more than half of the population in the early 20th century (Dimitri, Effland, & Conklin, 2005). Technology is the driv-

ing force behind these shrinking numbers. Advanced technology has increased U.S. farm output, allowing more individuals to leave the farm for an alternate occupation (Dimitri et al., 2005; Smart, 2009). The majority of consumers are now generations removed from the farm (American Farm Bureau, 2001; American Farm Bureau, 2007). As a result, the publics' perception of agriculture no longer corresponds with the realities of agriculture (American Farm Bureau, 2007). Rob Smart from the Huffington Post has recognized this occurrence and has titled it the "farm-to-plate knowledge gap" (2009). In order to explore this farm-to-plate knowledge gap, this study sought to evaluate the perceptions and knowledge of livestock housing methods held by a sample of citizens attending the Ohio State Fair.

Literature Review
Agriculture Literacy

Agriculture literacy is a term given to address the knowledge and perceptions of agriculture held by the general public (Wright, Stewart, & Birkenholz, 1994). The National Research Council (1988) indicates that being agriculturally literate means an individual understands the history of agriculture as well as its current economic, social, and environmental impact. However, many research studies have shown the general public does not possess accurate knowledge and perceptions of agriculture (Frick, Birkenholz, & Machtmes, 1995; Duncan & Broyles, 2006; National Research Council, 1988). It is important for individuals to have some knowledge of agriculture since their survival depends on it (Frick et al., 1995). As the U.S. population becomes more suburbanized, it has been suggested that individuals are becoming less knowledgeable about agriculture (Duncan & Broyles, 2006). Additionally, the influences of media (Rhoades & Irani, 2008), acquaintances, and involvement in various organizations are impacting the knowledge and perceptions individuals, specifically those in younger generations, have about agriculture (Duncan & Broyles, 2006).

Livestock housing in Ohio

During 2009, Ohio was home to 74,900 farms (National Agricultural Statistics Service, 2010). Of the common livestock raised in Ohio, there are approximately 293,757 beef cattle; 271, 938 dairy cattle; 1.8 million hogs; 27 million laying hens; and 49.6 million broilers (National Agricultural Statistics Service, 2009). The majority of these animals are raised conventionally. For the purpose of this research, conventional livestock housing was defined as any operation where a large number of animals are confined and raised in a localized area (indoors or out), where food is brought to them (U.S. Environmental Protection Agency, 2010). Traditional housing was defined, in this research, as housing where livestock are not confined and have the ability to graze and obtain their own food. The American Veterinary Medical Association (AVMA) indicates the best livestock housing environments include: "freedom of movement; expression of normal behaviors; protection from disease, injury, and predators; adequate food and water; and proper handling" (AVMA, 2008, para. 2). Neither conventional nor traditional livestock housing adequately address all of these requirements.

In the Midwestern United States, the swine and poultry industries have seen a dramatic increase in the number of conventional farms over the last several years (Sharp, Roe, & Irwin, 2002). A gap exists in the literature providing both a clear definition of, and the precise number of animals raised using conventional production methods. Although it is not precisely known how many animals are raised in conventional housing in the state of Ohio, estimates can be drawn based on numbers provided by several sources. Ohio's average hog farm has approximately 492 hogs. Additionally, the

average laying hen farm has approximately 5,151 laying hens, while the broiler farms have an average of 62,776 broiler chickens (National Agricultural Statistics Service, 2009). Due to the large numbers of individual animals on these farms, it has been estimated that the majority of these farms are conventional in nature, since housing this many animals in a traditional housing setting would require an inordinate amount of acreage.

In addition, the average number of dairy cattle per farm in Ohio is 74.5. The dairy industry has been moving toward more conventional or partially conventional housing (Sharp et al., 2002). However, it is estimated that a smaller proportion of the dairy farms in Ohio are conventional compared to the swine and poultry facilities. The beef industry in Ohio has not seen a large increase in conventional housing (Sharp et al., 2002). Thus, it is estimated that more beef farms consist of traditional housing rather than conventional housing.

Theoretical Framework

Semiotics and knowledge gap theory guided this study and provided a theoretical foundation for this research.

Semiotics and Images

Semiotics is a theory of signs and codes (Blaney & Wolfe, 2004; Eco, 1979). Visual signs help one interpret a message, while a code helps an individual understand what the message means (Moriarty, 2005). This theory suggests that signs and codes are closely related to language and everyday communication of a culture (Blaney & Wolfe, 2004). Thus, words and visual images promote a cultural ideology. Each visual image or word is composed of a combination of cultural ideologies, creating a sign system. A sign system is a group of signs that imply meaning for one sign or image (Blaney & Wolfe, 2004). Therefore, one image may contain several visual elements that contribute to the interpretation of the image.

When an individual views an image, there are many ways the image can engage the individual (Messaris & Moariarty, 2005). Images can produce a representation to everyday life. If an individual is able to relate an image to their life, the individual is likely to have an emotional connection with that image. The composition of an image has the ability to manipulate an individual's point of view, thus influencing their perceptions. These principles of image power seek to address how people learn from the images they see (Messaris & Moariarty, 2005).

In the study of semiotics, signs are defined as anything that represents another entity. Thus, the meaning of a sign is determined by a following thought or action (Hoopes, 1991; Moriarty, 2005). According to Saussure, a sign may also be referred to as a signifier (Moriarty, 2005). The signifier then promotes the content that the sign stands for, which is also known as the signified. Peirce created a model similar to Saussure's idea of the signifier and the signified, but he added the concept of the interpretant (Moriarty, 2005). The interpretant, or effect of a sign, is established when a sign generates a mental idea in one's mind (Moriarty, 2005).

A subject that becomes imperative is the relationship between the sign and the object or the signifier and the signified. These relationships include iconic, indexical, and symbolic relationships. An iconic relationship is when the sign and the object look alike or similar, like a photograph and a portrait (Moriarty, 2005). Peirce's examples of smoke to fire or symptom to disease are examples of the indexical relationship; this is when the sign and object are indicators of each other. Lastly, the symbolic relationship describes when the sign is a symbol for the object, like a flag as a sign and its

corresponding country as the object (Moriarty, 2005). Understanding the relationship between the sign and the object allows researchers to analyze the resulting mental image that is likely to occur among viewers.

An additional point for analysis between the sign and the object was extended by researchers Barthes and Hall (Moriarty, 2005). Their analyses included connotation and denotation. Connotation is referred to as the meaning that is established by the object; the meaning of an object is generally cultural. Denotation is defined as "…the direct, specific, or literal meaning we get from a sign" (Moriarty, 2005, p. 231). An example that demonstrates the functionality of connotation and denotation is as follows. A magazine advertisement shows a picture of a tractor, the tractor is at the denotative level. The connotative level of the advertisement might associate the tractor with terms such as farm, farmer, country, and crops. Connotation and denotation become especially important when studying visual communication and the influence of visual images in advertising (Moriarty, 2005).

Knowledge Gap Theory

Knowledge Gap Theory suggests that information is obtained more efficiently by those who have a higher socioeconomic status rather than those who have a low socioeconomic status (Tichenor, Donohue, & Olien, 1970). Mass media infusion is absorbed at different rates across different socioeconomic groups, thus impacting the rate of information obtained by individuals (Tichenor et al., 1970). As home computer ownership and Internet access has increased, it has been suggested that knowledge gaps have decreased (Hindman, 2000). However, despite access to computers and the Internet, knowledge gaps continue to exist because people continue to lack comprehension of information and/or the technology (Chadwick, 2006). A lack of motivation to cognitively digest certain information has also been discussed as contributing to knowledge gaps (Weenig & Midden, 1997).

Knowledge gap is closely related to the digital divide, suggesting those who have lower incomes and reside in rural areas have less access to media outlets (Rainie et al., 2003). Alternatively, those with higher levels of education, higher income, and residence within an urban or suburban location, generally have abundant media access (Rainie et al., 2003). When discussing the knowledge gap in agriculture, those who have experience with agriculture have traditionally not had resources available to share their knowledge within media outlets. In addition, the agricultural information present in the media often tends to be misguided (Whitaker & Dyer, 2000). Due to the lack of comprehension of agriculture information, inaccurate media coverage, the lack of motivation of some to process agriculture information, and the struggles of those in the industry to communicate to the public and media about agriculture a knowledge gap exists between those who produce and consume agricultural products.

Purpose and Objectives

It is important for agricultural educators and communicators to regularly assess the knowledge and perceptions individuals have about agriculture. The purpose of this study was to evaluate the perceptions and knowledge of livestock housing methods held by a sample of citizens attending the Ohio State Fair. In addition, this study sought to explore the thought process of consumers when viewing agriculture images by analyzing their qualitative responses. This information should provide beneficial insight for agricultural professionals. The information may be used to improve educational and communication mechanisms, as well as creative image advertisements.

Three objectives guided this study:
1. Evaluate consumers' perceptions of conventional and traditional livestock housing in Ohio.
2. Evaluate consumers' perceptions of animal health and disease as related to livestock housing methods.
3. Evaluate consumers' perceptions of safe and wholesome food products and consumer friendly prices as related to livestock housing methods.

Methods

In order to fulfill the purpose and objectives of this study, researchers conducted a directly administered questionnaire to individuals attending the Ohio State Fair. Directly administered questionnaires are referenced by Ary, Jacobs, Razavieh, and Sorensen (2006) as a research tool that enables researchers to gather information from an array of individuals who have gathered at common place for a common purpose. The benefits of directly administered questionnaires include the ability to guide participants through the questionnaire and answer any questions (Ary et al., 2006).

A convenience sample was used for this study. Convenience sampling involves using readily available subjects as the study sample, thus making it a weak sampling procedure (Ary et al., 2006). Convenience sampling was used in this study because it was difficult to predict the population elements that the study would encounter, thus limiting enumeration required for probability sampling (Ary et. al., 2006). The convenience sample was comprised of volunteers who attended the 2009 Ohio State Fair. Data collection occurred at a booth in the Agriculture and Horticulture building. Participants volunteered for the study and were recruited by a sign above the research booth that read "Are you 18 years or older? Are you an Ohio resident? Do you want Free Ice Cream?" Six individuals administered questionnaires over a period of eight days. Each participant was given a coupon for a free single-dip ice cream cone from the Ohio Dairy Producers booth at the fair. The Ohio Farm Bureau provided funding and support for this research. A sample of 508 questionnaires was collected, of which 502 questionnaires were deemed usable and were evaluated. The six questionnaires dismissed from the research were unusable due to lack of responses or Ohio citizenship. In addition to the 508 participants who participated in the study, 57 other individuals declined participation after inquiring about the study.

Training was required for all questionnaire administrators prior to data collection. The training allowed the administrators to practice and become familiar with the questions, learn how to listen carefully and pick out important details, as well as eliminate personal bias when talking with participants. Two prescreening questions were asked at the beginning of the questionnaire to establish that the participants were adults and Ohio citizens. In addition to demographic questions, questions regarding a comparison of two images were asked. One image contained several smaller images of conventional livestock housing while the other contained several smaller images of traditional livestock housing. A panel of researchers familiar with livestock production selected these images. The participants were asked to determine which picture represented how most livestock were raised in Ohio, showed the healthiest animals, showed the most humane treatment, showed animals most protected from disease, would produce the most safe and wholesome food product, and would produce the most consumer-friendly food prices. Participants were then asked to provide justification for each of their responses. Each questionnaire took approximately 5-10 minutes to administer. A panel of researchers and Ohio Farm Bureau staff evaluated the questionnaire instrument to ensure validity.

Upon the completion of the data collection, data were entered into SPSS© and basic quantitative descriptive statistics were calculated. Qualitative information was evaluated through the use of open-coding and identification of common responses within the data.

Results

Researchers collected demographic information on age, ethnicity, gender, and highest level of education. The average age of participants was 44.35 (SD = 15.89), with a median of 46, and a mode of 50. Various ethnicities were represented among the participants; however, the Caucasian ethnicity was most abundant with 412 (82.1%) participants. Gender was not asked, but was identified by the researchers. More females participated in the research than males, as the sample was composed of 315 (62.7%) females. The most abundant level of education among the participants was a bachelor's degree, held by 181 (36.1%) respondents.

Objective 1: To evaluate consumers' perceptions of conventional and traditional livestock housing in Ohio.
Most abundant housing method.

The first research objective was to evaluate consumers' perceptions of conventional and traditional livestock housing in Ohio (see Figure 1). Of those responding, 329 (65.5%) participants indicated that conventional housing (Image A) was used to raise the majority of livestock in Ohio. A summary of the response frequencies can be seen in Table 1.
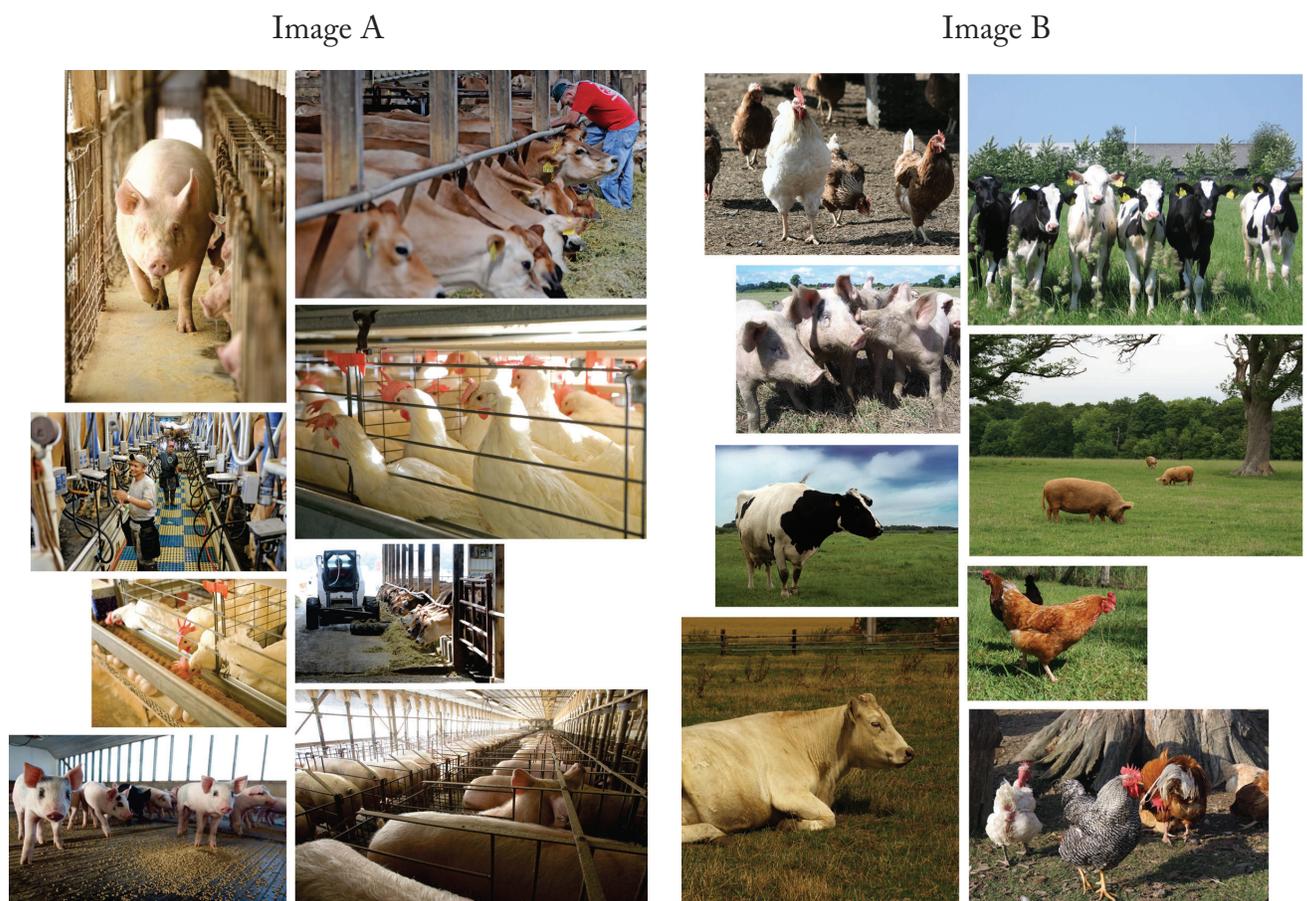
Image A   Image B

Figure 1. Image A was shown to participants to represent conventional livestock housing. Image B represented traditional livestock housing.

Table 1

Consumers' Perceptions of Most Abundant Livestock Housing Method

Image Selection	*f*	*%*
Image A	329	65.5
Image B	123	24.5
Both Images	45	9.0

When the participants were asked why they felt livestock were raised one way versus another, several responses were given. Of those responding, the most common reasons for selecting conventional livestock housing were mass production, economic feasibility, technology, and media influence. Some notable responses included: "image A because B looks like how my grandparents would have done it," and "A, because I assume they're all inhumane."

The common themes that arose by those who selected traditional livestock housing as most abundant included: there are more small farms than large farms, participants had seen animals raised this way, and participants had not seen farms like image A. Many participants referenced seeing images like image B while driving down the road. Unlike those who chose image A, only one person directly referenced the media as justification for choosing image B. It is important to note that some of the respondents commented on the aesthetic nature of image B by using words like "looks nice," "free/comfortable," and "happy." One respondent said "they look happy, outdoors, grassy 'happy cows come from California.'" While another participant said "cows on a hill equals America."

Of the 9% of participants who indicated that both images were prevalent in the state, most indicated that image A and image B were equally distributed. However, some chose both because of specie difference (i.e., chickens and pigs are housed like A, cows are housed like B). In addition, some respondents suggested that neither picture was representative of livestock housing methods in the state. These participants indicated that a combination of methods were used and that the method depended the season.

Most humane housing method.

Although the majority of respondents thought image A was most abundant in the state, the majority did not think it was humane. When asked what housing method was more humane, 322 (64.1%) participants selected traditional housing as being more humane, while 68 (13.5%) selected conventional housing.

Those who indicated traditional housing was more humane justified their responses with the common themes of: less crowded/not caged, natural setting, room to roam/free, and better physical and mental health. One participant referred to image B as a "natural setting and not crowded like prison." Additional responses included "they can breathe air not each other's smells, they can stretch, and live naturally." Some respondents referenced the livestock's health. One respondent chose image B because image A looked "like they are on life support." Two notable references to the media were made. These references were, "looks like the ones in the commercials 'happy cows,'" and "when you pack animals together we are shown in media they are less humane."

Participants who thought that both pictures showed humane treatment indicated that they did so because the animals looked "healthy and happy" in both images, humane treatment was not indicated by the housing method but rather the operator, and neither picture showed "inhumane" treatment. Some quotes from these responses included: "nothing inhumane, each is better in its own way;"

and "in image A people are caring for them, in image B they are out in nature."

Those who selected image A as the most humane, referenced "health and happiness", "environmental control", people taking care of the animals, and the presence of "technology". Responses that represented these themes include the following: "animals are protected from each other," "production based on science and research," and "environmentally controlled animals that are happy will produce more."

Objective 2: To evaluate consumers' perceptions of animal health and disease as related to livestock housing methods.
Housing method with the healthiest animals.

The second objective was to determine if consumers think animals are healthier and more protected from disease in one housing method versus another. Of those responding, 242 (48.2%) participants selected image B. A summary of the responses in regard to what image showed the healthiest animals can be found in Table 2.

Table 2

Consumers' Perceptions of the Image that Showed the Healthiest Animals.

Image Selection	ƒ	%
Image A	104	20.7
Image B	242	48.2
Both Images	153	30.5

Participants who selected image B justified their selection by saying the animals were happy, out in the open, in their natural green environment with room to roam. Some examples of specific responses to this question included: "the animals actually have room to breathe and live comfortably," "more control over their freedom," "coloring better green and pretty," and "reading and exposure to media says that animals that are separated are healthier."

The respondents who chose both images said they chose both because the animals in both images looked healthy. Some specific responses included: the animals look "comfortable, heads up, and ears are perky," "nobody looks sick, underweight, or without hair," and "cannot see any ribs, lost feathers, or rotten flesh." Additionally, a few respondents justified selecting both images through comparison. For example, one participant said "in image B they are less likely to spread disease, in image A there are preventative measures, it's controlled." Lastly, a small number of participants selected both images. These participants stated that they could not choose one image over another because an assessment of health could not be established through a picture.

Of the 30.5% of individuals who indicated that the healthiest animals were in image A, several discussed that the environment in image A was controlled, clean, and sanitary. Additionally, respondents selected image A as having the healthiest animals because they said the animals were being closely monitored and cared for. Lastly, some respondents chose image A because they said the animals in image B "look skinny," "not very healthy," and "sick."

Housing method with animals most protected from disease.

After selecting the image with the healthiest animals, respondents were asked in what image the animals would be most protected from disease. Of those responding, 230 (45.8%) participants selected image A, and 222 (44.2%) participants selected image B. A complete summary of these responses can be seen in Table 3.

Table 3

Consumers' Perceptions of what Image Showed Animals Most Protected from Disease.

Image Selection	*f*	*%*
Image A	230	45.8
Image B	222	44.2
Both Images	38	7.6

Responses from individuals selecting image A fell into four common themes: a controlled environment, close monitoring of animals, clean and sanitary conditions, and the prevalence of vaccination programs. Some notable responses for the selection of image A included, "more controlled environment, but one bad apple could infect the rest" and "animals provided antibiotics and vaccines along with other medicines."

Of those respondents who chose image B, many did so because the animals were not confined or overcrowded. One respondent referenced image A as spreading disease more rapidly, "like kids in school." Other respondents referenced "natural habitat" and "freedom" as their reasons for selecting image B.

Those who chose both images did so because they said the protection from disease depended on other factors besides housing method, such as proper care. Other respondents justified selecting both images by making an argument for each image. For example, one respondent said in image A farmers are "very precautious, they shower in shower out" and in image B if farmers are "rotating pastures and doing it right the livestock won't have worms."

Objective 3: To evaluate consumers' perceptions of safe and wholesome food products and consumer friendly prices as related to livestock housing methods.
Safe and wholesome food products.

The final objective of this study was to evaluate consumers' perceptions of safe and wholesome food products and consumer-friendly prices as related to livestock housing methods. When participants were asked what image would produce the safest and most wholesome food product, 224 (44.6%) participants selected image B. A summary of all the responses to this question can be found in Table 4.

Those who selected image B gave several justifications. The common themes included: the animals were not confined and thus would have less disease, the animals were outside in a natural free-range environment, fewer chemicals (hormones, antibiotics, steroids) were used while the animals were being raised, and the animals were happier and healthier. A participant said "range animals have no chemicals pumped into them." Additionally, some specific responses relating to health and happiness included: "the healthier the animal the healthier the food" and "happy animals make happy meals." Some of the participants who selected image B referenced reading scientific studies and

Table 4

Consumers' Perceptions of Safe & Wholesome Food According to Housing Method.

Image Selection	*f*	*%*
Image A	165	32.9
Image B	224	44.6
Both Images	97	19.3

indicated that free range was healthier. One participant stated, "the spin media puts on it tells us to want free range."

Image A was selected by respondents who reasoned that the animals were being taken care of, were in a controlled environment and receiving controlled nutrition, and appeared clean and in good health. "Someone's taking care of them and monitoring them," said one respondent. In addition, another respondent concluded that the animals in image A were "more protected and not exposed to elements."

Participants who chose "both images" provided justification that both images appeared to show healthy and safe animals, the safety of food could not be determined from the pictures, the safety and wholesomeness of food would depend on the management, and both methods are inspected and have laws to follow. One respondent indicated that it "doesn't have to do with living conditions, just how animals are cared for."

Consumer friendly prices.

When the research participants were asked what picture would produce the most consumer friendly food prices, image A was selected by 352 (70.1%) of respondents, while 102 (20.3%) selected image B. Image A was frequently selected as participants were able to identify that this housing method was cost efficient, involved mass production, was controlled, and required less labor and less land. Some examples of participant responses included: "assembly line, more efficient" and "if we go back to a pasture system we'll increase the price of food by five fold." Additionally, one participant stated "one guy can do a lot more; the animals are less labor intensive in this system."

Participants chose image B for reasons such as less overhead costs, less disease, and cost justified by consumer values. Two statements included, "it's natural you don't have to spend money on machines and buildings" and "farmers don't have to pay for grass." In addition, another participant stated "people are looking for healthier foods, we are a sick nation because we have crap in our food," while another reasoned "if we're going to eat animals it's worth the price."

The respondents who selected both for this question reasoned that they just thought it was both. Examples of responses were it is a "toss up," there is "no wrong answer," and "more likely A, but probably both."

Discussion/Conclusions

Although this study is not generalizable past those who attended the [State] State Fair and volunteered for this study, it still provides valuable data for agricultural communicators. Much can be gained in regard to the perceptions consumers have about livestock housing methods, the conclusions they draw from images, and how the images in media affect those perceptions. Due to the animal welfare issues occurring in Ohio at the time of this study, it is suspected that participants may have been more familiar with the research topics than they would have been if animal welfare had not been a current issue. However, Ohio's Livestock Care Board ballot initiative had not been officially placed on the ballot or released to the public at the time of this study.

The results of the study show more participants believed that the majority of livestock were raised in conventional livestock housing. Although this is accurate, the concern becomes the 24.5% (n = 123) of individuals who believed that traditional housing was more abundant. Agricultural communicators should take note of the reference to the images consumers see driving down the road, as well as the images they see on television. The observations of this research support the theory of

semiotics suggesting that visual images promote a cultural ideology (Blaney & Wolfe, 2004). The quote "Cows on a hill equals America" is one example of the cultural ideologies discussed by participants when viewing the livestock images.

The results also show that most participants did not perceive conventional livestock housing to be the most humane. Neither traditional nor conventional livestock housing meets all of the requirements of the best livestock-housing environment as suggested by the AVMA. However, based on participants' responses it can be concluded that consumer's may associate humane treatment with factors other than environmental requirements. Additionally, an indexical relationship may be causing consumers to associate conventional livestock housing with inhumane treatment (Moriarty, 2005). On more than one occasion, respondents provided justification for their response by indicating the animals were happier in one image vs. another. Some of these responses referenced the "Happy cows come from California" commercial campaign. Although this is a positive advertisement in regard to agriculture, communicators should evaluate if commercials such as this are creating idealistic views about agriculture rather than showing reality.

The results of objective two indicated that most respondents believed traditional livestock housing produced the healthiest animals, but most participants also believed conventional housing was more adequate in protecting livestock from disease. When participants discussed image B as producing the healthiest animals they used emotionally laden terms such as natural, happy, free, and green. Participants exhibited positive emotions when using these terms. It can be concluded that many participants may have made an emotional connection with image B because they felt more familiar with image B (Messaris & Moariarty, 2005). When determining which housing method would protect animals from disease the most, participants referenced more logical terms such as, control, people taking care of the animals, and vaccination programs. Thus, it seems participants may have been less familiar with image A and did not develop the same emotional connections to the image as they did with image B. As related to semiotics, the participants' responses in this study illustrated that they regularly saw images of traditional livestock housing, thus they are likely able to relate cultural meanings to the image at the connotative level (Moriarty, 2005). The average consumer has not regularly seen conventional livestock housing and cultural meanings are less associated with this image, thus one may conclude that this image was assessed at the denotative level (Moariary, 2005). By using this information, communicators could create advertising campaigns that would allow the consumer to make a positive cultural connection with conventional livestock housing as well.

The farm-to-plate knowledge gap seemed to be observed in the participants' responses when asked what method produced the most safe and wholesome food. Most respondents selected traditional housing as being the most safe and wholesome, with the common reasoning that various chemicals were not used in traditional livestock housing. This finding may indicate that participants were not aware that pasture-raised animals may receive supplemental feeding besides grass and that pesticides may be present in the grass pasture-raised animals consume. Also, the results illustrated that some participants assumed hormones, antibiotics, and steroids were only used in conventional housing methods. Although in reality, hormones, antibiotics, and steroids may be used in both or neither of the housing methods. One could attribute this apparent misunderstanding to mass media influence or a lack of motivation gain this knowledge (Tichenor et al., 1970; Weenig & Midden, 1997).

The majority of respondents correctly understood that conventional housing produced more consumer-friendly prices. However, an important observation from these responses was that many

of those respondents who answered image B did so not because they thought it was cheaper, but because they were willing to pay extra for products from a traditional housing situation.

Agricultural communicators should use this information to produce effective advertising campaigns for agriculture, as well as to effectively educate consumers about agriculture, specifically livestock production, in order to narrow the farm-to-plate knowledge gap. The findings show that respondents were somewhat knowledgeable about agriculture, but the perceptions and justifications provided were not always accurate. This is somewhat surprising as the participants demonstrated an interest in agriculture by walking through the agricultural building at the state fair and choosing to participate in the study. However, this finding aligns with previous research that has indicated consumers' knowledge and perceptions of agriculture are often inaccurate (Frick, Birkenholz, & Machtmes, 1995; Duncan & Broyles, 2006; National Research Council, 1988). In addition, it provides valuable information about what consumers are interpreting through agricultural images.

The results of this study are not generalizable beyond those who participated in this study and provided useable responses. Additionally, the location and incentive used in this study may have biased this research and discouraged those who do not support the consumption of animal-based products from participating. Participants may have been influenced by the volunteer nature of the participants, individuals in the building, the survey administrators, other participants, or the exhibits in the building. Further analysis should be conducted on this data to evaluate if the demographics of the participants are related to their responses. This study should be replicated at a different venue and through random sampling in order to get a wider selection of the population. Further replication should also include sampling in a rural venue as well as an urban venue. A chi-square analysis of these geographical samples and image responses would provide valuable results in regard to the relationship between geographical region and knowledge and perceptions of agriculture, thus indicating if the farm-to-plate knowledge gap is widespread.

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MANAGEMENT OF COFFEE LEAF RUST DISEASE IN INDIA: EVIDENCE FOR CHANNELS OF COMMUNICATION

Dr. M.R. Narayana

Abstract

Management of coffee leaf rust (CLR) disease is essential to avoid its resultant production losses of Arabica coffee. Communication channels provide coffee farmers with the required knowledge for management by the recommended disease control methods and their applications. In this context, this paper analyses the role of communication channels for management of CLR by using a newly collected household level data of 575 Arabica coffee farmers in India. Management is focused on cultivation of resistant varieties and application of chemical sprays. Two methods of analyses are developed: Descriptions based on spatially aggregate data. Second, estimations based on Binary Logit Model using individual data. Descriptions show that prevalence of CLR is universal; key channels of communication are fellow farmers, extension workers and television; and desired channels of communications include on-farm demonstration and training workshops. While individual communication is most preferred channel, farmers' associations are considered useful institutional channels of communication. Estimations distinguish communication channels by fellow farmers and extension workers and show significant differences in nature and extent of impact of these communication channels on CLR management by resistant varieties and chemical sprays. These results have important implications for identifying and improving the current and future information needs and channels of communication for effective management of CLR, especially for small farmers with lower educational attainments in India. However, the approach and implications of this paper are of general relevance and applicability for other coffee growing countries in Asia and Africa.

Introduction

Coffee Leaf Rust (CLR) is an important disease which affects the coffee production, especially Arabica coffee that is more susceptible to CLR than Robusta.   According to the Coffee Board (2009a), when the disease is severe, loss of foliage up to 50 per cent and berries up to 70 per cent can occur. Thus, management of CLR management is essential to increase production and productivity of coffee and to attain long run sustainability of income generation from coffee cultivation and improvement in livelihood of coffee farmers, especially small farmers. Management of CLR refers to all coffee farming practices which are directly or indirectly aim at prevention of occurrence and spread of the disease. The management practices include chemical sprays, intercropping, weeding, pruning, shade regulation, topping, de-suckering, uses of fertilizers and nutrients. This paper focuses

on cultivation of CLR resistant varieties and application of chemical sprays or fungicides as the most important CLR management practice for Arabica coffee because of their relevance for channels of communication. This approach presumes that all other CLR management practices are uniformly followed by all farmers.

Analyses of communication channels in the management of CLR by household coffee farmers raise following research questions because of multiple channels and management practices. What are the channels of communication by which farmers receive the required information for management of CLR? Are the channels different or common between the management practices? Do these channels and management practices differ by coffee regions? What is the nature and extent of impact of communication channels on different CLR management practices? What are the desired future information needs and channels of communications for management of CLR? Can CLR management be effective if we improve the current and future channels of communications? If so, which of the channels can be singled out for effective CLR management? Can there be a communication-based strategy or policy for promotion of adoption of recommended CLR management practices? If yes, can such a strategy be targeted for small and less educated farmers?

To our knowledge, there exists no study or analysis which provides plausible answers to the above research questions for household coffee farmers in India. This research gap is evident, for instance, in the Indian studies on Arabica coffee [Babu Reddy et al., (2003) and Babu Reddy (2004)]; international studies on CLR by Schieber's (1972), Hillocks et al (1999) and Phiri et al (2001); and extensive review of studies on information and communication technology based on agricultural extension services in Asia and Africa, such as, Siraj (2011) for Pakistan, Ortmann (2000) for Nigeria and Meera et al., (2004) for India. A notable exception is Aker (2011) who provides with an excellent review of economic studies by types of agricultural extension (e.g. farmer field schools, training and visit, farmer to farmer, and social networks) and the role of information and communication technologies for non-coffee specific agricultural extension in developing countries of Asia and Africa with special reference to the role of mobile phones. However, this paper fills in the research gap on the role of channels of communication for management of CLR in India.

The main objective of this paper is to analyze the role of different channels of communication in the management of CLR by household coffee farmers in India. This analysis is approached in two ways by using a newly collected household survey data of 575 household coffee farmers in traditional coffee growing regions of India. First, description of grouped data (or spatially aggregated data by the coffee regions). Second, estimation of relationships between adoption of CLR management practices and channels of communication based on individual data. Descriptions are focused on assessing the nature and extent of current utilization of existing channels of communication, identifying plausible channels by types of management of CLR and by assessing future information needs by the channels. Throughout, all descriptions are disaggregated by traditional coffee growing states and districts to highlight the uniqueness of inter-regional variations. Estimations are based on Binary Logit Model with different channels of communication to obtain empirical evidence on the impact of channels of communication on CLR management practices. These descriptions and estimations are intended to draw implications and argue for a communication based policy for management of CLR by household coffee growers in India and find their generality for other developing coffee growing countries in Asia and Africa.

Methods

Sample survey of household coffee farmers

Due to unavailability of a nationally representative and disaggregate database on the household farmers, a new database is created through a sample survey of 575 farmers in traditional Arabica coffee growing regions from 23 February 2010 to 31 August 2010. Traditional coffee growing states (all located in Southern India) are Karnataka, Kerala and Tamil Nadu. Major coffee growing districts in Karnataka State are Chikmagalur, Hassan and Kodagu. These traditional regions contributed about 98 per cent of total coffee production or 94 per cent of total Arabica coffee production by post-monsoon estimates as well as post-blossom estimates in 2010-11. Further, Karnataka is the largest producer of Arabica coffee in India. Its share is about 80 per cent in total production of Arabica coffee. The national share of its three districts is: Chikmagalur: about 40 per cent; Kodagu: about 22 per cent; and Hassan: about 18 per cent. Other major Arabica coffee growing regions include Pulneys, Shevroys and Annamalais in Tamil Nadu and Nelliampathis in Kerala.

The selection and allocation sample household coffee farmers is based on multi-stage and simple random sampling method. The multi-stage sample design is distinguished by three stages. In Stage I, total sample is allocated to three states in proportion of the average combined share by five variables: (a) Planted area (Arabica) in 2007-08, (b) Planted area (Arabica) in 2008-09, (c) Production of coffee (Arabica) in 2007-08, (d) Production of coffee (Arabica) in 2008-09 and (e) Production of coffee (Arabica) in 2009-10. In Stage II, sample size in Stage I is allocated in proportion of the distribution of farmers by estate size of planted area under Arabica coffee in each state. This has the objective of giving sufficient representation to the small farmers. In Stage III, sample farmers are randomly drawn from all the Liaison Zones of the Coffee Board of India. In the absence of a complete household listing of coffee farmers by the Zones, however, the entire fieldwork is executed in coordination with the officials and staff in extension services of the Coffee Board and local coffee estate workers for identification and location of sample estates or farmers.

Structured questionnaire is the instrument of collection of primary data from the sample farmers. Trained investigators canvassed the questionnaire by direct personal interview with the farmers at their estates. The questionnaire sought information including coffee farming activities, CLR prevalence and control methods, farmers' awareness of CLR management practices and current and future information needs and channels of communication for CLR management. The survey data is the basis for the entire descriptions and analyses in this paper.

Technique of analyses

Two techniques of analyses are developed based on the above primary data. First, descriptions based on spatially aggregate data. Second, empirical estimations based on Binary Logit Model using individual data.

Descriptive technique. This technique focuses on descriptions of basic data by tabular presentation and using ratios and percentages. All descriptions are given by traditional coffee growing regions by using grouped data at state and district levels of aggregation.

Empirical technique. Whether or not a farmer is an adopter of a CLR management practice is a qualitative response in the sample survey. This response can be quantified by the familiar dummy-endogenous variable and modeled in the framework of a Binary Logit model as follows.

$$\text{In } [\rho ki / (1-\rho_{ki})] = \alpha_j + \beta_j \, C_{jki} + \varepsilon_{ki} \qquad (1)$$

Where In $[\rho ki / (1-\rho_{ki})]$ is the logit for application of k-th CLR management practice by chemical sprays (e.g application of Bordeaux mixture, Systemic fungicides or both Bordeaux mixture and Systemic fungicides); In is the base of natural logarithms; ρ_{ki} is the probability (defined by the standard Logistic distribution function) of applying k-th practice by i-th farmer; $(1- \rho_{ki})$ is the probability of non-adopting a CLR management practice; C_{jki} is j-th channel of communication for k-th application of a CLR management for i-th farmer; α_j and β_j are intercept and slope parameters to be estimated; and ε is random disturbance term.

The model in (1) is inherently non-linear and estimated by the technique of non-linear maximum likelihood estimation. We predict the sign on β_j to be positive. This implies that, other things being equal, an increase in communication of information by the j-th channel of k-th management practice will have positive impact on the odds in favour applying the k-th management practice by i-th farmer.

Using the estimated parameters [denoted by asterisk (*)], the probability of application of k-th practice by i-th farmer is equal to:

$$\rho_{kj}{}^{*} = \ In(Z_{ki}{}^{*}) / \{1 + In (Z_{ki}{}^{*})\}. \quad (2)$$

Where Zki* is the estimated odds-ratio and is equal to $[\alpha_j{}^{*} + \beta_j{}^{*}.C_{jki}]$. Equation (2) is computed separately for each of the channels of communication. Next, the elasticity of probability by the j-th channel of the k-th management practice is computable at its sample mean value $[A_{jk}]$ as follows.

$$\eta_{kj} = A_{jk}.(1- \rho_{ki}{}^{*}).\beta_j{}^{*} \quad\quad\quad (3)$$

The elasticity is computed for each CLR management practice by channels of communication. If all the channels are measured by dummy variables, then the elasticity shows the responsiveness of a CLR management practice to a discrete change of the communication channel variable from 0 to 1.

The above framework is focused on impact of communication channels on CLR management by chemical sprays. This framework can be extended to incorporate the importance of j-th communication channel for CLR management by resistant varieties for i-th farmer (R_{ji}) and level of educational attainment of i-th farmer (E_i) in the following way.

$$In [\rho_{ki} / (1-\rho_{ki})] = \alpha_j + \beta_j\, C_{ji} + \theta_j\, R_{ji} + \lambda E_i + \varepsilon_{ji} \quad\quad (4)$$

We predict the sign on θj to be negative. This means that, other things being equal, an increase in communication of information of CLR management by resistant variety will reduce the odds in favour of adoption of CLR management by chemical sprays. This prediction implies that management of CLR by resistant varieties and chemical sprays are substitutes when the substitutability is estimable by channels of communication. In addition, we predict the sign on λ to be positive and interpret that a farmer with higher educational attainment would have higher odds in favour of applying the CLR management by cultivation of resistant varieties.

Results
Descriptive results
Select background characteristics of farmers. Of the total 575 sample farmers, 73 percent (or

417 farmers) belong to Karnataka, 18 percent (or 103 farmers) to Tamil Nadu and the rest 9 percent (or 54 farmers) to Kerala. Of the 417 sample farmers within Karnataka, the distribution by districts is as follow: Chikmagalur (44 percent), Kodagu (31 percent) and Hassan (25 percent).

Farmers with estate size of less than 10 hectares or about 25 acres are called small farmers. They constitute the highest share of sample farmers at the national, state and district levels. For instance, share of small farmers is equal to 90 percent at all India level. Within Karnataka, this share varies from 86 per cent in Chikmagalur to 94 percent in Hassan and to 94 per cent in Kodagu. In particular, the sample is dominated by the smallest farmers with less than 5 acres or smaller farmers with less than 10 acres of estate size. For instance, share of smallest (or smaller) farmers is equal to about 43 (or 24) percent in Karnataka, 81 (or 7) percent in Kerala, 64 (or 14) percent in Tamil Nadu and 51 (or 21) percent at all India level. Thus, the results of this paper are of special relevance for these vulnerable sections of India's coffee farmers whose livelihood depends exclusively on income from coffee farming.

Prevalence rates of CLR are the bases for analysis of role of communication in management of CLR. Educational background of farmers is useful to identify the particular channels of communication for management of CLR, especially for the focus group of farmers by their lower educational attainments. Table 1 summarizes the survey results on prevalence rates and education background of farmers by coffee regions.

CLR is not new for coffee farmers in India because more than 50 per cent of total farmers have identified it from the beginning of their farming or may not even remember when it did first occur in their estates. A notable exception is Kerala where prevalence rate is higher for new growers since 2005. In the same way, new growers since 2001 and 2005 have identified CLR in all districts in Karnataka and in other states. Thus, CLR has continued to live with the India's coffee farming from past to the present.

Household heads with completed levels of education show interesting variations. Higher number of household heads has completed primary, upper primary, high school and higher secondary levels of education. Non-professional graduates are highest in completed levels of higher education. Household heads with non-formal education are highest in Tamil Nadu and Hassan district in Karnataka. These diversities in educational attainments of farmers have important implications for adoption of CLR management practices, especially when it involves technical and economic details to be disseminated and translated into production and business strategies at the individual and community levels.

In the absence of non-formal education, however, the farmers would have been left with illiteracy. Of the total farmers, share of farmers with non-formal education and primary education (or up to high school) accounts for about 18 (or 59) per cent in Karnataka, 11 (or 70) per cent in Kerala and 20 (or 48) per cent in Tamil Nadu. Overall, they account for about 18 (or 58) per cent of total farmers in India. These farmers with completed lower education levels constitute the focus group for dissemination of information on CLR management practices by distinct communication channels, because they may have less technical capacity to self- learn the CLR management details.

Channels of communication by management practices. CLR management methods are distinguished by cultivation of CLR resistant varieties and applications of chemical sprays in the form of Bordeaux mixture and systemic fungicides. Six important varieties of Arabica coffee are grown in traditional coffee regions of India. They are called Selection 3 (or S.795), Selection 5A, Selection 6, Selection 9, Selection 12 (Cauvery/Catimore) and Chandragiri. Except for S.795, all other varieties

Table 1
Prevalence rates of CLR and educational background of farmers by coffee regions of India

Identification	Karnataka				Kerala (N=54)	Tamil Nadu (N=104)	Total (N=575)
	Chikmagalur (N=185)	Hassan (N=104)	Kodagu (N=128)	Total (N=417)			
	Prevalence rates						
CLR was identified first							
• From the beginning	61.08	54.81	54.69	57.55	37.04	60.58	56.17
• Since 2001	19.46	26.92	26.56	23.50	3.70	14.42	20.00
• Since 2005	19.46	18.27	16.41	18.23	42.59	22.12	21.22
• Not known	0.00	0.00	2.34	0.72	16.67	2.88	2.61
	Percent of farmers						
Level of completed education							
• Non-formal education (e.g. adult education)	6.49	15.38	4.69	8.15	1.85	13.46	8.52
• Primary school education	8.11	10.58	10.94	9.59	9.26	6.73	9.04
• Upper primary or middle school education	22.16	13.46	16.41	18.23	16.67	10.58	16.70
• High school education	36.22	30.77	28.13	32.37	44.44	30.77	33.22
• Higher secondary or pre-university education	7.57	13.46	14.06	11.03	12.96	13.46	11.65
• Graduate in non-professional education	16.76	16.35	17.97	17.03	12.96	18.27	16.87
• Post-graduate in non-professional education	0.54	0.00	0.78	0.48	0.00	3.85	1.04
• Graduate or post graduate in professional education	0.00	0.00	5.47	1.68	0.00	0.96	1.39
• Diploma holder	2.16	0.00	1.56	1.44	1.85	1.92	1.57

Note: N is total number of sample farmers. All figures under each background characteristic are per cent to total number of sample growers in the respective State/District. Number of growers with Post-graduate in professional education is nil.

are considered CLR-resistant [Coffee Board (2009b)]. The recommended application of chemical sprays by dosages and input combinations of fungicides by Bordeaux mixture and Systemic fungicides (i.e. Bayleton and Contaf) are as follows [Coffee Board (2009a)]. (a) Copper Sulphate (1Kg.) + Lime (1 Kg.) to prepare the Bordeaux mixture @ 0.5% for 5 barrel/acre/spray. (b) Bayleton@160g/barrel or   Contaf@400ml/barrel for preparation of Systemic fungicide for 3 barrel/acre/spray. In total, 5 spray schedules and 9 fungicide combinations are recommended: (i) two-rounds of Bordeaux mixture, (ii) two-rounds of Systemic fungicides (Contaf or Bayleton), (iii) three-rounds of Systemic fungicides, (iv) two-rounds of Systemic fungicides and one-round of Bordeaux mixture, and (v) one-round of Bordeaux mixture and one round of Systemic fungicides. Further, recommended application of fungicides are distinguishable by coffee seasons in India. That is, Bordeaux mixture spray is recommended during pre-monsoon (May-June); Systemic fungicides during break in monsoon (August); and combination of Bordeaux mixture and Systemic fungicides during post-monsoon (September-October). Access to and awareness of these scientific and technical details is

required for effective management of CLR by all coffee farmers. In the absence of appropriate channels of communication, however, the required information may not reach to all the individual farmers. This creates asymmetric information and its differential impacts on CLR management across coffee farmers.

Current channels of communication are identified below by three CLR-management practices: (a) Planting CLR resistant varieties, (b) application of Bordeaux mixtures by three times (pre-monsoon alone, post-monsoon along and pre and post monsoon) and (c) application of systemic fungicides (e.g. Bayleton/Contaf) by three times (pre-monsoon alone, post-monsoon along and pre and post monsoon).

Planting CLR-resistant varieties. Extent of planting the CLR resistant varieties and its channels of communication are given in Table 2. About 34 per cent of farmers in Karnataka, 70 per cent in Kerala and 37 per cent in Tamil Nadu have planted the CLR resistant varieties. Within Karnataka, this per cent varies from 26 per cent in Chikmagalur, 35 per cent in Hassan and 45 per cent in Kodagu. The important communication channels on the application of CLR-resistant varieties are fellow farmers and extension workers in all the states and districts. Other communication channels are specific to states and districts, such as, television in Karnataka and visiting researchers in Hassan. It is important to recognize that both fellow farmers and extension workers are forms of inter-personal channels of communication. In contrast, TV is a form of impersonal channel of communication and

Table 2
Channels of communication for household farmers' management of CLR by resistant varieties

Management by channels of communication	Karnataka				Kerala (N=54)	Tamil Nadu (N=104)	Total (N=575)
	Chikmagalur (N=185)	Hassan (N=104)	Kodagu (N=128)	Total (N=417)			
Per cent of farmers who planted the CLR resistant varieties	25.95	34.62	44.53	33.81	70.37	36.54	37.74
Channels of communication	Among the farmers who planted CLR resistant varieties						
• Fellow farmer	35.42	27.78	31.58	31.91	47.37	10.53	30.88
• Visiting researchers	0.00	11.11	1.75	3.55	0.00	0.00	2.30
• Radio	2.08	0.00	0.00	0.71	0.00	0.00	0.46
• Extension worker	41.67	30.56	43.86	39.72	50.00	86.84	49.77
• Training workshop	4.17	0.00	0.00	1.42	0.00	0.00	0.92
• TV (own)	16.67	22.22	21.05	19.86	2.63	2.63	13.82

Note: N refers to total number of sample farmers.

beneficial to the largest number of farmers by providing information on CLR resistant varieties.

Application of chemical sprays. Table 3 summarizes the extent of application of chemical sprays by Bordeaux mixture and Systemic fungicides and their channels of communication. There are remarkable inter-regional variations in the adoption of chemical sprays. Farmers in Karnataka (or Kerala) are the highest (or lowest) appliers of both the Bordeaux mixture and Systemic fungicides. The main reason for low application of chemical sprays by farmers in Kerala is due to their highest cultivation of CLR resistant varieties of Arabica coffee as shown in Table 2. Of the districts within Karnataka State, Hassan has the lowest number of farmers who apply both the chemical sprays.

The major channels of communication for application of chemical sprays are fellow farmers, visiting researchers, extension workers and TV. Interestingly, TV and visiting researchers as channels

of communication are relevant only for Karnataka State. In contrast, fellow farmers and extension workers, as forms of inter-personal communication, are the important and common channels of communication in all regions.

It is important to recognize that the major channels of communication for resistant varieties and chemical sprays exhibit more similarities than differences.

In particular, fellow farmers, extension workers and TV may be considered as the most common channels of communication for CLR management in all coffee regions of India. Further, many channels of communication in Table 2 and Table 3 are not reported because of their zero values. These channels include print media (e.g. newspapers and pamphlets), radio, on-farm demonstrations, and local leader, telecommunications (e.g. fixed and mobile phones and information technology (e.g. email and internet resources).

Future demand for information and channels of communication. Farmers' responses on their particular future information needs, desired communication channels and important informational constraints for management of CLR are summarized in Table 4. These responses show interesting insights and are useful to match supply of and demand for information by desired channels of communication.

First, farmers' information needs and communication channels to cope with the CLR are many and diversified   The crucial information needed include knowledge on preparation of chemical sprays, disease control inputs and exact time of application of various fungicides. The most desired channels of communication to receive these information are the visiting researchers, fellow farmer, extension workers, training workshop and on farm demonstration. Second, most farmers desire to receive the needed information individually/personally (about 71 per cent in Karnataka and 100 per cent in Kerala and Tamil Nadu). In addition, farmers desire to receive the information by selects institutions, such as, growers' (general farmers', general coffee farmers' and small coffee farmers') associations and partnership with government. Third, two major constraints to take up a new technology for improving the control of CLR are lack of awareness/ information/ knowledge on new technology and its applications and impact of new technology on increase in production and income.

Surprisingly, mass media (print, audio and audio-visual) and telecommunication services (e.g. telephones and internet) are of less importance for coffee farmers to receive the needed information. A general presumption for this insignificant role of telecommunication channels is lack of resources to access and utilize the telecommunication services, especially among the large number of very small and poor farmers. In reality, however, this presumption is not plausible because access to telephone in terms of household teledensity (i.e. number of telephones per 100 households) is remarkably higher: 64 per cent for mobile phones; 31 per cent for landlines; 86 per cent for combined mobile and landline. However, the teledensity is lower if calculated for total household population (1874 persons). That is, 18 for landlines and 25 for mobile phones. Nevertheless, as compared to the national level rural teledensity, coffee regions have a higher teledensity for landlines and lower for mobile phones. This reality provides a strong factual basis for introduction of a broader telecommunication-based information services for future management of CLR in India, given the experiences of mobile-based agricultural extension services in Asian countries [Aker (2011)].

Empirical results

Using the sample survey data 575 farmers, equations from (1) through (4) are estimated. To start with, we used three dependent variables for estimation of equation (1): (a)   Adopter of Bordeaux mixture [=1 if adopter of Bordeaux mixture (one or two times), =0 otherwise], (b) Adopter Sys-

Table 3
Channels of communication for household farmers' management of CLR by application of chemical sprays

Management by channels of communication	Karnataka				Kerala (N=54)	Tamil Nadu (N=104)	Total (N=575)
	Chikmagalur (N=185)	Hassan (N=104)	Kodagu (N=128)	Total (N=417)			
1. Per cent of responses among the farmers who applied pre-monsoon Bordeaux mixture (or Systemic fungicides)	19.46 (24.32)	5.77 (14.42)	23.44 (13.28)	17.27 (18.47)	9.26 (9.26)	22.12 (14.42)	17.39 (16.87)
Among the farmers who applied pre-monsoon Bordeaux mixture (or Systemic fungicides)							
1.1. Channels of communication							
⋏ Fellow farmers	30.56 (42.22)	16.67 (26.67)	50.00 (5.88)	37.50 (31.17)	40.00 (0.00)	86.96 (13.33)	49.00 (26.80)
⋏ Visiting researchers	0.00 (0.00)	16.67 (6.67)	0.00 (11.76)	1.39 (3.90)	0.00 (0.00)	0.00 (6.67)	1.00 (5.15)
⋏ Extension worker in coffee Liaison zone	13.89 (35.56)	16.67 (33.33)	20.00 (29.41)	16.67 (33.77)	60.00 (0.00)	13.04 (80.00)	18.00 (43.30)
⋏ TV (own)	55.56 (22.22)	50.00 (26.67)	30.00 (52.94)	44.44 (29.87)	0.00 (0.00)	0.00 (0.00)	32.00 (23.71)
2. Per cent of responses among the farmers who applied post-monsoon Bordeaux mixture (or Systemic fungicides)	4.86 (5.41)	12.50 (8.65)	1.56 (9.38)	5.76 (7.43)	0.00 (0.00)	3.85 (1.92)	4.87 (5.74)
Among the farmers who applied post-monsoon Bordeaux mixture (or Systemic fungicides)							
2.1. Select channels of communication							
⋏ Fellow farmers	11.11 (30.00)	30.77 (22.22)	50.00 (16.67)	25.00 (22.58)	0.00 (0.00)	50.00 (0.00)	28.57 (21.21)
⋏ Visiting researchers	11.11 (10.00)	0.00 (0.00)	0.00 (0.00)	4.17 (3.23)	0.00 (0.00)	0.00 (0.00)	3.57(3.03)
⋏ Extension worker	0.00 (30.00)	0.00 (44.44)	0.00 (66.67)	0.00 (48.39)	0.00 (0.00)	50.00 (100.00)	1.00 (51.52)
⋏ TV	77.78 (30.00)	69.23 (33.33)	50.00 (16.67)	70.83 (25.81)	0.00 (0.00)	0.00 (0.00)	0.00 (24.24)
3. Per cent of responses among the farmers who applied pre and post monsoon Bordeaux mixture (or Systemic fungicides)	66.49 (57.84)	75.96 (67.31)	45.31 (51.56)	62.35 (58.27)	3.70 (1.85)	7.69 (3.85)	46.96 (43.13)
Among the farmers who applied pre and post monsoon Bordeaux mixture (or Systemic fungicides)							
3.1. Select channels of communication							
• Fellow farmers	54.47 (27.10)	23.75 (28.57)	50.00 (27.27)	44.06 (27.57)	0.00 (0.00)	87.50 (0.00)	44.07 (27.02)
• Visiting researchers	4.07 (3.74)	6.25 (10.00)	12.07 (1.52)	6.51 (4.94)	0.00 (0.00)	0.00 (0.00)	6.27 (4.84)
• Extension worker	15.45 (43.93)	11.25 (44.29)	20.69 (50.00)	15.33 (45.68)	50.00 (100.00)	12.50 (100.00)	15.50 (46.77)
• TV	25.20 (24.30)	58.75 (17.14)	17.24 (21.21)	33.72 (21.40)	50.00 (0.00)	0.00 (0.00)	32.84 (20.37)

Note: N refers to total number of sample farmers

Table 4
Coffee growers' future needs for management of CLR in India

Farmers' information needs by channels of communication	Karnataka				Kerala *(N=54)*	Tamil Nadu *(N=104)*	Total *(N=57...*
	Chikmagalur (N=185)	Hassan (N=104)	Kodagu (N=128)	Total (N=417)			
1. Crucial information needed							
➢ Preparation of chemical sprays	54.59	48.08	63.28	55.64	7.41	10.58	42.96
➢ Disease control inputs	34.05	30.77	43.75	36.21	22.22	8.65	29.91
➢ Exact time of application of various fungicides	55.14	62.50	50.78	55.64	92.59	97.12	66.61
2. Desirable channels of communication							
➢ Fellow farmers	31.35	30.77	39.84	33.81	1.85	0.00	24.70
➢ Visiting researchers	23.24	20.19	24.22	22.78	72.22	78.85	37.57
➢ Newspapers/pamphlets (Print media)	1.08	1.92	3.91	2.16	0.00	0.96	1.74
➢ Radio	1.62	7.69	3.13	3.60	5.56	0.00	3.13
➢ Extension worker	54.05	62.50	60.94	58.27	100.00	100.00	69.74
➢ On-farm demonstration	35.68	32.69	39.84	36.21	24.07	32.69	34.43
➢ Training workshop	40.54	43.27	56.25	46.04	94.44	90.38	58.61
➢ Electronic media	2.16	0.96	0.00	1.20	5.56	2.88	1.91
➢ Internet	2.16	1.92	0.00	1.44	3.70	0.00	1.39
➢ Telephones	0.54	0.00	0.00	0.24	0.00	0.00	0.17
3. Proposed channels of communication							
➢ Growers' association	46.49	64.42	35.94	47.72	1.85	31.73	40.52
➢ Size-specific (e.g. small growers') association	48.11	39.42	59.38	49.40	25.93	11.54	40.35
➢ General farmers' association	31.89	22.12	19.53	25.66	12.96	7.69	21.22
➢ Individually	75.68	67.31	65.63	70.50	100.00	100.00	78.61
➢ Partnership with NGOs	4.32	3.85	0.78	3.12	7.41	0.96	3.13
➢ Partnership with government	40.54	28.85	32.03	35.01	1.85	2.88	26.09
➢ Others including telephones	3.24	0.00	0.00	1.44	0.00	0.00	1.04
4. Major informational constraints for management of CLR by lack of awareness/ information/ knowledge on							
➢ new technology and its applications	57.30	69.23	62.50	61.87	3.70	46.15	53.57
➢ impact of new technology on increase in production and income	66.49	62.50	69.53	66.43	59.26	48.08	62.43

Note: N is number of sample farmers. NGOs refer to non-governmental organizations.

temic fungicides [=1 if adopter of Systemic fungicides (one or two times), =0 otherwise] and (c) Adopter of both Bordeaux mixture and Systemic fungicides [=1 if adopter of both Bordeaux mixture and Fungicides (one or two times), =0 otherwise]. Independent variables are three channels of communication for each management practice: fellow farmer [=1 if a farmer received communication from a fellow farmer, =0 otherwise], extension worker [=1 if a farmer received communication from an extension worker, =0 otherwise] and TV [=1 if a farmer received communication from the TV, =0 otherwise]. Due to high collinearity between communication channels and few adopters, estimation of (1) by using the dependent variable (a) and (b) was not possible. Hence, all estimations are obtained by using the dependent variable (c) which is one the recommended chemical sprays for CLR management. In addition, education attainment of farmer (Ei) is measured by a dummy-variable (=1 if a farmer is higher educated, = 0 otherwise).

Table 5 presents the estimation results of 6 models by the estimated intercept and slope coef-

ficients and their asymptotic t-ratio. Goodness of fit of the estimated models is shown by the Log-likelihood test statistic and significance of Chi-square test. In addition, estimated probability of

Table 5
Determinants of CLR management practices by household famers in India: Estimates of Binary Logit Model for channels for communication and education

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable	Adopter of both Bordeaux mixture and Systemic fungicides					
	[=1 if adopter of both Bordeaux mixture and Fungicides (one or two times), =0 otherwise]					
Independent variables						
Intercept	-2.232 (9.24)*	-2.187 (9.73)*	0.535 (4.98)*	-6.301 (10.29)*	-6.190 (9.79)*	-6.556 (9.71)*
Fellow farmer as a channel of communication for						
• Bordeaux mixture	3.994 (13.70)*			5.452 (9.25)*	5.634 (9.11)*	5.752 (9.07)*
• Systemic fungicides		4.336 (13.12)*		5.994 (9.26)*	6.116 (9.09)*	6.301 (9.12)*
• Resistant varieties			-0.411 (1.77)***		-1.303 (2.31)*	-1.513 (2.64)**
Extension worker as a channel of communication for						
• Bordeaux mixture	3.042 (8.42)*			4.772 (6.46)*	4.584 (6.47)*	4.554 (6.44)*
• Systemic fungicides		3.763 (12.49)*		4.772 (8.84)*	4.955 (8.76)*	5.164 (8.72)*
• Resistant varieties			-0.872 (3.91)*		-0.751 (1.49)	-0.863 (1.66)**
Education						0.960 (2.27)**
-2 Log likelihood	236.790	212.385	384.036	107.834	104.219	101.583
Chi-square	310.93#	359.74#	16.44#	568.84#	576.07#	581.34#
Number of observations	575	575	575	575	575	575
Estimated probability	0.566	0.582	0.575	0.626	0.613	0.613
Estimated elasticity of probability						
Fellow farmer						
• Bordeaux mixture	0.934			1.114	1.169	1.217
• Systemic fungicides		0.574		0.710	0.735	0.773
• Resistant varieties			-0.029		-0.083	-0.098
Extension worker						
• Bordeaux mixture	0.149			0.186	0.197	0.199
• Systemic fungicides		0.479		0.543	0.573	0.609
• Resistant varieties			-0.070		-0.535	-0.063
Education						0.080

Note: Figures in the parentheses are t-ratios. * (or **) indicates (or indicate) that the t-statistic is significant at 1 (or 5) percent level or more.
# indicates that the Chi-square statistic is significant at 1 percent level or more.

adoption of CLR management and elasticity of probability by variables are given.

Channels of communication for Bordeaux mixture and systemic fungicides are distinguished by fellow farmers and extension workers. In Model 1 and Model 2, the coefficients of these variables are positive and significant. The magnitude of estimated coefficient for fellow farmer variable is higher than for the extension worker variable in both the models. However, the magnitude of coefficient for systemic fungicides is bigger than for the Bordeaux mixture. These results imply the relative size of impact of channels of communication on the adoption of both Bordeaux mixture and systemic fungicides for management of CLR by household farmers.

Interestingly, the coefficients of channels of communication for resistant varieties in model 3 are negative and significant. This implies that, in the presence of communication channel for adoption of resistant varieties, probability of management of CLR by chemical sprays is reduced. This indicates that resistant varieties and chemical sprays are substitutes for management of CLR in India.

Model 4 include all variables of channels of communication of chemical sprays. Model 5 extends the model 4 by including the channels of communication of resistant varieties as well as chemical sprays. In these models, all the coefficients have predicted signs and significant. Thus, the interpretation of the results is qualitatively similar as in case of Model 1 through Model 3.

Model 6 shows the consistency of results on channels of communications of chemical sprays and resistant varieties. In addition, the model shows that the estimated coefficient of education variables is positive and significant. This implies that, other things being equal, a farmer with higher education has a higher probability of adopting the CLR management practices than a farmer with lower levels of education. Thus, level of educational attainment does matter for management of CLR in India.

Estimation results in Table 6 clearly imply that the probability of adoption of CLR management is highest for channels of communication for Bordeaux mixture. This result offer empirical bases for prioritizing the improvement and strengthening of channels of communication of Bordeaux mixture for effective management of CLR in India.

Discussion/Conclusions

Using a newly collected sample survey of 575 farmers on Arabica coffee in traditional coffee growing regions of India, this paper has described the importance of communication channels for management of CLR by household coffee farmers and estimated the empirical relationship between CLR management practices and channels of communication. The descriptions and analyses lead to the following major conclusions.

The prevalence of CLR is universal and its management continues to be relevant due to its expected negative impacts on production. Channels of communication are important for coffee farmers to receive information on management of CLR by cultivation resistant varieties and application of chemical sprays. The major current channels of communications are inter-personal and in the form of fellow farmers and extension workers. These channels are common across CLR management practices in all coffee growing regions. However, the magnitude of impact of different channels on CLR management practices. Among the inter-personal channels, fellow farmers can be singled out by its biggest impact on management of CLR by application of Bordeaux mixture. Surprisingly, except for TV, farmers do not consider other communication channels, such as, print media, radio, on farm demonstration, training workshops and local leaders as remarkable sources of information and channels of communication.

Farmers' are explicit on their future needs of information in terms of preparation of chemical sprays, disease control inputs and exact time of application of various fungicides. The most desired channels of communication to receive these information are inter-personal [i.e. visiting researchers, fellow farmer, extension workers, training workshop and on farm demonstration] rather than impersonal channels [i.e. mass media and telecommunication services]. In addition, most farmers opt to receive the needed information in future through personal channels [i.e. individually/personally] or institutional channels [i.e. farmers' or growers' associations and partnership with government]. This implies a strong need for improving and strengthening the inter-personal channels of communication for effective management of CLR, both at present as well as in future.

More than 90 percent of coffee farmers are small and 50 per cent of coffee farmers have no education beyond high school. The presence of farmers with no formal education and up to primary education makes them a focus group to target the needed information through individual, interpersonal and institutional channels of communication. Thus, a policy for promotion of recommended CLR management practices may target the small farmers by educational levels and provide them the needed information on the management practices by communicating with them through the individual, interpersonal and institutional channels. The results of this paper are relevant for design of such a targeted communication-based policy for promotion at all India level of aggregation as well as state or district level of disaggregation. Other things being equal, a promotional policy for successful management of CLR may include specific measures for promotion and improvement of three major channels of communication: fellow farmer, extension worker and mass media. In addition, the use of information and telecommunication based technologies may also be explored for effective implementation of such a promotional policy.

This paper has shown that the presence of communication channel for adoption of resistant varieties reduces the probability of management of CLR by chemical sprays. In this context, whether or not a farmer may substitute the CLR cultivate resistant varieties for CLR tolerant varieties of Arabica coffee depends on long term assessment of cost and returns from cultivation of these varieties. This assessment is an important extension of this paper. In addition, the approach, results, conclusions and implications of this paper are of relevance and applicability for other coffee growing countries in Asia and Africa where the information needs and communication channels for management of CLR may be generally comparable with that of India. To establish this generality on empirical grounds, this study may be replicated in other countries.

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