Exploring school foodservice directors' intentions to implement farm-to-school procurement methods considering food safety practices

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Exploring school foodservice directors’ intentions to implement farm-to-school procurement methods considering food safety practices

by

Sandra C Curwood

A dissertation submitted to the graduate faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Hospitality Management

Program of Study Committee:
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Lakshman Rajagopal, Co-Major Professor
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Iowa State University
Ames, Iowa
2016
DEDICATION

To my family

My husband, Douglas, for his endless patience and support;

and my children, Jason, Devon, and Jessica;

I have always been so proud of you and it is an honor that you are also proud of me.
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ABSTRACT

This study explored school foodservice directors’ knowledge and behavioral beliefs regarding food safety practices in farm-to-school (F2S) programs and normative and perceived behavioral control in using alternative produce procurement methods. Alternative procurement methods are used in F2S programs to purchase produce directly from regional growers for use in school foodservice programs. Food safety has been perceived as a barrier to implementation of F2S procurement practices (Conner, King, Koliba, Kolodinsky, & Trubek, 2011).

A web-based questionnaire was used to explore school foodservice director’s (FSDs) intentions to adopt F2S procurement based on food safety practices. The theory of planned behavior (TPB) (Ajzen, 1985) and the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980) were used as theoretical underpinning to examine intentions as predictors of behavior. The questionnaire, developed based on previous literature, was distributed to California school FSDs (n= 864). Analysis was conducted on 136 usable questionnaires (16.4% response rate). Most respondents were female (84.4%), between the ages of 35-64 (82.6%), with a least a bachelors’ degree (60.9%), and four or more years of school foodservice experience (85.2%). Food safety knowledge results revealed 56.7% of responding FSDs (n= 125-127) answered five or more, of the six total, questions correctly. School FSD demographics did not yield any statistically significant differences in mean knowledge scores.

The findings indicated the TPB (Ajzen, 1985) model did not explain the determinants of intention, as the relationship between control beliefs and perceived behavioral control were not supported. In measuring behavioral beliefs, findings related to food safety in alternative produce procurement had high levels of agreement among school FSDs in their confidence to manage
produce safety practices. Results related to normative and perceived behavioral control in using alternative produce procurement practices, indicated that despite willingness, FSD’s capacity and intention to change their process was much weaker. Future studies could include other theoretical models, such as risk avoidance, to identify factors inhibiting school FSD’s control or perceived control. These results would suggest that if implementing alternative produce procurement methods is desirous, it would likely require policy or a mandate, possibly as part of reauthorization of the Child Nutrition Act.
CHAPTER ONE. INTRODUCTION

The National Farm to School Network describes farm-to-school (F2S) as the practice of sourcing local agricultural products for schools with the goals of providing agriculture, health, and nutrition education opportunities, and supporting local and regional farmers. Experiential learning in F2S such as school gardens, farm field trips, and cooking lessons enhance the curricular experience and connections to the cafeteria and community. F2S programs aim to improve student health and communities’ economic viability through local produce procurement practices (National Farm to School Network, 2015). The F2S effort has focused on connecting local farms with consistent and stable buyers; this relationship is the keystone to bringing local seasonal produce through direct marketing in an effort to both support farm viability and to provide fresh seasonal produce to school foodservice programs (Izumi, Ronstadt, Moss, & Hamm, 2006). The direct marketing model, used in F2S projects, has identified perceived benefits such as financial gain to farmers and decreased travel time for products resulting in fresher foods and lower fuel consumption during transport (Gregoire, Arendt, & Strohbehn, 2005). Perceived barriers to implementing F2S include cost, distribution, food safety, and legal liability (Conner, King, Koliba, Kolodinsky, & Trubek, 2011).

Background

The first studied F2S initiatives were noted in the 1990’s in two U.S. regions; in Florida by a United States Department of Agriculture (USDA) consultant linking farmers directly to schools, and in Southern California between a school district and the Santa Monica Farmers Market (Vallianatos, Gotlieb, & Hasse, 2004). These early programs established an alternative procurement method for school foodservice to purchase local and seasonal produce for use in the school meal program. Projects have proliferated in tandem with the implementation of the new
meal pattern guidelines under the Healthy Hunger Free Kids Act of 2010 and the USDA initiative to promote local produce procurement (U. S. Department of Agriculture, Food and Nutrition Services, 2013). In November 2013, the USDA published a F2S census reporting that in the 2011-12 school year $354 million dollars were spent on locally purchased foods in 3,812 school district foodservice programs. A second census report was conducted in 2015, reviewing data from 2013-14 school year to document progress towards the USDA goal of student access to local foods in school meal programs (USDA, 2015).

A tenet of F2S programs is the transition from previously established procurement practices to an alternate direct-marketing model (Allen & Guthman, 2006). Alternate procurement practices in F2S vary from conventional purchasing by shortening the purchasing chain (Selfa & Qazi, 2005). School foodservice directors are responsible for complying with established procurement and food safety regulations and laws from a variety of local, state, and national jurisdictions.

The Child Nutrition and WIC Reauthorization Act of 2004 mandated school foodservice operations to include HACCP plans (Hazard Analysis Critical Control Points) as part of defined standard operating procedures (SOPs) in their food safety program. Food safety knowledge and training is necessary for school foodservice directors to implement and manage F2S programs compliant with safe produce procurement practices as integral to their food safety plans.

School foodservice has a responsibility to uphold and promote food safety practices to maintain student health and well-being. According to United States Federal Drug Administration Food Code, school-aged children are considered a susceptible population and require additional safeguards (U.S. Food and Drug Administration, 2014). The need to address food safety in F2S programs has been identified by USDA through programs, such as Produce Safety University
Statement of the Problem

F2S has garnered increasing interest, yet procurement and food safety practices for produce have not specifically been addressed. While F2S programs are noted to be more prevalent in states with F2S laws (Schneider, Chriqui, Nicholson, Turner, Gourdet, & Chaloupka, 2012), alignment with training, resources, and technical assistance, has not been readily available to buyers or sellers. Developing F2S standard practices is further complicated due to the variety in F2S project size, capacity, and programming (Schafft, Hinrichs, & Bloom, 2010).

Contributing to the barriers associated with implementing new or varied produce procurement methods are concerns related to food safety breaches by small or mid-sized farms leading to foodborne illness outbreaks. Food safety is a high priority for school foodservice program directors. While interest exists in supporting F2S work, concerns regarding food safety still remain. The Center for Disease Control and Prevention (CDC) monitors, tracks, and investigates when two or more people become ill from eating the same food (Centers for Disease Control and Prevention, 2013). Painter, Hoekstra, Tauxe, Braden, Angulo, and Griffin (2013) found that of the 17 food commodity categories, produce had the highest percentage (46%) of attributed foodborne illness cases.

The theory of planned behavior (TPB), as a theoretical framework, was used to examine determinants of intention as predictors of behavior (Ajzen, 1985). The TPB model theorizes that there is a relationship between beliefs and determinants of intention; these determinants are predictors of future behaviors. The theory of reasoned action (TRA) (Ajzen & Fishbein, 1980)
predates the TPB; conceptually there is a distinction between the two theories. The TRA was utilized to supplement the TPB. In the TRA subjective norms were further delineated beyond the general influence of others, to include influence of experts, and organizational superiors and will be used in this study. School foodservice directors’ behavioral intentions to adopt F2S practices may be impacted by their knowledge as well as behavioral, normative, and control beliefs’ regarding food safety in traditional procurement and alternative procurement associated with F2S.

**Purpose of the Study**

The purpose of this study was to explore school foodservice directors’ knowledge and behavioral beliefs regarding food safety in F2S programs and normative and perceived behavioral control in using traditional procurement and alternative procurement practices. F2S programs are a fairly new practice in school foodservice operations. Subsequently, the research regarding food safety in an alternate produce procurement scenario is scant.

F2S programs are developing at a rapid rate across the U.S. particularly in California due to a long growing season and large crop variety. Transition to an alternate system of procurement necessitates identification and evaluation of challenges and best practices. This research will identify and assess California school foodservice directors’ knowledge and behavioral beliefs regarding food safety in produce procurement practices for conventional and alternate methods associated with F2S programs. Therefore, the following eight research questions were identified. Research findings can be used to identify gaps in resources, training, and policy to support produce safety in F2S programs.
Research Questions

The central question posed is “How do K-12 school foodservice directors’ knowledge, and their behavioral, normative, and control beliefs’ about food safety impact behavioral intentions to implement alternative produce procurement associated with a F2S program?”

1. Does school foodservice directors’ food safety knowledge impact their behavioral intentions to implement alternative produce procurement associated with F2S programs?

2. Does school foodservice directors’ attitudes about food safety training impact their intentions to implement alternative produce procurement methods associated with F2S programs?

3. Does school foodservice directors’ subjective norm (the impact of other’s influence) impact their intentions to implement alternative produce procurement associated with F2S programs?

4. Does school foodservice directors’ perceived behavioral control impact their intentions to implement alternative produce procurement associated with F2S programs?

5. Does school foodservice directors’ attitudes regarding food safety differ for alternative produce procurement versus conventional procurement?

6. What is the relationship between school districts’ operational characteristics and foodservice directors’ intentions to implement F2S procurement practices?

7. What is the relationship between foodservice directors’ demographics and their intentions to implement F2S procurement practices?
8. What are the challenges to implementing food safety training for fresh produce in California school meal programs?

Definitions of Key Terms

**Alternative food systems**: are characterized by providing value along the supply chain for growers, producers, and consumers within geographic boundaries (Peterson, Selfa, & Janke, 2010).

**Alternative produce procurement**: As used in F2S programs consist of purchasing practices in which value along the supply chain for growers, producers and consumer within geographic boundaries occur. Examples of alternative procurement sourcing include: grower direct, farmers market, community supported agriculture, and regional food hubs (USDA-FNS, 2014).

**Attitude**: Ajzen (1985) describes attitude as “the degree to which a performance is positively or negatively valued.”

**Behavioral intention**: is defined as “indication of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior” (Ajzen, 1991, p. 181). Behavioral intentions are related to implementation of alternative procurement practices associated with F2S programs.

**Farm-to-school program (F2S)**: sourcing seasonal and locally produced agricultural products through direct marketing channels to be used in school meal program (National Farm-to-School Network, 2014).

**Farm-to-school initiatives**: include addressing the food environment, improving human nutrition and health, and supporting the local economic community by supporting local agriculture (Bagdonis, Hinrichs, & Schafft, 2008).
**Farm-to-school activities:** include procurement of local foods served in school cafeterias, student educational activities, and school gardens that engage students (National Farm-to-School Network, 2014).

**Food code:** published by the FDA, every four years, the *Food Code*, is used as a source document for government regulators that conduct health inspections to develop their food safety requirements (FDA, 2014).

**Food defense:** “Food defense is the protection of food products from intentional adulteration by biological, chemical, physical, or radiological agents” (USDA, FSIS, 2014, “Food Defense and Emergency Response,” para. 1).  

**Food poisoning:** food illness or disease acquired from consuming foods containing harmful toxins or poisonous chemicals (CDC, 2014).

**Food safety:** “food safety can be defined as “Protection of food from unintentional contamination and controlling biological contaminant growth with time/temperature control” (Pannell-Martin, 2014, p. 271).

**Foodborne disease:** an illness associated with consuming foods contaminated with microbial organisms, which include bacteria, parasites, molds, and viruses (CDC, 2014).

**Foodborne illness:** The Center for Disease Control and Prevention notes that the terms foodborne illness, foodborne disease, and foodborne infection, can be used interchangeably (CDC, 2014).

**Foodborne illness outbreaks:** are defined as “two or more cases of foodborne illness occur during a limited period of time with the same organism associated with either the same foodservice operation, such as a restaurant, or the same food product” (U. S. Department of Food and Drug Administration, 2009).
**HACCP:** “Hazard Analysis and Critical Control Points (HACCP) is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product” (FDA, 2014, “Hazard Analysis and Critical Control Points,” para 1).

**Intention:** In the TPB, Ajzen (1985) defines intention as “an indication of a person’s readiness to perform a given behavior, and it is considered to be the immediate antecedent of behavior.”

**Knowledge:** Merriam-Webster defines knowledge as the “information, understanding, or skill that you get from experience or education” (Merriam-Webster, 2015).

**Local:** use of geographic parameters of “less than 400 miles or about an eight hour drive from its origin, or within the State in which it is produced” drawing from U.S. Department of Agriculture’s Local Food Systems: Concepts, Impacts and Issues publication (Martinez, 2010).

**Perceived behavioral control:** In the TPB, Ajzen (1985) perceived behavioral control is the individual’s belief that they have control over the behavior.

**Sustainable agriculture:** The U.S. Department of Agriculture, National Institute of Food and Agriculture’s premise is “to provide more profitable farm income, promote environmental stewardship, and enhance quality of life for farm families and communities” (USDA, NIFA, 2013).

**Subjective norm:** In the TPB Ajzen (1985) uses the terminology of subjective norm to refer to the degree of influence that other persons’ (whom are important to the person) opinions impact the individual to act.

**Sustainability:** is defined in the Merriam-Webster Dictionary, as “using a resource so that the resource is not depleted or permanently damaged” (Merriam-Webster, 2015).
Traditional produce procurement: also termed “conventional” procurement and described as purchasing through a broadline (whereby distributes multiple product lines) or wholesale foodservice distributor.

Dissertation Organization

This dissertation contains six chapters. Chapter one provides an introduction to the study. Chapter two provides a review of literature. Methodology is reviewed in chapter three. Chapter four contains a manuscript to be submitted to the *Journal of Foodservice Management and Education* focusing on directors’ intentions regarding farm-to-school procurement practices. The writing and referencing complies with the journal format requirements. I was involved with each stage of research from idea conception to development, data collection, data analysis, and manuscript preparation. Dr. Rajagopal and Dr. Arendt served as co-major professors, and contributed at every phase of the process. Dr. Sapp served as statistical expert and assisted with data analysis. Chapter five consists of a manuscript to be submitted to the *Journal of Child Nutrition Management* with a focus on food safety training challenges in school nutrition programs. The writing and referencing complies with the journal format requirements. I was involved with each stage of research from idea conception, development, data collection, data analysis, and manuscript preparation. Dr. Arendt and Dr. Rajagopal served as my co-major professors and contributed at every phase of the process. Dr. Sapp served as statistical expert and assisted with data analysis. Chapter six is comprised of general study conclusions. References are included after each chapter. Appendices follow chapter six.
References


CHAPTER TWO. REVIEW OF LITERATURE

This chapter includes six major sections. The first is a review of school meal programs. This includes the history of program genesis, development of school meal standards, and the subsequent implementation of additional requirements and legislative impacts over time. The next section includes a discussion of local food systems. The third section provides a review of farm-to-school (F2S) programs. The fourth section describes safety in a foodservice setting. The fifth section describes training and knowledge acquisition. The theory of planned behavior (TPB), used as the theoretical underpinning, is discussed in the final section.

School Nutrition Programs

History

Interest in ensuring that school children in the United States do not go hungry during the school day was identified as early as 1853 when a New York children’s aid group started providing lunch in a vocational school (United States Department of Agriculture – Food and Nutrition Services, [USDA-FNS], 2014a). In the early 1920’s other community-supported efforts to provide school meals began occurring across the country (USDA-FNS, 2014a). During the Great Depression, attention was increasingly paid to issues of poverty and related hunger. As a result, both local and state legislation, some with associated funding, was enacted sporadically across the United States to institute school meal programs (Briggs & Hart, 1931).

Recognition of the need to battle hunger and malnutrition in school aged children combined with the endeavor to provide a market to struggling farmers receiving agricultural subsidies led to the establishment of the Richard B. Russell National School Lunch Act of 1946. The National School Lunch Program (NSLP) was amended regarding funding allocations in 1966, school breakfast received permanent authorization status as of 1975, and was expanded to
include afterschool snacks, and as of 2010, included a supper program (USDA-FNS, 2015). Also in 1975 the Summer Food Service Program and Child Care Food Program were established (USDA-FNS, 2015).

Currently, school foodservice, frequently referred to as school nutrition programs, operates under the NSLP as a federally supported meal program administered by the U. S. Department of Food and Agriculture. There are over 100,000 U.S. public and private non-profit schools participating in the program (USDA-FNS, 2013a). At the state-level, agencies manage the program. In California, school foodservice is administered by the California Department of Education. The U.S. Department of Agriculture describes the NSLP as “having far reaching effects” by providing nutritionally-balanced meals at either no charge or reduced-price for economically disadvantaged students, as well as being available for full price to students not classified as economically disadvantaged (USDA-FNS, 2015). In 2014 more than 31 million students participated daily in the NSLP (USDA-FNS, 2015).

Established meal standards assure nutritionally balanced meals. School districts receive federal reimbursement for school meals when compliance with meal standards is met. Funding is provided from federal sources through donated surplus commodities, per-meal cash reimbursements, and revenue from students paying for meals and ala carte food sales. Some states, such as California, provide an additional per-meal allocation (USDA-FNS, 2013a).

**School Meal Nutrition Standards**

Prior to 2012, school meal standards could be met by using one of the menu planning options available; either based on nutrients or food components. The nutrient standard menu planning provided latitude in meeting guidelines by focusing on calories and nutrients, compared to the food-based approach which focused on items as components of a meal (National
In 2012, school meal program nutrition standards were updated as required by the Healthy, Hunger-Free Kids Act of 2010 (USDA-FNS, 2014b). The 2010 school meal program nutrition standards established a single meal pattern guideline to be followed by all NSLP participating agencies across the United States. The new meal pattern guidelines, based on the Dietary Guidelines for Americans, increased the requirements for fruits, vegetables, and whole grains. Under the revised meal pattern guidelines, students are required to take at least a one-half cup of fruit or vegetable to qualify as a reimbursable meal (USDA-FNS, 2014b). Required vegetable subgroup offerings include red and orange, dark green, peas and beans, starchy, and other vegetable groups (USDA-FNS, 2014b). The competitive food and beverage nutrition standards were also revised under the Healthy, Hunger-Free Kids Act of 2010 (HHFKA) to align with meal pattern guidelines, and now apply to all food items sold at schools during the school day (USDA-FNS, 2014b).

**Local School Wellness Policy**

Recognition of the role schools play in shaping student health, eating habits, and life-long physical activity practices was evidenced with the passage of the Women Infant Child Nutrition Act of 2004 (USDA-FNS, 2004b). The Women, Infants, and Children, (WIC) Child Nutrition Reauthorization Act is the federal legislation authorizing national child nutrition programs to operate, and its passage in 2004 required educational agencies to implement a Local School Wellness Policy by 2006 (USDA-FNS, 2004b). Wellness Policy requirements were enhanced in HHFKA with full compliance required by June 2017 (CDC.gov, 2016) The mandate required school districts’ wellness policy to address nutrition and physical activity promotion, nutritional
quality of all foods on campus, communication and participation with stakeholders, and to provide a periodic progress report to the school district’s board of education (Centers for Disease Control and Prevention, 2015).

While the implemented NSLP meal standards have remained relatively unchanged since their inception, the public health focus has changed dramatically. Traditionally, the NSLP focused on reducing malnutrition. However, there is now another public health concern for children ages 2-19, obesity and overweight. Obesity in children, as a health concern, is defined by the Centers for Disease Control and Prevention (2015) as children with a body mass index over the 95th percentile, and overweight as those with a body mass index between the 85th and 95th percentiles. Body mass index is measured using a ratio of height to weight calculation (CDC, 2015). Increasing incidence of childhood obesity was identified as early as 1976 in the United States (Ogden, Flegal, Carroll, and Johnson, 2002). Following the Institute of Medicine’s 2005 report indicating childhood obesity as an epidemic, public health concern shifted from malnutrition to childhood obesity prevention strategies (Institute of Medicine, 2005).

Governmental agencies responding to the childhood obesity issues are the U.S. Department of Agriculture and the U.S. Department of Health and Human Services. They jointly address, develop, and update the Dietary Guidelines for Americans (Health.gov, 2015). This resource is used for developing policy and guiding programs, agencies, and the public. Furthermore, the U.S. Department of Health and Human Service’s Healthy People: 2020, a federally supported science based data collection and analysis project, measures impact of preventative activities. A number of objectives linked to childhood weight, food security, and access to fruit and vegetables (U.S. Health and Human Services, 2013) can be used as indicators to establish connections between consumption of produce and student health. According to a
study by Story, Kaphingst, and French (2006), increasing fresh fruit and vegetable consumption by students at school is one recommended strategy for improving student health and curbing rising obesity rates.

**Developing Local Food Systems**

**Food Systems**

The concept of a food system emerged as production of food went beyond what people could produce for their own consumption (Clark & Brandt, 1984). As defined, a food system is comprised of growing, producing, and distributing foods for maintaining a population (Eames-Sheavly & Wilkins, n.d.). A distinction can be drawn between conventional food systems and alternative food systems. Conventional food systems are characterized by maximization of production by increasing economies of scale and controlling costs (Sonnino & Marsden, 2006). Alternative food systems are characterized by providing value along the supply chain for growers, producers, and consumers within geographic boundaries (Peterson, Selfa, & Janke, 2010).

In the 1970’s, the concept of alternative food systems began to emerge in the literature as Mead (1970) related food production to food access and to the environment. Subsequently, writings have further articulated the distinction between conventional and alternative food systems, including the elements of resource use, environmental concerns, and human welfare (Berry, 1977; Getz, 1991; Lappe, 1975). In terms of food production and consumption, the concept of foodshed was introduced by Hedden around 1929. Foodshed described the geographic area, as well as the relationship between food production and consumption (Kloppenburg, Hendrickson, & Stevensen, 1996).
Alternative food systems focus on localized food production and consumption using direct marketing (Bagdonis, Hinrichs, & Schafft, 2008). Alternative food systems, using localized production and distribution, include consideration for social implications (for example food security), environmental factors, and economic benefit for participants (Bloom & Hinrichs, 2010). Community supported agriculture, farmers’ markets, and F2S programs are examples of alternative food systems (USDA-FNS, 2014).

Sustainability

Sustainability is defined in the Merriam-Webster Dictionary, as “using a resource so that the resource is not depleted or permanently damaged” (Merriam-Webster, 2015). The term “sustainability” as an integral component of alternative food systems has been evaluated using the “three legs of sustainability stool” approach, which encompasses economy, environment, and social components. The concept is that without balanced input from any one of the three components, sustainability efforts would become unbalanced, like a stool with one leg either shorter than another or missing a leg altogether (Newport, Chesnes, & Lindner, 2003).

Sustainable Agriculture

Sustainable agriculture can be defined using the U.S. Department of Agriculture, National Institute of Food and Agriculture’s premise “to provide more profitable farm income, promote environmental stewardship, and enhance quality of life for farm families and communities” (USDA, NIFA, 2013). In 2011, Hu, Wang, Arendt, and Boeckenstedt conducted a study drawing on the interest in sustainable agriculture and the ability to access enough food within a region to sustain the population within that region. The review used a linear mathematical model to compare crop yield and capacity to grow and distribute food in the State of Iowa compared to the demand for food. This study utilized concepts from a foodshed study of
New York State, where geographic information system (GIS) and food production data mapping were used to analyze distribution needs based on population centers. Demand was assessed based on calculations of dietary needs, based on the dietary guidelines for Americans of the local population. Foodshed mapping was accomplished by using linear programming methodology to compare food production capacity to food consumption by geographic area with a goal of minimizing transportation distance. Iowa, as an identified geographic foodshed, could sustain food production demand for the Iowa population and demonstrates that this technique could be applied to other geographic areas to ascertain if food production in the foodshed could support the demands of the population.

**Sustainable Practices**

Sustainable practices include efforts to conserve resources, both environmental and economic, and to promote social welfare. Public and private organizations have developed programs, policies, and practices regarding sustainability. Shriberg (2002) noted that universities have the ability to research and develop models, to implement and test sustainability measurement tools, and to share information with the public. In 2002, Shriberg conducted a study to assess the University of Michigan housing division’s environmental impact and the potential to contribute to the triple bottom line of environmental, financial, and social impacts. University housing management was interested in supporting sustainability practices and to model and teach these principles; therefore, a sustainability study was conducted to analyze operations of housing, dining, facilities, and communications. Case study analysis was conducted of other universities’ efforts to improve sustainability practices and to save money. An assessment was undertaken for each area including procurement, resources utilized, and goods. Sustainability principles used for evaluation consisted of morality and intergenerational equity,
survival and competitiveness, and economic and social responsibility. Results of evaluating the University of Michigan case study indicated that procurement practices had limited reach and lacked product standards or resource usage evaluation criteria. Based on these results, the highest priority recommendations included establishing a sustainability coordinator and oversight committee; establishing university mission and goal statements with an independent sustainability statement; and establishing goals with a yearly audit conducted.

In 2011, Barlett examined sustainable food projects in colleges and universities using the prevalence of four common components to gauge academic and fiscal commitment by institutions. The frequency of components were examined across colleges and universities (n = 30) with 47% of programs having purchasing goals and guidelines, 67% with curricular elements, 73% utilizing direct marketing channels (farmers, farmers’ markets, and community supported agriculture), and 83% with experiential learning on school farms or gardens. The author suggested that higher education has interest in impacting changes in the food system from both a practical and an instructional perspective.

College and university dining operations are operations that utilize many natural resources and generate large amounts of waste. The opportunity exists to both generate cost savings and to lessen environmental impacts. In 2011, Chen, Gregoire, Arendt, and Shelley examined college and university dining administrators’ intentions to implement sustainable practices using the theory of planned behavior (TPB) model as a theoretical underpinning to the study. The sample was selected from the national population of College and University Dining Services Administrators (CUDSA) from the 2008 National Association of College and University Dining Foodservices (NACUFS). A questionnaire was piloted and then administered, via the web (n= 555 participants). The findings indicated that pressure from administrators and
students had the greatest impact on sustainable practice adoption intention. Subjective norms (the influence of what others think about sustainability practices), attitudes, and feelings of obligation, could predict CUSDA’s intention to adopt sustainable practices. Understanding the sustainability trend and that pressure from students and administrators influence CUSDA’s to adopt sustainable practices can be used by constituent groups to motivate change.

**Supply and Value Chain**

The value chain in the context of the supply chain refers to the points from farm to user at which value is added, usually economic value such as revenue and jobs. Efforts around local food procurement that provide support for economic viability in each step of the value chain have been identified in the literature (Bloom & Hinrichs, 2010; Izumi, Wright, & Hamm, 2010; Selfa & Qazi, 2005; Sharma, Moon, & Strohbehn, 2014).

In 2011, Feenstra, Allen, Hardesty, Ohmart, and Perez conducted a study to identify elements in the supply chain that support farm-to-institution programs by examining barriers, opportunities, and possible solutions. The authors used a value chain analysis framework from three valuations- information, product, and finance. The study was conducted using three data collection techniques. The first involved a national survey of college students (n = 2,000). A mailed questionnaire yielded a 25% response rate (n= 500). The questionnaire included items about interest, current purchasing practices, and willingness to pay extra for foods deemed sustainable. The second technique was a telephone survey of higher education institutional buyers in California (n= 99). The third technique involved interviews with California distributors (n= 15), farmers (n= 17), and foodservice buyers (n= 16). College student study participants indicated that current (at least monthly) purchasing practices included organic (n= 216, 43%), local (n= 219, 46 %), and sustainably produced foods (n= 218, 19%) with 40% (n= 219)
indicating willingness to pay more for these attributes. However, in a list of 12, qualities ranked highest based on percentage of participants, included safe, fresh, and tasty (80-95%), while produced on a small farm, certified organic and locally grown ranked lowest (18-30%) in the student sample. Both survey and interview participant foodservice buyers identified as having programs using locally grown crops reported using multiple suppliers with the top criteria of reliable delivery, stable supply, and availability of local produce. Distributors had mixed perceptions about the impact of procuring local crops regarding cost and availability, but did not see liability and insurance as barriers. Farmers were concerned about too much paperwork, having adequate supply, and complications of the bidding process. The researchers noted that information, products, and financial considerations along the value-based supply chain vary among stakeholders.

Bloom and Hinrichs (2010) reviewed two case studies in Pennsylvania, one rural and one urban, using a model of value chain distribution of local foods within the wholesale system. The researchers’ purpose was to examine possible usefulness of conventional distribution to support a local food system. From the programs reviewed, two used wholesale produce distributors for local produce deliveries, and were therefore selected for the case studies. For the two case studies, 14 key informants consisted of two distributors and their respective foodservice buyers of local produce and local producers as sellers. In the urban setting, one distributor, two producers, three buyers, and a non-profit organization providing communication facilitation, were identified, and the rural setting consisted of one distributor, three producers and three buyers. The presence and significance of four value chain characteristics, “differentiation and value-added”, “committing to the welfare of all participants,” “creating partnerships,” and “role of trust and shared governance” were compared between the two distributors from key informant
perspectives. The researchers found that in the rural setting, the distributor did not perceive a demand for local differentiation, and price was the most important feature for buyers. This appeared as a deterrent to relationship development among the key informants. In the urban network, there was a greater emphasis from buyers, producers and the distributor on the value of local procurement. However, demonstrated challenges were noted in creating partnerships, commitments to participant welfare, and shared governance despite the role of the non-profit organization’s efforts to facilitate these relationships. Identifying the challenges, expectations, and perceptions of distributors, buyers, and producers in using a conventional distribution system to engage in local food procurement can provide for adjustments in current models or alternative system development.

In 2014, Sharma, Moon, and Strohbehn examined restaurant buyers’ decisions to purchase local foods, defined as foods grown in Iowa, and how activities along the value chain impacted their procurement practices. Value chain activities included sourcing logistics, handling, and food preparation. Participants were asked about their experiences with purchasing local foods, what factors affected their decisions, and specific current purchasing practices. Independently owned restaurants in Iowa (n= 2460) compromised the target sample receiving the mailed survey with a response rate of 5.14% (n= 126). The respondents represented a variety of positions, owners (n= 43) and managers (n= 42) making up 67%. Chefs/cooks (n= 6) and other managers (n= 35) comprised 33% of respondents. The authors found stronger associations between perceptions about local procurement, such as ease of ordering and perceived yield when previous purchasing experience existed than expressed by those without previous purchasing experience. The coefficients of quality (β= 29.5), properly packaged (β= 47.9), and portioned to requirements (β= 5.0) were positive in logistic regression output for decision to purchase and
sourcing experience. Sourcing, as a value chain activity, was noted to be less impactful on decisions to purchase local foods than operational issues. For example, logistic regression used for decision to purchase and operations experience had positive coefficients for preparation ($\beta = -1.3$), labeling ($\beta = 10.5$), and profitability ($\beta = 4.7$). However, in this study, service factors such as the ability to promote local foods to increase profitability and as a marketing strategy, had the greatest influence on restaurant managers’ decision to purchase local foods. Therefore, sourcing of local foods could support increased revenues and provide a source of marketing differentiation.

**Use of Local Foods**

Local foods, as part of an alternative food system, have been defined by geographic measures as well as the direct procurement relationships between farmer and foodservice buyer (Martinez, 2010). Foodservice industry segments, both private and public sector, have recognized the value of sourcing local products and adopting sustainable practices for a variety of motivations (Chen, Gregoire, Arendt, & Shelley, 2010; Izumi, Alaimo, & Hamm, 2010; Kang & Rajagopal, 2014; Strohbehn & Gregoire, 2003). From the industry perspective, in the National Restaurant Association Restaurant Trends Survey conducted in 2013, restaurant operators reported their customers were at least 50% more interested in locally sourced foods than two years prior. In the 2014 menu trends report, it was noted that locally sourced meats, seafood, and produce raised or produced with environmentally sustainable practices ranked third (National Restaurant Association, 2014).

These trends are also reflected in legislative changes in support of local food procurement. Since 2006, several U.S. states have adopted F2S related laws to support program implementation in the kindergarten through twelfth grade school setting (K-12) (Schneider,
Chriqui, Nicholson, Turner, Gourdet, & Chaloupka, 2012). The National Farm-to-School network reported, as of October 2013, that 47 states had proposed legislation related to farm-to-school programs (National Farm to School Network, 2015). In the 2008 Farm Bill, the Child Nutrition Act was amended to provide for geographic preference to be applied to purchases of unprocessed agricultural products (United States Department of Agriculture - Agricultural Marketing Services [USDA-AMS], 2008). For use in school nutrition programs, the term unprocessed agricultural products eligible for geographic preference application cannot be modified in such a manner where value added elements exceed minimal handling or processing into a usable form (USDA-FNS, 2011). The 2014 Farm Bill included expansion of the Local Food Promotion Program, and designated funding and support for farm-to-institution, food hubs, regional processing and distribution entities as well as other direct promotion strategies (USDA-AMS, 2014).

In 2003, Strohbehn and Gregoire conducted case studies of local food purchasing by restaurants and foodservice operations in Central Iowa to identify local foodservice purchasing strategies through direct purchasing from local producers. In this study, a balanced mix of nine restaurants and on-site operations in Central Iowa participated. Three site visits were conducted. The initial visit included collection of baseline data regarding attitudes about direct purchasing and current procurement practices. During the second visit, questions focused on purchasing regulations, pricing, and food safety. The third visit concluded with a post-questionnaire on changes following the provision of food safety information and availability of local food items. The study concluded that there was strong interest in local procurement via direct marketing and that producers can market based on quality and freshness. Suggestions for selling strategies such as weekly fact sheets as a communication tool were generated. Both buyers and sellers noted
benefits from creating common language and understanding from both the supply and demand side of local foods procurement.

**Selling Local Foods**

In 2005, Gregoire, Arendt, and Strohbehn conducted a study to explore perceived benefits and obstacles for local Iowa growers and producers in selling directly to local foodservice operations. The authors’ premise was that direct marketing is an opportunity for producers to increase profits. The study utilized a questionnaire to evaluate the perceived benefits and obstacles for growers and producers in marketing directly to restaurants and foodservice entities. A total of 195 responses from Iowa producers were returned, a response rate of 35%. Producer characteristics showed that 31% used conventional agricultural practices, in addition, 31% utilized limited pesticides and antibiotics, 27% reported sustainable practices, 17% other, and 9% were organic. A variety of produce (e.g. tomatoes, onions, and peppers) and protein items (e.g. eggs, chicken, and beef) were reportedly being sold via direct methods to a variety of foodservices. Delivery methods included direct, wholesale, cooperatives, and other means. Of the growers surveyed, 25% were selling direct to local foodservice operations but 44% had never sold directly. The top five statements receiving the highest mean rating (on a scale of 1-5, 1= no benefit to 5= strong benefit) of perceived benefits for growers and producers in Iowa were support for local farmers (M= 4.71 ± 0.75), fresher food for customers (M= 4.62± 0.74), fewer miles traveled for food (M= 4.47± 0.93); higher food quality (M= 4.46± 0.81), and buyer knows source (M= 4.32± 0.95). Perceived obstacles to marketing products directly to restaurants and other foodservice operations varied between producers who had sold directly to establishments versus those who had never sold directly to local foodservice establishments. Producers who had never sold directly ranked each obstacle higher than their counterparts,
except for the identified obstacles of availability of proper packaging, delivery time windows, and transportation available for delivery. The highest rated obstacles (on a scale of 1-5) for all producers were year-round availability of products (M= 4.28± 1.21), lack of dependable market (M= 3.67± 1.15), ability to charge desired price (M= 3.50± 1.21), foodservice ordering procedures (M= 3.42± 1.07), and ability to produce quantity needed (M= 3.36± 1.39). The authors noted that among Iowa producers who participated in this study, those who had already sold directly to foodservice operations scored the obstacles lower than those producers that had not had previous experience. However, those with experience rated issues of transportation, packaging, and delivery restrictions higher as obstacles to direct marketing. A conclusion was that knowledge of perceived benefits could encourage efforts to overcome perceived obstacles and reasons for not previously attempting local sales to foodservice operations.

**Benefits of and Opportunities for Local Procurement**

Education institutions can engage in, and benefit by, local procurement and incorporating sustainable practices into their operations. They benefit from a financial, social, and environmental perspective as well as educational opportunity capitalizing on noted industry and legislative trends. Ng, Bednar, and Longley (2010) studying college and university farm-to-cafeteria programs found dining program administrators (n= 99) noted benefits, including support for a university’s public image, connection with the local community, and provision of a market for local farmers as well as the opportunity to educate students, staff, and faculty about sustainability. Other benefits and opportunities exist for educational institutions in which foodservices are an integral part of the campus, as noted in other studies. For example, the prospect to adopt sustainable practices that support both cost savings and ecological conservation
while engaging and educating students, such as paper waste reduction and reusable “to go” trays (Chen, Gregoire, & Arendt, 2010).

**Challenges and Barriers to Local Procurement**

Several studies have identified perceived and actual barriers to implementing local procurement practices in hotels and schools in a number of states, such as Vermont (Conner, King, Koliba, Kolodinsky, & Trubek, 2011), Michigan (Colasanti, Matts, & Hamm, 2012), Minnesota (Conner, Abate, Liquori, Hamm, & Peterson, 2010) and Pennsylvania (Schafft, Hinrichs, & Bloom, 2010). Said procurement issues include cost, distribution, food safety, and legal responsibility. Procurement is a challenge, as noted by Strohbehn & Gregoire (2005, 2002), because adequate supply of locally grown foods may not be available to meet the demand during an off peak growing season. In the Midwest hotel industry, challenges noted by purchasing decision makers included procurement issues of adequate quantity, inconsistent quality, identifying local producers and seasonality; with seasonality being less of an issue for local meats (Kang & Rajagopal, 2014).

**Perception and Knowledge about Local Foods**

In 2010, Ng, Bednar, and Longley conducted a study to examine perceptions regarding farm-to-institutions using a sample of college and university foodservice professionals. Perceptions examined included benefits, challenges, and strategies used to implement and manage farm-to-institution programs in higher education dining services. Demographics for foodservice operations surveyed (n= 99) included schools from six geographic locations across the United States, with an average student population of 12,241 and an average 27,622 meals served weekly. Independently operated dining services represented the majority of operations (n= 75), with the remainder managed by contract services (n= 24). Conventional production was
the most frequently used food production method (n= 94), with many operations using more than one method, such as assembly-serve, cook-chill, and central production. There was no correlation noted between type of production method and incidence of farm-to-institution program. There were slightly more operations with farm-to-institution (n= 57) programs than those without (n= 42) and this was fairly evenly distributed between independent operators (44 of 75) and contract foodservice providers (13 of 24). Respondents’ levels of agreement with statements regarding challenges and benefits were measured using a Likert-type scale (with 1= strongly disagree and 5= strongly agree). Respondents with a farm-to-institution program scored challenge statements (with a mean level of agreement with challenge statements) addressing supply, distribution, operations, budget, purchasing, and administrative support lower than respondents who did not have a farm-to-institution program (in 22 of the 23 statements). Statistical significance (p ≤ 0.05) existed in each category, except for product supply and distribution, suggesting that perceived challenge was greater than actual challenge. When surveyed about benefits, respondents with a farm-to-institution program indicated a higher mean level of agreement (p ≤ 0.05) for connecting to the local community, improving public image of the institution, and providing a reliable market for local farmers. Strategies rated highest by those with farm-to-institution programs included identifying a source with reasonable pricing (M= 4.42), maintaining good relationships with sellers (M= 4.40), developing a back-up plan (M= 4.39), educating customers/students about the program (M= 4.35), and establishing relationships with agricultural organizations (M= 4.33). The authors concluded that foodservice professionals who had already implemented farm-to-institution programs could share their experiences and best practices with their colleagues who were just embarking on a farm-to-institution program.
In 2010, DeBlieck, Strohbehn, Clapp, and Levandowski conducted a study to examine the perceptions, interests, and knowledge about local food procurement by university dining services staff. Iowa State University’s dining services had implemented a farm-to-university program and undertook strategies to engage staff. The assumption was made that informed and knowledgeable dining services staff participating in the decision making process will support and adopt changes in practices necessary to implement a successful local foods program. Eighteen months into the project, dining services staff, including employees and managers, were surveyed (n= 115, 58% response rate) regarding their awareness, experience, understanding, and value perception of local food procurement. Over the subsequent six months, a two-pronged approach was implemented to disseminate targeted Farm-to-University information to dining services staff. This included the posting of monthly informational posters and participatory in-service sessions. Foodservice staff (n= 96) completed a post-survey following the interventions. The list of food categories included: “locally produced,” “certified organic,” “food from local businesses,” “sustainable certified foods,” “food from family farms,” and “fair trade foods.” Findings revealed the percentage of respondents indicating food categories they believed were being promoted in their program increased in each food category marginally from 90% to 92% for locally produced foods, and dramatically from 54% to 88% for items noted as certified organic. Other noted findings included increased familiarity with the components and benefits associated with a Farm-to-University program. Around 21% of staff who completed the pre-survey and 6% who completed the post-intervention survey were unfamiliar with the components and benefits prior to intervention. Staff receiving intervention and completing the post-survey responded to statements regarding increased time and effort needed, but noted “it is worth it” by 50% of participants prior to interventions and increasing to 70% of the participants who
responded as being in agreement with this statement. The authors suggested that targeted efforts to engage dining services staff would result in increased awareness, knowledge and support for local procurement in their Farm-to-University program.

**Farm to School Programs**

**Definition**

The National Farm to School Network describes F2S programs as school foodservices that participate in sourcing local crops for schools with the goal of providing agriculture, health, and nutrition education opportunities as well as supporting local and regional farmers (National Farm to School Network, 2015). A tenet of F2S programs includes local food procurement for school meal programs. Experiential learning as part of F2S, such as tending school gardens, taking farm field trips, and cooking lessons enhances the curricular experience and connections to the cafeteria and community have been noted in several studies (Bagdonis, Hinrichs, & Schaffit, 2008; Berlin, Norris, Kolodinsky, & Nelson, 2013; Conner, Abate, Liquori, Hamm, & Peterson, 2010; Conner et al., 2011; Vogt & Kaiser, 2007; Winston, 2011).

**Farm-to-School History**

The first studied F2S programs demonstrating school foodservices sourcing local crops for school meal programs were noted in the 1990’s in two U.S. regions, in Florida by a USDA consultant linking farmers directly to schools, and in Southern California between a school district and the Santa Monica Farmers Market (Vallianatos, Gotlieb, & Hasse, 2004). These initial efforts were focused on linking farms directly with a consistent and stable buyer supporting farm viability and providing seasonal, locally produced agricultural products to school meal programs.
Vallianatos, Gottlieb, and Haase (2004) reviewed some of the first F2S programs including a Los Angeles high school classroom pilot project, and case studies from three California school district foodservice projects. In their study the authors examined F2S as a strategy to influence student health, urban sprawl, and community food systems. Based on their review of literature and case study findings, the opportunity for F2S efforts to support local agriculture, increase fresh fruit and vegetables offerings in school foodservice, and engage students in nutrition education existed.

The pilot project in a Los Angeles high school included teachers receiving a box of local, seasonal crops with an accompanying nutrition lesson. The participating teachers completed a survey about the usefulness of the produce and nutrition education material in making curricular connection and with regards to the quality of the produce. Among the findings from teachers surveyed (n = 105), 92% indicated the lesson and produce were useful in teaching nutrition, and 94% were satisfied with the quality of the produce.

The three California F2S case studies referenced above were Santa Monica Malibu Unified School District, Ventura Unified School District, and Davis Joint Unified School District. The Santa Monica-Malibu school district was an early adopter of F2S, implementing a salad bar (reimbursable) school meal, sourced from the local farmer’s market. The authors noted favorable meal cost comparisons and increased meal participation rates. These finding were also observed in the Davis Joint Unified School district case study. The Ventura Unified School District program yielded similar results related to costs and meal participation, and the authors noted that meal consumption (based on a plate-waste assessment) was higher with salad bar days compared to non-salad bar days. In each of these scenarios school meal participation increased following the implementation of F2S salad bars.
Vallianatos, Gottlieb, and Haase (2004) noted that emerging F2S programs, as in the three California case studies, demonstrated opportunities for school foodservices to utilize local produce procurement as part of a F2S program to increase meal participation. Positive outcomes noted in the Los Angeles pilot project included experiential learning to teach nutrition education using local, seasonal produce. Challenges in implementing F2S programs in school foodservice such as crop availability and logistics were identified by Mascarenhas and Gottlieb (2000) in a review of the Santa-Monica Malibu Farmers Market Salad Bar program.

Farm-to-School Legislative History

The first documented F2S programs predate any related legislation by about ten years. The initial effort was implemented with the “Buy American” provision of the NSLP implemented in 1999 and required the purchase of domestically produced items to the greatest extent possible (USDA, FNS, 2001), for items produced in sufficient quantities in the United States.

In 2000, the USDA Agricultural Market Services initiated the small farm/school meals initiative providing F2S workshops to support relationship building between farmers and school foodservices (USDA-AMS, 2000). Barriers identified in these workshops included procurement constraints in the federally mandated procurement process (USDA-AMS, 2000). Formal and informal bids require school foodservices to select the lowest bidder as part of the open competition process (USDA-FNS, 2004a). In 2002, for the first time, the Farm Bill included language to encourage schools to purchase locally produced foods for school meal programs (USDA, Economic Resource Service, [ERS], 2002).

Subsequently, the Child Nutrition and WIC Reauthorization Act of 2004 created a statute for F2S programs to promote local procurement but did not allocate funding (USDA- FNS,
2004b) or establish policy to address purchasing regulations restrictive to buying directly from local farmers. The 2008 Farm Bill authorized USDA to adopt geographic preference guidelines and allowed schools to utilize geographic preference in procurement of locally grown and locally raised unprocessed agricultural products (USDA-FNS, 2013). For example, in addition to pricing, consideration could now be given to other factors, such as where products are grown or raised, in both formal and informal procurement (USDA-FNS, 2014).

The “Know Your Farmer, Know Your Food” initiative was established in 2009 as a USDA-wide effort to strengthen local and regional food systems (USDA-AMS, 2013), and emphasized the relationship between farms and food. The signing of the Healthy Hunger Free Kids Act in 2010 provided for the development of a USDA F2S unit to provide technical assistance for programs and grant funding for F2S program feasibility and implementation (USDA-FNS, 2012).

In addition to national policy, legislative developments were occurring at the state level. In the first noted legislation in 2001, New Mexico legislators enacted a joint memorial to request the state Departments of Agriculture and Education to collaborate on using New Mexico agricultural products in school meals (National Farm to School Network, 2015).

Nicholson, Turner, Schneider, Chriqui, and Chaloupka (2014) conducted a study to evaluate which U.S. states had farm to school legislation, and the potential impact of this legislation on the availability of fruits and vegetables in United States school lunches. A review of legislation was conducted to identify state laws which became effective from September 2006 through 2008. State level legislation that supports F2S activities includes specific F2S guidelines or laws that support the availability of local foods for schools. F2S legislation and regulations were compared with the presence of F2S programs to evaluate if a positive relationship existed.
To study this relationship, a survey was mailed to elementary schools, requesting principals to complete the sections regarding nutrition and physical activity policy, and school foodservice personnel to answer questions related to food and beverage availability. Schools were surveyed from 47 states from 729 different school districts. Cross-sectional data from 1,792 elementary schools were used from the Bridging the Gap study covering three school years, 2006-2009. Survey data were collected from February to June for each of the three school years. Return rates for school years were as follows: 2006, n= 578 schools, 54.6%, 2007, n= 748, 70.6%, and for 2008, n= 641, 61.8%. In this study, 70% of schools surveyed that had fruits and vegetables available on most days, also had a F2S program and State F2S legislation. In contrast, only 48% of schools without F2S programs and lacking State F2S legislation served fruits and vegetables on most days. The authors also found that the number of F2S programs increased over the study years (from 5.1% in 2006-07 to 18.0% in 2008-09), and there was also an increase in F2S legislation over that time period. The authors concluded that F2S legislation can positively impact and support F2S programming.

A F2S legislative survey covering the decade from 2002-2014 found that 40 states had legislation that supported F2S (F2S, 2015). State legislation supporting F2S includes allocation for program funding, establishment of grants, additional meal reimbursement, local preference laws and state databases (F2S.org, 2015). In 2014, the California legislature passed Assembly Bill 2413 to establish the Office of Farm to Fork, in the California Department of Food and Agriculture (CDFA). The Bill’s directive facilitated local procurement between schools and local producers and Assembly bill 1990, which authorized community food producers, such as school gardens to sell and provide whole uncut fruits, vegetables, and eggs to the public, including school cafeterias (F2S.org, 2015). However, Assembly Bill 2602, introduced in 2014, sought to
establish a farm-to-school program within CDFA and was held up in committee (California Legislative information, 2014).

**Public-Private Partnerships**

Partnerships between public-entity F2S programs, and the private sector and non-profit organizations have emerged, providing resources such as policy guidance, funding, and research. Three examples of partnerships that feature F2S program support are the National Farm-to-School Network, United Fresh Produce Association, and the Community Alliance of Family Farmers.

The National Farm-to-School Network was established in 2007 through the collaboration of two organizations, the Community Foods Security Coalition, and the Urban and Environmental Policy Institute at Occidental College from a grant through the W.K. Kellogg Foundation (W.K. Kellogg, 2014). The National Farm-to-School Network organization provides resources and networking for F2S programs (National Farm to School Network, 2015).

Non-profit and industry groups have developed initiatives to add salad bars to schools. United Fresh Produce Association (Unitedfresh.org, 2014) established the Let’s Move Salad Bars to Schools project creating linkages for donors to provide salad bar equipment to school applicants (Unitedfresh.org, 2014). Salad bars and the accompanying equipment are frequently used in school meals to serve local, seasonal produce (Vallianatos et al., 2004), and meet the vegetable sub-group requirements of the NSLP meal pattern (USDA, FNS 2015). The Let’s Move Salad Bars to Schools project provides necessary equipment which can be an additional cost to the school meals program. To be eligible, schools must commit to incorporating the salad bar into the reimbursable meal as part of their school lunch programs. Applicants are matched with business donors who provide funds for the equipment. Since the establishment of the Let’s
Move Salad Bars to School project launch in 2010, 2,800 salad bars have been placed across 49 states in the United States (Unitedfresh.org, 2014).

The Community Alliance of Family Farmers is a California-based non-profit organization whose mission is to support family farmers by increasing farm viability and promoting sustainable agricultural practice and encouraging alternative procurement practices. Their efforts support F2S programs by sponsoring a statewide networking structure with regional lead persons across the state (Community Alliance of Family Farmers, 2015). Characteristics distinguishing family-scale farming include farming practices that include crop diversity, focus on crop resiliency, and identified values, for example economic benefit, to support communities and ecosystems (CAFF, 2016).

**Potential Impacts of Farm-to-School Programs**

F2S programs have proliferated, growing in numbers from six identified school district programs in 2001 to 4,322 school districts with reported F2S programs in 2012 (USDA- FNS, 2014). In November 2013, the U. S. Department of Agriculture published a F2S census, reporting that in the 2011-2012 school year, $354 million dollars were spent on locally purchased foods in 3,812 school district foodservice programs (USDA- FNS, 2014). A subsequent census was conducted in 2015 reviewing the 2013-2014 school year, a 105% increase in spending was found with $790 million dollars spent on locally purchased foods (USDA-FNS, 2016). In this survey, school districts (n= 5254) were asked how they defined local related to their food procurement, choices ranged from same city/county, produced within a number of miles, region or state and if there were any other restrictions beyond geography. Product categories for local foods were identified as fruit, vegetable, milk, other dairy, eggs, seafood, plant based proteins, grains and flour, bakery products, meat or poultry, and herbs in any form-
such as, fresh, minimally-processed, or processed. When asked, 40% of respondents indicated that they purchased directly from local individual farmers, ranchers, and fishers (USDA-FNS, 2016). As interest has grown in farm to school programs, so have potential impacts.

A number of studies have examined potential economic, health, and education-related impacts of F2S programs. Allen and Guthman (2006) examined how the development of F2S programs potentially impact free trade and open market opportunities between farmers and school foodservice programs. The federally subsidized NSLP provides meals to low socio-economically disadvantaged school children while utilizing United States Department of Agriculture (USDA) donated commodities, which are intended to purchase farm surplus to the pricing advantage of farmers (USDA, FNS 2015). Allen and Guthman (2006) described F2S as a concept that connects a diverse group of interests, such as health advocates, environmentalists, agriculture, labor interests, educators, and consumers to a common activity as well as links the public and private sectors. The method of investigation included a review of literature on California F2S programs, and of reports and assessments from the National F2S Network and the Community Alliance of Family Farmers database. Noted challenges and operational barriers for school foodservice operations were product cost, need for additional labor, and procurement, including logistics and transportation. Allen and Guthman (2006) noted potential impacts identified for school foodservices to benefit from F2S program implementation were recognition, resources and funding support from advocates and the “foodie” community, as well as collaboration between diverse groups for mutual benefit around healthy school meals, and an alternate market for small, local farmers.

Potential impacts extend beyond farmers and foodservice to the students eating in the school cafeterias. Bontrager et al. (2014) conducted a study in nine Wisconsin elementary
schools that were participating in F2S programming, from new programs to those with greater than two years of experience. The purpose of the study was to examine effectiveness of Wisconsin F2S program efforts to increase students’ fruit and vegetable consumption. The study was undertaken at the beginning of the school year (quasi-experimental baseline), with follow-up conducted towards the end of the school year. Efforts included F2S programming elements such as Harvest of the Month lessons, procurement of local produce for the school meal program, and school gardens. Two methods were used to evaluate consumption of school meals, completing a fruit and vegetable questionnaire, and meal trays observed and photographed before and after eating. Students in 3rd-5th grade (n= 888) participated in the baseline and follow-up study. The findings indicated a significant (p≤.001) increase, from baseline to the end of year follow-up, in students’ willingness to try fruits and vegetables (2%), attitude toward trying fruits and vegetables and exposure by actually tasting (3%), and nutrition and agriculture knowledge (4%) using F2S programming. From the pre/post photography using Lunch Tray Photo Observation, student trays (n= 850) were observed over four days. From baseline to follow-up, 4,451 lunch trays were photographed. Baseline date revealed 25.1% of students with no fruits and 56.1% with no vegetables taken or eaten. Following intervention, these percentages decreased to 23.4% for fruits and 24.8% for vegetables. Conversely, the percentage of students with adequate fruit consumption at baseline, 55.5%, decreased slightly to 55.1%, while for vegetables, adequate intake at baseline was 4.3% and this improved to 8.6% at the follow-up.

Kloppenburg, Wubben, and Grunes (2008) reviewed the Wisconsin Homegrown Lunch project for six years, starting with its conception in 2002. The Madison Metropolitan School District F2S program was developed and implemented via a nonprofit community group and the University of Wisconsin. The program intended to integrate locally grown foods into the school
meal program, and provide farm and food educational activities. The authors reported positive educational experiences, including successful engagement of stakeholders such as parents, administration, faculty, and students.

In 2008, Joshi, Azuma, and Feenstra conducted a review of fifteen F2S program studies. To be included in their review, a study had to include collection of quantitative data with standard gathering methods noted and be comprehensive in approach. The findings from the studies were compiled into categories of individual, school foodservice operations, and farmer practice behavioral changes. F2S participants were identified as students, parents, teachers, administrators, foodservice personnel, and farmers. Eleven studies noted a behavior change impact, with ten showing that F2S programs increased student fruit and vegetable consumption following implementation of F2S programming activities. School meal participation was evaluated in seven of the studies, each indicating an increase in all payment categories (i.e. free, reduced and full pay), ranging up to 16% participation increase. Foodservice operations were assessed in six of the studies which reported program changes as local and seasonal recipe implementation and F2S salad bars. Sales data were evaluated in four studies whereby farmers reported less than 5% of their incomes associated with sales to schools.

**Stakeholders in Farm-to-School Programs**

F2S program early efforts were focused on connecting local farm crops with a consistent stable buyer, and to bring local, seasonal produce directly to the consumer to support farm viability and provide very fresh produce to schools. The relationships have expanded beyond the farmer and school foodservice director. There are many stakeholders in F2S programs, each with a different perspective and interest. Conner et al. (2011) examined the relationships and partners in the Vermont F2S network based on their role identification system map. The roles and
functions of stakeholders were analyzed in various geographic hierarchies and developed a network map to identify barriers, lessons learned and suggestions for policy change and further research. The authors used literature, case study research and data from participants in the Vermont’s Food Education Every Day network to complete this study. Vermont’s Food Education Every Day collaborative is an example of a coalition of stakeholders providing technical assistance on local procurement to Vermont schools for the incorporation of the “three C’s—community, classroom, and cafeteria”. The focus of Vermont’s Food Education Every Day collaborative project is to promote procurement of local foods and healthful eating in school foodservice with the intended benefit of supporting community farmers.

In the Conner et al. (2011) study, the authors collected data to identify partners, their resources and interests, and to contrast with perceived and articulated barriers to identify opportunities for developing programs and further research. The researchers developed a visual map to represent this complicated system. The map can be used to identify connections between stakeholders, how information and resources flow and address barriers for F2S efforts.

School foodservice stakeholders have opportunities to participate in F2S programs through the procurement process. In 2012, Colasanti, Matts, and Hamm conducted a study on the 2009 Michigan F2S survey, building on the study conducted in 2004. An electronic census survey was distributed to all 952 Michigan school foodservice directors. A return of 270 represented a 28.4% response rate. Findings from the 2009 study indicated that among foodservice directors not having previous experience in local procurement, 57.9% were interested in trying direct marketing for local products. Results indicated that participation in F2S programs increased from 10.6% in 2004 to 41.5% in 2009, (93 of the 270 respondents who were
also respondents to the 2004 survey). In 2009, 87% of the respondents (n= 250) indicated their motivation for purchasing local food was to help Michigan farmers.

Conner, Abate, Liquori, Hamm, and Peterson (2010) conducted a study to examine efforts made by a consortium of large, urban school districts to incorporate local, healthful, and sustainably grown foods into school meals. The goal of the School Food FOCUS (Food Options for Children in Urban Schools) consortium is engaging the districts in collective policy advocacy, communication to share knowledge among participants, and to create buying power for local foods procurement. In this study, the authors reviewed the genesis of this effort and the conceptual framework, identification of issues, and the participatory approaches undertaken. Data collection was conducted with one school district, Saint Paul Public Schools in Saint Paul, Minnesota over a two (school) year period from 2006-2008 using an experiential learning cycle in the purchase of fruits and vegetables for the District’s meal program. Researchers reviewed purchasing records for the two-year period and conducted interviews with district purchasers, and vendors identified through the request for proposal process (RFP). Findings revealed that current produce suppliers were using local farms, but had not identified it as such. By identifying local designation as a priority, the District was able to classify produce procured during the 2009 school year as 56% from local farms (defined as farms within Minnesota). The Saint Paul Public Schools scenario was used to present the first study phase attempt in addressing the goals of the School food FOCUS consortium.

**Motivations for Participating in Farm-to-School**

Motivations for foodservice professionals, farmers, and food distributors to participate in F2S programs have been studied from a variety of perspectives. Izumi, Alaimo, and Hamm (2010) used a case study approach with semi-structured interviews to determine what motivates
participants and to identify barriers and opportunities in F2S programming. The study was conducted in the Upper Midwest and Northeast United States from seven existing F2S programs having at least two years of program history. The school districts ranged in size from 2,300 to 40,000 students and represented urban, suburban, and rural geographies. Participants consisted of seven school foodservice professionals, seven farmers, and four food distributors. In addition to the in-depth interviews, procurement documents were reviewed to substantiate responses.

Izumi, Alaimo, and Hamm (2010) found school foodservice professionals top three motivations for purchasing local crops for their school meal programs were “liked by students,” “competitively priced,” and “support for the local farming community.” The themes associated with why students liked local produce was associated with quality, engagement with foodservice staff, and farmer recognition. Understanding foodservice professionals’ perspectives and motivations for participating in F2S provides insights for advocates to engage in the process. By identifying the opportunities and barriers for each stakeholder, F2S programs can benefit both farmers and foodservice professionals by creating mutually beneficial relationships that in turn support student consumption of fruits and vegetables.

The farmer, supply-side, has been studied to analyze farmer motivations for participating in F2S programs. Izumi, Wright, and Hamm (2010) examined what motivates farmers to participate in direct marketing in farm to school programs. Maximum variation sampling was used to identify farmers from the Midwest and Northeast of the United States as selling to school programs. Interviews were conducted with seven farmers. Farm size ranged from 50-1200 acres, each growing a diversity of crops, and farmers indicated less than 5% of their income came from sales to farm to school programs. Themes captured in the interview process included the
opportunity to diversify markets and generate social benefits as motivation for them to continue participation in farm to school programs.

The purpose of the study by Conner, King, Kolodinsky, Roche, Koliba, and Trubek (2012) was to identify procurement practices and motivations for the Vermont school foodservice F2S program from perspectives of school foodservice operators and participating farmers. This study was conducted following two other studies about the Vermont farm to school project. The aspect of procurement for Vermont Food Education Every Day (FEED) project as a means to address the issue of farmer benefit from selling directly to schools was reviewed. A sample pool consisting of 198 Vermont farmers, was identified as having some previous F2S experience; 133 responses were received, a 67% response rate. Of the 133 respondent farmers, 67 respondents (approximately 50%) had sold crops to schools in the school year prior to data collection. This group was used for further analysis. The authors noted, consistent with other studies, there was a variety of motivations for farmers to participate in F2S programs. Motivational variables for selling to schools were identified as either social or economic; farmers were then grouped either as socially motivated or market-motivated and a low engagement group identified as not motivated to sell to schools.

Farmers identified as socially motivated were defined as being less likely to consider the schools as a customer and more as a philanthropic endeavor. Of this group, 16% of the 61 respondents used growing contracts 64% of respondents (n = 56), were more willing to allow more than two orders per month 60% of respondents (n = 2) would deliver more than twice per month, 44% of respondents (n = 58) required crops to be picked up from the farm. Market-motivated farmers were more interested in increasing sales to schools and in consideration of distribution practices compared to the socially motivated farmers, 50% of respondents were
willing to use a growing contract, 79% willing to take more than two orders per month, 92% were willing to deliver more than twice per month, and only 7% required crops to be picked up from the farm. Farmer respondents identified as low engagement, despite their low value of sales to schools, 55% (n=22) indicated a farm benefit associated with sales to schools, such as philanthropic opportunities.

**Barriers in Farm-to-School Programs**

In Kloppenburg, Wubben, and Grunes (2008) review of the Wisconsin Homegrown Lunch project in Madison Metropolitan School District F2S program found that serving local foods in the school meal program had procurement and operational challenges including staffing, equipment, and procurement process. Supply-side barriers included inability for small growers to aggregate or provide minimally processed produce. Recommendations included public policy development to support F2S programs and federal policy to assist growers in addressing market issues.

In the Colasanti, Matts, and Hamm study in 2012, an electronic census survey was distributed to all 952 Michigan school foodservice directors to examine motivations, barriers, and concerns regarding F2S programs. A return rate of 270 represented a 28.4% response rate. The greatest percentage (88.0%) of respondents viewed cost as a concern. Procurement regulation, both federal and state was indicated as a perceived barrier by 78.0% of respondents. Food safety was ranked fourth of the fourteen noted concerns in 2009 and 2004, by 78.7% of respondents (n=250) and 66.8% of respondents (n = 383) respectively. From the 2009 findings, an examination of factors that would support expansion of F2S procurement included food safety, funding and some processing of products. These findings demonstrate an increase in supporting local agriculture as an important component of F2S. Identifying and understanding
perceptions surrounding costs, regulatory issues and food safety will assist in providing support for these issues in F2S promotion and implementation.

Food Safety

Background

Food safety is important in foodservice settings serving large numbers (e.g. schools), given the potential impact on so many participants. Food safety encompasses several categories that include foodborne illness prevention, allergen awareness, allergens, preventing chemical and physical contamination, and food defense affecting the food supply (United States Food and Drug Administration [FDA], 2014). Government and industry both have a role in maintaining a safe food supply and protecting the public. While the government is responsible for food safety inspections, and establishing and enforcing food safety requirements, the food industry is responsible for adhering to governmental requirements and producing safe food (Foodsafety.gov, 2015). The foodservice industry has a legal, economic, and ethical responsibility to keep food safe (National Restaurant Association Education Foundation, 2012).

Foodborne Illness

Preventing foodborne illness is integral to food safety management. Foodborne illness can be defined as an illness associated with consuming contaminated foods which include microbial organisms such as bacteria, parasites, and viruses (CDC, 2014). The Centers for Disease Control and Prevention notes that the terms foodborne illness, foodborne disease, foodborne infection, and food poisoning, can be used interchangeably (CDC, 2014).

Scallan, Hoekstra, Angulo, Tauxe, Widdowson, Roy, Jones, and Griffin (2011) completed a study for the United States Centers for Disease Control and Prevention (CDC) to update data regarding the major pathogens causing foodborne illness in the United States and to
include more current active and passive surveillance data using updated methodology. Data were collected from a variety of sources, using both active and passive surveillance, to estimate the number and types of foodborne illness caused by 31 major pathogens from 2000-2008 using the U.S. census 2006 population of 299 million people. The estimates are that annually 9.4 million cases of foodborne illness occur caused by 31 different pathogens.

The authors noted the top five pathogens causing illness were norovirus, Salmonella, Clostridium perfringens, and Campylobacter. The pathogens contributing to hospitalization were Salmonella, norovirus, Campylobacter, and toxoplasma gondii. Leading causes of death from foodborne illness were attributed to Salmonella, toxoplasma gondii, Listeria monocytogenes, and norovirus. The authors proposed that with ongoing data collection and improved reporting mechanisms, estimating procedures can be enhanced to provide better data and to utilize current findings to sharpen food safety plans’ foci to decrease foodborne illness outbreaks.

Vega, Barclay, Gregoricus, Shirley, Lee, and Vinje (2014) evaluated norovirus outbreak trends between 2009 and 2013 noting 83.7% of the 2,895 reported and confirmed outbreaks were foodborne. Of these, 5.7% or 227 were in schools. However, whether this was related to the school foodservice program or outside of the program was not reported. Scallan, Mahon, Hoekstra, and Griffin (2013) reviewed reported U.S. foodborne illness in young children, defined as under the age of 5, and found that bacterial enteric pathogens were responsible for close to 300,000 illnesses annually. The authors noted the three most frequent bacterial enteric pathogens were non-typhoidal Salmonella, Campylobacter, and Shigella. While it was noted that young children are more likely to receive medical treatment for foodborne illness, the rates of foodborne illness in children is still higher than found in the overall population.
The number of reported and confirmed foodborne disease outbreaks and related illnesses categorized by the places where food was prepared was reviewed in the Foodborne Disease Outbreak Surveillance System in the United States for years 1998 to 2008. Gould, Walsh, Vieira, Herman, Williams, Hall, and Cole (2013) identified 286 outbreaks in schools representing 17,266 illnesses, with the median outbreak size of 38. Comparably, restaurants/delis had 7,939 outbreaks, with 102,091 illnesses and the median outbreak size was five. In private homes, the number of outbreaks was 1,058, with 12,962 illnesses and a median outbreak size of eight. While the number of outbreaks was far less in schools than in restaurants or private homes, the median number of illnesses per incident was much greater.

Despite the estimated rates of foodborne illness, the CDC (2015) concludes that most cases of foodborne illness go unreported or even undiagnosed. Arendt, Rajagopal, Strohbehn, Stokes, Meyer, and Mernench (2013) conducted a study to investigate why healthcare workers and the general public did not report cases of foodborne illness. In the first phase of the study, authors recruited consumers having previously experienced foodborne illness (n= 35) to participate in focus groups. In the second phase of the study, focus group participants were healthcare professionals (n= 16) in a Midwest state. Findings from the consumer participant focus groups as to why they did not report to authorities that they believed they had a foodborne illness, included not knowing how, where, or why to report, not sure of the cause or source of their illness, and/or too sick at the time. The most frequently cited barriers to foodborne illness being diagnosed, as identified by healthcare professional participants, included time between food ingestion and seeking of treatment. Additional barriers cited by this group were lack of patient knowledge, cost of testing, and unavailability of suspect food. Additional findings revealed that 60.0% of consumers participating in the study had concerns about the safety of
food purchased to prepare at home, and 85% reported they had concern about the safety of food prepared away from home. Of note, only 34% indicated that produce posed the greatest risk of foodborne illness, while seafood was thought to pose the highest risk (by 82.9% of participants). Among consumers, 91.4% reported having gotten sick from something they ate, with roughly one-third (31.4%) indicating they had sought medical treatment. For healthcare professional participants, 94.0% of respondents had concerns about the safety of food; 69.0% of all healthcare participants believed the greatest risk for acquiring foodborne illness was at establishments away from home.

Foodborne illness outbreaks are defined as “two or more cases of foodborne illness occur during a limited period of time with the same organism associated with either: the same foodservice operation, such as a restaurant, or the same food product” (FDA, 2009, “Food Facts”, p. 1). The Centers for Disease Control and Prevention conducts investigations when there is a foodborne illness outbreak. The goal of conducted investigations is to understand what caused the specific outbreak to help prevent future foodborne outbreaks and breaches in food safety protocols (CDC, 2014).

Powell, Jacob, and Chapman (2009) presented three case studies of commercial foodservice suppliers with food safety failures resulting in serious foodborne illness outbreaks. In 2005, a food manufacturer in Wales provided meat products used in schools, and 157 people, mostly children, were sickened with E. coli. In 2009, a Canadian company caused 57 illnesses of which 22 people died, when deli meats contaminated with L. monocytogenes resulting in listeriosis were consumed. Again, in 2009, a peanut butter plant in Georgia had products contaminated with Salmonella, and caused 691 people to become ill and resulted in nine deaths. The authors concluded that minimal compliance with regulatory guidelines was not sufficient to
prevent foodborne illness outbreaks, rather ongoing evaluation and communication between management and staff as well as food safety programs were needed.

There have been changes in types and incidences of foodborne illnesses as well as detection and identification in sources and modes of transmission, as noted in the Scallan et al. (2011) study. Consequently, there has been a decrease in some types of foodborne illness while an increase in others. The resultant injuries related to foodborne illness of microbial origin have also shifted, and while for some pathogens, occurrences have increased, the number of serious illnesses and deaths has decreased (CDC, 2014).

In a study by Painter, Hoekstra, Tauxe, Braden, Angulo, and Griffin (2013) reported foodborne illness outbreaks from 1998-2008 in the United States were analyzed according to food commodity categories and the numbers of hospitalizations and deaths that occurred related to food borne illness. The authors found that of the 17 food commodity categories, produce and nuts had the highest percentage (46%) of attributed foodborne illness cases, 38% of hospitalizations, and 23% of deaths. Produce commodities included fruits, nuts, and vegetables.

**Governmental Role in Food Safety**

The Centers for Disease Control and Prevention (CDC) is a federal agency of the U.S. Department of Health and Human Services, responsible for protecting public health (U.S. Department of Health and Human Services, 2013). CDC’s role in food safety is in data collection, foodborne illness surveillance and enforcement as well as collaborations with public health partners (CDC, 2014) to disseminate information and provide resources for education. The CDC Prevention and Education unit details suggested procedures to address foodborne illness prevention, procedures which include quality control and Good Agricultural Practices (GAP),
inspections, procurement guidelines, staff training in distribution and production segments, and consumer awareness programs (CDC, 2014).

Other divisions of the federal government also have food safety responsibilities. While CDC’s primary focus is on the demand-side of public health (people) the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) are supply-side centric around food supplies and the food industry. The FDA is responsible for food safety for up to 90% of the U.S. food supply (FDA, 2014). USDA’s Food Safety and Inspection Service (FSIS) include food safety oversight for meat and poultry (USDA, Food Safety and Inspection Service, [FSIS], 2014).

The Food Safety Modernization Act signed into law in 2011, with the final rule on produce safety effective in 2015, established science-based standards for farms that included water safety, soil amendments, staff health and hygiene training, and equipment, tools and buildings (FDA, 2015). Sneed and Strohbehn (2008) reviewed the literature to identify food safety related trends and implications for dietetic practitioners. Noted trends included consumer and foodservice categories. Consumer’s awareness about food safety, heightened with increased media attention on specific outbreaks, in addition to increased number of meals being eaten away from home by every segment, and an aging adult population were identified as trends. The older adult group segment is at a higher risk for foodborne illness due to increased health concern, aggregate living facilities, and the occurrence of home-delivered meals.

Trends in the foodservice workplace include demographic changes such as generational differences, cultural diversity, education, and literacy levels. Rood (2010) examined generational diversity in the hospitality industry between four age groups currently represented and found that, consistent with earlier research, differences in responses to authority, work ethic, and
dealing with change existed. Gursoy, Maier, and Chi (2008) noted similar findings in the hospitality workforce with significant differences in attitudes about work and workplace hierarchy. These demographics impact food safety management in foodservice settings.

Operational foodservice trends include the increased use of technology, food procurement changes, and government-identified food safety risk factors, such as food defense. Food procurement trends include increased interest in locally produced products, sustainable practices and environmental impact topics.

**Foodservice Industry Role in Food Safety**

The foodservice industry has an important role in maintaining food safety for the public. Commercial foodservice establishments are required to be inspected regularly by environmental health departments to ensure foods served are not a source of foodborne illness (FDA, 2014). Menachemi, Yeager, Taylor, Braden, McClure, and Ouimet (2012) compared types of restaurants and numbers and types of reported critical food safety violations to determine if some restaurant characteristics had higher incidences of violations than others. The restaurant characteristics included type of foodservice setting (n= 19), such as quick service, casual, and fine dining, as well as the number of businesses registered to the same owner. Most foodservice settings (61%) had one unit. Changing patterns in food safety violations from 2008 through 2010 with 5,488 food safety inspections in Jefferson County, Alabama were examined. This included 1829 restaurants doing business during the review time frame and included initial and subsequent visits. In their sample, averages of the most frequent critical violations over the three year study period were temperature control, 21.8%; equipment sanitizing, 21.8%; employee food safety training and certification, 19.0%; hand washing/ personal hygiene, 17%; and correct product storage, 15.3%. Findings included data that specific critical food safety violations were
more frequent in some types of restaurants. For example, quick service restaurants were more likely to have a greater number of critical violations in a single year ($\beta = -0.66$, $p = .003$) than fine dining establishments. Restaurants with certain characteristics had different critical violation types and numbers and at varying rates over the three year period. In addition, with interventions and enforcement from the local health department violations decreased in subsequent inspections; however, consideration for influence of inspectors and their possible pattern of citation behavior was not considered.

The foodservice industry is comprised of both commercial and non-commercial sectors. On-site foodservice (also referred to as non-commercial) generally is a subsidiary of an institution and serves the associated population (Gregoire, 2013). Meal services provided by on-site sectors, including childcare facilities, schools, hospitals, long-term care facilities such as residential care and nursing homes, colleges and universities, jails and prisons, and military installations, are integral to the organizations they reside in (Gregoire, 2013). On-site foodservice can be generally differentiated from commercial foodservice by characteristics such as customer base and regulatory requirements. On-site foodservice operations frequently have a captive audience and repeat customers.

Customers belonging to specific demographic groups, including young children, pregnant women, older adults, and people with weakened immune systems, are noted by the Centers of Disease Control and Prevention (CDC, 2014) to be more susceptible to foodborne illness. The aging U.S. population has increased risk for foodborne illness (FDA, 2014) due to increased health concerns. Older adults (age 65 and older) are living in a variety of on-site foodservice settings (Sneed & Strohbehn, 2008) such as nursing homes, assisted living and residential care facilities. In contrast, correctional facilities such as jails and prisons, military installations, and
colleges and universities have less concentration of susceptible customers. School children are considered “at-risk” with greater susceptibility to foodborne illness than the general population (FDA, 2014).

Another distinction in on-site versus commercial foodservice, particularly sectors serving identified at risk populations, is increased regulatory requirements in areas of procurement and agency oversight. These additional requirements can guide on-site foodservice operations in managing food safety. Public sector on-site foodservice operations are required to comply with public procurement guidelines. Public contract code requires states to impose laws to ensure agencies receiving tax payer-generated funds comply with competitive bid processes (Government Publishing Office, [GPO], 2014).

School nutrition programs operating under NSLP guidelines are required to follow federal procurement guidelines as outlined in the Code of Federal Regulations (USDA-FNS, 2014). The federal guidelines require school nutrition programs to utilize the competitive bid process to ensure tax-payer generated revenue fosters “full and open competition” using responsible and responsive bidders for the process (GPO, 2014). The federal small-purchase limit in 2015 was set at $150,000 for each procurement, requiring a formal, sealed, bid process be followed. State and local limits can be more restrictive, but not less (USDA-FNS, 2015). In 2016 the California Department of Education established the small-purchases threshold at $87,800 (CDE, 2016). Informal procurement can be used for dollar amounts below the small-purchase threshold; however, three quotes must be solicited, the bidder must also be responsive (conform to the conditions outlined in the bid), and responsible (have the ability to comply with the bid terms) (USDA-FNS, 2015). Procurement below the micro-purchase limit, raised to $3,500 per procurement, in 2015, allows for contracts to be awarded without quotes being
obtained, but stipulates purchases be distributed among qualified vendors. Additional federal procurement provisions for school nutrition programs include the Buy American Provision requiring purchase of “domestically grown and processed foods to the maximum extent practicable” (USDA-FNS, 2006). This legislation was updated in February 2016 with an additional provision defining an American agricultural food product as being produced and processed in the United States, having been substantially (at least 51%) made from domestically grown agricultural products (USDA, FNS, 2016). Included in the provision, USDA emphasized the importance to the small and local business and the American economy and renewed focus on compliance (USDA, FNS, 2016).

**Prerequisite Programs and Hazard Analysis Critical Control Points**

Prerequisite food safety programs are used by the food industry to meet regulatory compliance and serve as the foundation for an effective Hazard Analysis Critical Control Points (HACCP) system (FDA, 2014). Prerequisite programs include written policies, procedures, and practices to control for the safety of food as it flows through an operation; these programs are designed to reduce the risk for food safety related problems (USDA-FSIS, n.d.). Examples of prerequisite programs include those identified by the National Advisory Committee on the Microbiological Criteria for Food (1998) such as facilities, supplier control, sanitation, specifications, personal hygiene, training, chemical control, storage, traceability, and pest control. HACCP is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product” (FDA, 2014, “Hazard Analysis and Critical Control Points,” para 1).
Prerequisite food safety programs and HACCP are used in a wide spectrum of commercial foodservice and food manufacturing operations; however, school nutrition programs are mandated to implement a HACCP plan as part of their food safety program (Henroid & Sneed, 2004). In food manufacturing, HACCP plan efficacy has been studied. Wallace, Holyoak, Powell, and Dykes (2014) conducted a study to examine a multinational food manufacturer’s efficacy in developing an appropriate HACCP plan. In the organization studied, the HACCP plan was developed at the corporate level and implemented by a team of employees at each operational location. Data were collected at various plants across 91 teams. In the first survey phase, identified food company employee teams answered questions from the guidance manual specific to their operation and each employee team member at each location completed a questionnaire on HACCP knowledge. In the second phase, HACCP plan effectiveness was measured using audit tools. Participants were comprised of two test groups. Test group 1 was comprised of HACCP trained individual employees from various company locations (n=91), and test group 2 containing both employee team members and individual employees was conducted at other company locations (n= 75).

The researchers’ findings indicated a general lack of application of hazard analysis principles. For example, in test group 1 (n= 91) 67.0% and in test group 2 (n= 75), only 30.0% of respondents could explain what is meant by a hazard. When asked what should the HACCP team do if a significant hazard was identified but no control measure was in place, only 18.1% of test group 1 and 30.1% of test group 2, could answer this question correctly. Based on these findings, the authors indicated that there was a lack of guidance, tools, and experience present for the teams to adequately develop and manage the HACCP plan, despite their training. The researchers concluded that there was a lack of knowledge about what is required to carry out
hazard analysis and that foundational knowledge is necessary to identify and monitor correct indicators for hazard analysis. HACCP planning depends on correctly utilizing HACCP effectively and customizing the process to the individual organization. The findings in the food manufacturing industry with HACCP programs can be applied to the school foodservice setting where HACCP programs are also required with the requisite training, experience, and tools needed for the food safety plan to be adequately developed and managed.

**Food Safety in School Meal Programs**

The WIC Reauthorization Act of 2004 required school food authorities (SFA’s) to implement food safety programs based on hazard analysis and critical control points (HACCP) principles (USDA-FNS, 2004b). Two health inspections are required annually for each school (USDA, 2014). In many municipalities, the local public health departments conduct health inspections. The Food and Drug Administration’s Food Code is the source used by health inspecting agencies to develop their food safety guidelines (FDA, 2014). The California Retail Food Code, an excerpt of the Health and Safety code, serves as reference for the California Public Health Department to address food safety in retail establishments (California Department of Public Health, 2015). In California, each county’s environmental health department serves as the safety inspection agency. California adopted the 2005 Federal Food Code as the foundation for food safety management and updates are conducted every four years following each federal food code update (California Department of Public Health, 2015).

Recent programmatic changes have increased produce offerings in schools via the Healthy Hunger Free Kids Act of 2010, which requires increased fruits and vegetables available in the NSLP. The proliferation of salad bars in schools and increased participation of school
districts in F2S programs coincides with produce safety concerns and the recent associated foodborne illness rates.

Increasing local fresh produce in school foodservice programs can have a positive impact by engaging students in healthy eating and increasing participation in school meals. However, studies have also identified school foodservice professionals’ perceived barriers about managing food safety and liability issues regarding direct marketing practices (Colasanti et al., 2012; Conner et al., 2012; Izumi et al., 2006). School FSDs have a responsibility to establish and maintain food safety assurances independent of the produce procurement method utilized. It is incumbent on the produce buyer to determine specifications that include ensuring food safety requirements are met. Alternative procurement methods may include more direct purchasing in which the seller may not be as familiar with school nutrition program requirements. In this type of scenario the school foodservice director or designated produce buyer may consider using resources such as GAP/GHP requirements or producer safety checklist from seller. On farm food safety and produce safety checklists are available through extension programs, such as Iowa State University Extension and Outreach program (Extension, ISU.org, 2016).

Research is scant on food safety risks associated specifically with local produce procurement in the school environment. Strohbehn and Gregoire (2003) conducted case studies of local food purchasing by restaurants and foodservice operations in Central Iowa to identify foodservice local purchasing strategies through direct purchasing from local producers. Nine foodservice operations in Central Iowa participated in this study, a balanced mix of restaurants and on-site operations. Interview questions focused on purchasing regulations, pricing, and food safety. Information was provided on food safety requirements and contacts for local food producers. Food pathogen testing was also conducted to identify the presence of pathogens. In a
subsequent visit a post intervention questionnaire on changes following the provision of food safety information and availability of local food items was used. For the pathogens analyzed, the study concluded that there was no difference in food safety from the foods tested that were purchased locally versus traditional means.

**Food Safety Culture**

Consumers and industry alike recognize the importance of food safety everywhere food is handled. However, proper food safety practices are not always applied. Integral to an organizations’ overall culture, is how the organization embodies, embraces, and articulates food safety in the workplace. Food safety culture includes the food safety program, communications, behavioral modeling, management, and staff commitment. The concept of behavior-based food safety management systems was pioneered by Yiannas (2008) connecting the science-based concepts of food safety with the behavioral science of human nature. A culture of food safety supports behavior change and promotes positive food safety practices to prevent foodborne illnesses from occurring.

Ungku, Strohbehn, and Arendt (2014) examined food safety culture in on-site foodservice operations across three Midwest states. A total of 2,030 questionnaires were distributed to non-supervisory foodservice employees working in healthcare settings and in school foodservice operations. Healthcare response rate of 31.7% (n= 582) from 1,010 questionnaires, and a school foodservice operations’ response rate of 35.5% (n= 1020) were obtained. The authors found that participants reporting having received food safety training indicated a higher mean agreement score (on a 7-point Likert-type scale with 1 = strongly disagree and 7 = strongly agree) with factors indicative of food safety culture, compared to participants without food safety training. This was significant for five of the six food safety
culture factors identified: management and coworker support (p = .002), communication (p=.004), environmental support (p=.011), work pressure (p ≤ .000) and risk judgment, defined as taking shortcuts in food safety (p ≤ .000). Self-commitment, as a factor in food safety culture, was ranked highest in mean agreement scoring by both participants with food safety training (M= 6.55 ± 0.74) and without food safety training (M = 6.38 ± 0.81), but was not significantly different between the two groups (p = .238).

The authors noted unique observations for school foodservice respondents consisted of significantly higher agreement scores for work pressure (p = .010), risk judgment (p = .026), and manager/coworker support (p = .010), than those in the healthcare group.

**Food Safety and Foodservice Managers**

Researchers have recognized the importance of managers and supervisors in establishing and maintaining a food safety culture. Arendt, Paez, and Strohbehn (2013) conducted a study to survey foodservice managers about their perspectives on food safety in their operations. This qualitative study was undertaken to determine what factors would aid managers in effectively supervising their employees to maintain food safety practices. The researchers (2013) collected data by interviewing current (n= 15) and potential foodservice managers (n= 21). Four focus groups were conducted and three major themes emerged, namely, managers’ role, managers’ effectiveness, and employee training. Managers’ role was expressed as supervisory and training, with challenges to managing food safety due to high turnover and work environment. Positively impacting managers’ effectiveness was support from senior management and consistency among colleagues, while negative impact was from demanding and hectic work schedules. Managers reporting on employee food safety training noted they must have the training themselves as well as the ability to communicate messages through a variety of media. The authors concluded that
managers agree about the importance of food safety. Effective communication of food safety messaging was challenging due to a variety of workplace factors and staff demographic differences.

The current foodservice workforce is represented by a wide age range of staff. The Bureau of Labor Statistics (2015) noted that between 2007 and 2014 the number of 16-19 year old restaurant employees decreased from 20.9% to 16.6%, the number of employees 65 and older increased from 1.9% to 2.1% (U.S. Department of Labor, Bureau of Labor Statistics, 2015). The National Restaurant Association predicts this trend will continue (NRA, 2015).

Arendt, Paez, and Strohbehn (2013) noted foodservice managers perceive staff turnover and limited time as barriers in making sure that staff adheres to established food safety practices. The noted trend of generational and cultural/language diversity, in foodservice creates a need for the manager to customize food safety training and monitoring, facilitated with online and technology resources. Technology continues to advance at a rapid rate and can support food safety practices, but also has an associated cost and learning curve that can be daunting to on-site foodservice managers and their employees.

**Food Safety and Foodservice Staff**

In comparison with managers, studies regarding on-site foodservice employee perceptions and motivations about food safety are reflective of the food safety culture provided by the organization and supported by the manager (Arendt, Paez, & Strohbehn, 2013; Ellis, Arendt, Strohbehn, Meyer, & Paez, 2010; Ungku, Strohbehn, & Arendt, 2014). Foodservice employees representing different demographics, such as part-time or full-time employment, and a variety of educational backgrounds have different perceived barriers and motivations regarding safe food practices (Strohbehn, Jun, & Arendt, 2014). In a study of onsite operations, the
influence of organizational factors on staff motivation to follow food safety practices was examined (Ungku, Strohbehn, & Arendt, 2014). The authors noted that employee’s perceived organizational factors such as self-commitment and adequate equipment/supplies had high agreement scores indicating a positive food safety culture, while management oversight and intervention for not following food safety practices and cutting corners had lower agreement scores.

Brannon, York, Roberts, Shanklin, and Howells (2009), in a study relating the time staff had worked in foodservice and extent of food safety training received, showed these factors correlated with improved appreciation, awareness, and importance of food safety behaviors by food safety participants. Employees identified barriers to conducting food safety behaviors as time limitations and being required to complete other tasks (Brannon et al., 2009).

York, Brannon, Roberts, Shanklin, and Howells (2009) conducted a study to evaluate how foodservice staffs’ level of experience reflected their food safety practices. The study included factors of attitudes, perceived behavior control and the influence of others (subjective norms) about food safety in the workplace, based on these three most common food safety errors. These three food handling errors were time/temperature control (improper holding), personal hygiene (hand washing), and cross-contamination. The three levels of food safety experience were defined as no experience, basic (entry level), and formally food safety trained. A survey was conducted with undergraduate students and utilized the theory of planned behavior (TPB) to identify attitudes, perceived behavior control and subjective norms related to the three most common food safety errors. The questionnaire was completed by 270 undergraduates. The questionnaire was designed to identify three levels of foodservice experience among the participants, 25.2% had no experience, 30.4% with basic, and 44.4% with experience and formal
food safety training. Participants ranged in age from 18 to 49, with 68.5% being female. The findings indicated that increasing awareness about the importance of food safety improves attitudes about the behavior and consequently increases likelihood the behavior will be performed, for all three levels of experience. Participants with experience and formal food safety training were more likely to identify perceived control beliefs, which support food safety training influence on antecedents to food safety behaviors. Furthermore, improving the subjective norms, the belief about how others, such as supervisor and co-workers, view the importance of food safety, enhances the intended behavior. Perceived behavior control for such things as adequate time to perform, proper equipment, and training, also increases the likelihood the intended behavior will be performed. Foodservice managers and employees can use this information to address antecedents to behavior, such as provision of resources, beyond training as the only strategy.

**Recommendations and Strategies for Addressing Food Safety**

Researchers have identified recommendations and various strategies based on their study findings directed toward evaluation and monitoring by oversight and enforcement agencies, foodservice industry managers, educators and practitioners. For example, for county health department and food safety oversight agencies, Menachemi, Yeager, Taylor, Braden, McClure, and Ouimet (2012) suggested that critical food safety violations associated with various restaurant characteristics could be used as an evaluation tool to focus food safety monitoring and enforcement. While conducted in only one county, other local county health departments could examine their own data to target their resources.

Sneed and Strohbehn (2008) noted that by identifying trends and patterns, dietetic practitioners can deliver education and training for consumers and foodservice staff, and provide
leadership, adapt and manage food safety programs in foodservice operations. Arendt, Paez, and Strohbehn (2013) suggested that strategies for foodservice managers would include teaching techniques to communicate food safety practices.

Suggestions for foodservice operations to improve business outcomes and marketing opportunities using food safety culture were included in a study by Powell, Jacob, and Chapman (2009). The researchers concluded that analyzing the supply chain, applying a framework of science-based food safety practices, and incorporating these into the culture of the organization support consumer confidence and sound business performance. Strategies to promote a food safety culture include positive communications, such as posting informational sheets on food safety for food handlers and transparency with the public regarding food safety efforts are good marketing practices (Powell et al., 2009). Available free and accessible resources exist online to assist foodservice managers with training methods, resources, and modules to address key food safety issues. An example is addressing Norovirus prevention through good hand washing practices (FightBac, 2014).

Measures have been undertaken to address produce safety in school foodservice, in particular, Produce Safety University sponsored by USDA which was initiated in 2009, the National School Foodservice Management Institute’s program “Serving it Safe,” and the Partnership for Food Safety Education campaign “ProducePro”. The Center of Excellence for Food Safety Research in Child Nutrition Programs at Kansas State University offers a program entitled “Serving Up Science: the Path to Safe Food in Schools” to teach school foodservice professionals about food safety in food processing and production (Serving up Science, 2015).
Training and Knowledge Acquisition for Foodservice Professionals

Foodservice professionals, including directors, managers, and employees require training to acquire job knowledge to perform their duties. Acquiring job knowledge and applying that to practice supports organizational objectives. Training in the workplace is imperative for staff at all levels and has been identified in the literature as essential to facilitate meeting organizational objectives (Bartel, 1991; Delaney & Huselid, 1996). Conversely, Poulston (2008) in a hospitality study noted that lack of adequate training was related to increased disciplinary problems and staff turnover. Knowledge acquisition can be acquired through training, but also occurs via observation of other employees, as well as other means such as use of consultants and specialists.

Barriers and challenges to provide staff training as reported by foodservice managers include time, funding, and demographic differences (Arendt, Paez, & Strohbehn, 2013; Sneed & Strohbehn, 2008). Arendt, Paez, and Strohbehn (2013) noted foodservice managers perceive staff turnover and limited time as barriers in making sure that staff adheres to established food safety practices. Sneed and Strohbehn (2008) noted as a trend that generational and ethnic diversity in foodservice creates a need for the manager to customize food safety training and monitoring, and can be facilitated with online and technology resources. Technology continues to advance at a rapid rate and can support food safety practices, but also has an associated cost and learning curve that can be daunting to foodservice managers and their employees. Recognizing training strategies that apply to the needs of the adult learner can aid managers in improving training effectiveness. Strohbehn, Arendt, Ungku, and Meyer (2013) found that offering a variety of food safety training formats, such as face-to-face delivery and computer based, could be used with adult learners. The authors noted that food safety tool kits used in a variety of delivery formats could be effectively used by foodservice managers. The DeBlieck et al. (2010) study about
university dining services staff perceptions toward utilizing locally procured foods found assessing staff knowledge and awareness were important in identification of training needs, to support local foods promotion.

Training is relevant in food safety as foodservice professionals are central to foodborne illness prevention. According to the Centers for Disease Control and Prevention (2014) the three most common food safety errors contributing to unsafe food and foodborne illness are food handling errors, poor personal hygiene, and cross-contamination.

The research findings comparing the effectiveness of training with food safety practice compliance have been conflicting. In an observational study conducted in 40 school foodservice operations in Iowa, Henroid, and Sneed (2004) reported that despite significant knowledge by staff (mean score of 15.9/20 points ± 2.4) about food safety, their practices did not follow proper food safety techniques and guidelines. Of the total staff participants (n= 309) there was no difference in food safety knowledge noted between staff having taken a food safety certification course (64.4%) and staff not completing a course (35.6%). Food safety knowledge test scores and likelihood of having food safety certification were higher for managers than other staff categories. However, food safety practice scores were higher for staff (managers and employees) that had completed a food safety certification course. The authors found no significant differences in food safety practice scores based on personal demographics of age, education, or experience nor were there differences based on operational demographics such as number of schools or amount and type of staff.

In the on-site foodservice sector, such as school foodservice operations, the foodservice manager is responsible for complying with the food safety requirements. The on-site foodservice manager must also meet the expected goals of his/her institution, which potentially could be a
barrier to food safety, such as resource allocation for equipment and staff training. Foodservice management may have little latitude in allocating resources for technology, capacity to implement and train, and must utilize the infrastructure and systems of their organization to carry out these efforts and meet department objectives.

Professional standards for school nutrition programs became mandatory in July 2015 and include professional development requirements for all school foodservice staff (USDA, FNS, 2016). Specific standards include a minimum of six to twelve training hours depending on job category with food safety and HACCP as one of six training topics (USDA, FNS, 2016). All school foodservice directors are now required to have eight hours of food safety training every five years (USDA, FNS, 2016).

York, Brannon, Shanklin, Roberts, Howells, and Barrett (2009) conducted a study to assess the effectiveness of the traditional food safety-training program ServSafe®, utilizing the theory of planned behavior (TPB) to identify and target attitudes and perceived barriers, and mitigate factors that limit or decrease foodservice employees’ attitudes about positive food safety practices. ServSafe®, the most common and prominent food safety program used in the foodservice industry, is provided by the National Restaurant Association’s education foundation. Studies have shown some differences in the efficacy of food safety education and training programs. York, Brannon, Shanklin, Roberts, Howells, and Barrett (2009) conducted a two-year longitudinal study in restaurants using three phases of data collection, with 33 restaurant employees completing all three phases, from sixteen restaurants across three Midwest states.

In phase one, pre-test food safety knowledge quizzes were given. Subsequently, employees were observed conducting food safety practices using the three most common findings in health inspections- hand washing, cross-contamination, and temperature control.
Following phase one, a four-hour ServSafe® course was given to the participants. In phase two, participants completed another knowledge quiz and participated in a focus group to identify attitudes and barriers for the three food safety activities. The third phase consisted of developing interventions to deal with the findings from phase one and two.

Following the implementation of the interventions, effectiveness of the interventions was evaluated. The findings were consistent with previous conclusions that while ServSafe® increased knowledge, it did not necessarily improve food safety behaviors. Hand washing was improved with knowledge. Temperature control and cross-contamination showed no improvement with knowledge alone, but both did improve with interventions addressing attitude and perceived behavioral control. Foodservice managers and food safety trainers can use this information to improve outcomes by including the reinforcements that improve attitude, subjective norms and perceived behavioral control.

Roberts and Barrett (2011) conducted a study to examine restaurant managers’ beliefs about food safety training. The sample population was 1,321 commercial foodservice operations with 266 managers who responded to the questionnaire (237 usable), representing a 21% response rate. The majority of respondents had college education (70.4%), with only 68.4% having food safety certification. A summary of direct measures indicating the strength of respondents’ beliefs about food safety indicated positive attitudes about food safety. For example, (using a Likert-type scale of 1 to 7, with 1= extremely unlikely and 7= extremely likely), those who considered offering food safety within the next year as important (M= 6.64, SD= 0.89) and valuable (M= 6.54, SD= 0.85) were identified. Subjective norms (the influence of others opinions) also indicated intentions to support food safety training. However, perceived behavior control was not significantly (p ≤ .646) associated with managerial intentions to provide
training to foodservice employees. The authors concluded that managers likely already control resources; therefore, have perceived behavioral control, and it is not a factor in their intentions. Findings related to indirect measures of behavioral and normative beliefs about food safety trainings were significantly (p ≤ .000) related to managers’ intentions to provide food safety training to their employees. Conversely, control beliefs were not significantly related to managers’ perceived behavioral control, and therefore the authors were unable to determine what the impact on intentions to provide food safety training would be.

**Theory of Planned Behavior**

The theory of planned behavior (TPB) has been used as a theoretical framework to examine intentions and other factors that measure behaviors yielding empirical data used in supporting programmatic changes. For this research, TPB will be used to examine school foodservice directors’ attitudes, subjective norms, and perceived and actual behavioral controls regarding food safety and F2S programs. Conceptually there is a distinction between the two, TRA and TPB. In TRA Subjective norms were further delineated beyond the general influence of others, to include influence of experts, and organizational superiors and will be used in this study.

The TPB developed by Ajzen (1985), was built upon a previous theory, the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980). TRA, introduced by Fishbein and Ajzen (1980), proposed that the intention to perform a behavior is an antecedent and predictor of future behaviors and could be used to evaluate factors that influence behavior. TPB added the element of self-efficacy to the model. Self-efficacy is a person’s belief about the extent of his/her capacity to perform a specific behavior (Bandura, 1977).
The TPB model uses the constructs of behavioral beliefs, normative beliefs and control beliefs as a basis upon which attitudes towards behaviors are founded (Ajzen, 2006). Behavioral beliefs are based on personal judgement or experience as to whether an outcome will occur (Fishbein and Ajzen, 1980). Normative beliefs rely on individuals’ perceptions about the impact of others on their behavior, while control beliefs rely on their view of what resources are available to facilitate the behavior (Ajzen, 2006). As reflected in figure 1, intentions are influenced by three predictors: attitude towards the behavior, subjective norms, and perceived behavioral control (Ajzen, 2006). According to Ajzen (1985) intentions are the best predictor of behavior.

The TPB has been used in many behavioral studies to identify and predict people’s behaviors based on several indicators, including attitude, subjective norms (influence of others), and perceived control of behavioral performance. The TPB proposes that behavior performance

![Figure 2.1 Ajzen’s Theory of Planned Behavior. Ajzen, I. (1985). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50, 179-211Retrieved from people.umas.edu/Ajzen/tpb.diag.html](image-url)
can be predicted by the intentions to perform the behavior, the perceived control, and the influence of others associated with behavioral performance.

The TPB has also been used extensively in hospitality management. Jalilvand and Samiei (2012) used the TPB to determine social media and tourism destination choice. The TPB was utilized in a study on green hotel choice and environmentally friendly tourist activities (Han & Sheu, 2012). Studies regarding intentions around local food procurement have used the TPB as a theoretical framework (Kang & Rajagopal, 2014; Pilling & Brannon, 2008; Roberts & Barrett 2011; Robinson & Smith, 2002). For example, Robinson and Smith (2002) used the TPB to understand how consumers’ beliefs, attitudes and subjective norms impact intention to purchase sustainably produced foods in the Midwest. Studies examining consumers’ intentions to purchase sustainably produced products have been conducted (Chen, 2007; Vermier & Verbeke, 2006; Vermier & Verbeke, 2008).

The TPB was used in examining food safety behaviors of employees by Roberts and Barrett (2011); York, Brannon, Shanklin, Howells, Roberts, and Barrett (2009); and food safety behaviors of consumers by Redmond and Griffith (2003) and Milton and Mullan (2012). Soon and Baines (2012) used the TPB to evaluate handwashing intention by farm workers. Roberts and Barrett (2011) found that the TPB can be used to predict restaurant managers’ intentions to offer food safety to their employees.

Pilling, Brannon, Shanklin, Howells, and Roberts (2008) used the TPB to determine if foodservice employee’s performance of three important food safety practices: cleaning food contact surfaces, using thermometers and washing their hands, could be improved by addressing antecedents to the behaviors. These indicators were analyzed based on the three actions trying to
be influenced. The questionnaire was developed and pilot tested. It contained three sections: knowledge assessment, the TPB components, and demographics. The study was conducted with 32 restaurants and 190 staff that had food handling responsibilities. In an analysis of the data, it was found that attitude was the only significant indicator for the behaviors. For each of the three food safety behaviors, there was a different TPB associated item. For hand washing, intention was predicted by attitude and perceived control, cleaning was predicted by subjective norms and attitudes, while thermometer use was attitudes, subjective norms and perceived control. Utilizing these findings, managers could improve results from food safety training to influence employees’ attitudes, subjective norms and perceived control, to influence performance of food safety practices.

Summary

This review of literature has shown the emergence of alternative procurement strategies for sourcing local produce, along with the changing challenges in managing food safety. In summary, this chapter has discussed food safety knowledge and training as it applies to school foodservice directors and the impact on produce procurement and handling in both traditional and alternative procurement systems. The TPB has been used extensively in hospitality management to investigate behavioral intentions. In this study, the theory of planned behavior will be used as the theoretical underpinning.

This research seeks to explore California school foodservice directors’ attitudes, knowledge, subjective norms, and perceived behavioral control regarding the differences in safe produce procurement between traditional procurement and alternative procurement associated with F2S programs. This will be done by surveying California foodservice directors and conducting interviews with California foodservice directors.
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CHAPTER THREE. METHODOLOGY

Introduction

The purpose of this study was to explore school foodservice directors’ knowledge and behavioral beliefs regarding food safety in F2S programs and normative and perceived behavioral control in using traditional procurement and alternative procurement methods. The TPB was used as the framework. Alternative produce procurement practice in F2S programs are a newer practice in school foodservice operations and subsequently, the research regarding food safety with alternative procurement scenario is scant. This chapter describes the research design, data collection, and data analysis conducted to achieve the study objectives.

School foodservice directors’ behavioral intentions to adopt F2S practices may be impacted by their knowledge, behavioral, normative and control beliefs’ regarding food safety in traditional procurement and alternative procurement. The central question posed is “How do K-12 school foodservice directors’ knowledge and behavioral, normative and control beliefs of intention about food safety impact their behavioral intentions to implement a Farm-to-school program”? Therefore the following eight research questions were identified.

1. Does school foodservice directors’ food safety knowledge impact their behavioral intentions to implement alternative produce procurement associated with F2S programs?
2. Does school foodservice directors’ attitude about food safety training impact their intentions to implement alternative produce procurement associated with F2S programs?
3. Does school foodservice directors’ subjective norm (the impact of other’s influence) impact their intentions to implement alternative produce procurement associated with F2S programs?

4. Does school foodservice directors’ perceived behavioral control impact their intentions to implement alternative produce procurement associated with F2S programs?

5. Does school foodservice directors’ attitude regarding food safety differ for alternative produce procurement versus conventional procurement?

6. What is the relationship between school district operational characteristics and foodservice directors’ intention to implement F2S procurement practices?

7. What is the relationship between foodservice director demographics and their intention to implement F2S procurement practices?

8. What are the challenges to implementing food safety training in California school meal programs?

**Research Design**

This study uses a more quantitative methods approach. The TPB (Ajzen, 1985) and the TRA (Ajzen & Fishbein, 1980) was used as the theoretical underpinning for a portion of the study. A web-based questionnaire was developed and used for data collection.

**Use of Human Subjects**

The Application for Research Involving Humans was submitted to the Iowa State University Human Subjects Institutional Review Board for approval. The approval is included in (Appendix A). The researcher and others on the committee who have access to identifiable data have completed human subjects training and certification according to Iowa State University
protocol. Research participants were notified regarding the purpose of the study prior to their participation and informed that their participation was voluntary. Participants were advised that their identity would be anonymous.

**Questionnaire**

A survey was conducted using a web-based questionnaire. The TPB (Ajzen, 1985) and the TRA (Ajzen & Fishbein, 1980) were used as foundation to develop questions that elicited school foodservice directors’ behavioral, normative and control beliefs’ about food safety training in school foodservice and F2S programs and to assess foodservice directors intentions to adopt farm-to-school alternative produce procurement practices. In addition, the TRA (Ajzen & Fishbein, 1980) was used to expand the categories of other person’s reflected in subjective norm. TPB refers to subjective norm as the influence that other person’s opinion impacts the individual to act (Ajzen, 1985). The TRA predates the TPB, and as a behavioral process provides a useful distinction (Ajzen & Fishbein, 1980) in that the TRA further delineates “other persons” into beliefs of what others think, what experts think and motivations to comply with others (Ajzen & Fishbein, 1980). Questions to assess foodservice director’s food safety knowledge were also included.

**Population and Sample Selection**

The population was California school foodservice directors as identified using the California Department of Education, Nutrition Services Division database. E-mail addresses are available from the California Department of Education, Nutrition Services Division. In 2015, 864 California public school districts had school foodservice programs (California Department of Education, Nutrition Services Division, 2015). School district foodservice departments may not each have a position with the title of foodservice director; therefore the sample included the
staff person designated as responsible for oversight of the foodservice department in each district.

California was selected due to a long growing season and large crop variety. As produce safety requirements and procurement practices vary across state lines, it was determined to specify a geographic region. Designating the State of California minimized potential differences due to conflicting food safety or state department specific requirements or guidelines in other jurisdictions.

**Questionnaire Content**

The questionnaire (Appendix B) contains three parts. Part one consists of 14 operational demographic questions. Part two addresses behavioral, normative and control beliefs, food safety knowledge, and behavioral intentions to adopt alternative procurement practices associated with F2S programs. While part three contains foodservice director personal demographics.

Part one operational demographic variables were related to the school district and included geographic location, population numbers and settings, and student socio-economic information derived from free and reduced price meal eligibility data. School district foodservice department data includes management type, production system, preparation methods, numbers of meals served, as well as annual expenditure information. There were five questions that addressed annual expenditures for food, produce, and percentage of these costs related to traditional and alternative procurement, as used in farm-to-school programs.

California Farm-to-School Network geographic regions were used for the purpose of identifying school district geographic location (California F2S Network, 2015). School district setting was identified as: urban, rural or suburban, distinguished by population size (United States Department of Health and Human Services, 2015). School district population size
categories were determined from the United States Department of Agriculture, Food and Nutrition Services Division’s professional guidelines. Data drawn from this demographic delineation may be valuable as, effective July 1, 2015, USDA mandated professional development standards are to be based on these three school district size levels. School grade levels were divided into the most frequent grade level groupings with latitude to include “other.” School foodservice production systems and preparation types were identified using the Institute for Child Nutrition reference document (NFMSI.org, 2008), and foodservice management types as defined by Gregoire (2013). Free and reduced meal eligibility percentages category ranges include: very low free and reduced (0-24%), moderate level (25-49%), high free and reduce, (50-74%) with 50% being the threshold for many grant proposals, and very high (75-100%). Harwell and Le Beau (2010) noted that educational researchers use meal eligibility as an indicator of socio-economic status.

Part two of the questionnaire measured five constructs school foodservice directors’ attitude towards food safety training, subjective norm, perceived behavioral control, behavioral intention to implement alternative produce procurement practices, and food safety knowledge. The TPB model uses the constructs of behavioral beliefs, normative beliefs and control beliefs as a basis upon which attitudes towards behaviors are founded (Ajzen, 2006). Behavioral beliefs are based on personal judgement or experience as to whether an outcome will occur (Fishbein & Ajzen, 1980). Normative beliefs rely on individuals’ perceptions about the impact of others on their behavior, while control beliefs rely on their view of what resources are available to facilitate the behavior (Ajzen, 2006). Intentions are influenced by three predictors: attitude towards the behavior, subjective norms and perceived behavioral control (Ajzen, 2006). According to Ajzen (1985), intentions are the best predictor of behavior.
Food Safety Training

The questionnaire used three items to assess school foodservice directors’ attitude, subjective norm and perceived behavioral control toward food safety training. Questions 15-17, as shown in Table 3.1, were adapted from Roberts (2008) study utilizing the TPB to examine restaurant managers’ behavioral intention to support food safety training. Roberts (2008) used an elicitation study to identify belief-based measures and utilized the findings to construct the questionnaire. These questions were modified for school foodservice by adding stakeholders specific to the school district setting. Research participants were asked to answer questions using a seven point Likert-type scale. DeVellis (2012) notes Likert-type scales are used in studies measuring beliefs and attitudes.

Roberts (2008) found his scale to be reliable and valid. Roberts (2008) noted in his study, that internal consistency was measured using Cronbach’s alpha and found to be: for attitude towards food safety 0.73, subjective norm 0.79, perceived behavioral control 0.86, and behavioral intention of 0.92.

Table 3.1

Questions 15-17 and Associated Items A through H Regarding Food Safety Training

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<td><strong>Attitudes:</strong> The items will be measured using a 7-point Likert type scale, with polar endpoints of 1, strongly disagree to 7, strongly agree.</td>
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| 15. **Offering food safety training to my employees will:** |
|---|---|
| A. keep my supervisor satisfied |
| B. keep my customers satisfied |
| C. ensure safe food |
| D. reduce food cost |
| E. increase employees’ awareness of food safety |
| F. help maintain the department reputation |
| G. increase employee satisfaction |
| H. decrease the likelihood of lawsuits |
Subjective Norm: The items will be measured using a 7-point Likert type scale, with polar endpoints of 1, *extremely unlikely* to 7, *extremely likely*.

16. Please indicate how LIKELY the following individuals will think that you should offer food safety training to your employees:
   A. Your supervisor
   B. Your long-term employees
   C. Your short-term employees (less than 2 years)
   D. Your customers (students, parents, faculty)
   E. The health inspector
   F. Your vendor(s)
   G. Your Board of Education
   H. District superintendent

Perceived Behavioral Control: The items will be measured using a 7-point Likert type scale, with polar endpoints of 1, *strongly disagree* to 7, *strongly agree*.

17. Please indicate the extent to which you agree that the item makes it difficult to provide food safety training.
   A. Employee scheduling availability for food safety training
   B. Managers’ time
   C. Financial resources
   D. Lack of off-site food safety training opportunities
   E. Lack of on-site food safety training opportunities
   F. Lack of targeted food safety training materials
   G. Employees don’t follow what they learn from food safety training.
   H. Time commitment for food safety training classes

Subjective Norm

Question 18, items A through C, and question 19, items A through E, are presented in Table 3.2, were used to measure school foodservice directors’ subjective norm related to implementing alternative produce procurement. Using a 7 point Likert-type scale respondents were asked to indicate how strongly they agree or disagree with the statements, with 1 being strongly disagree and 7, being strongly agree.
Table 3.2

Question 18 and 19 and Associated Items A through D Regarding Subjective Norm

Subjective Norm: The items will be measured using a 7-point Likert type scale, with polar endpoints of 1, strongly disagree to 7, strongly agree.

18. For each statement below, please indicate how STRONGLY you agree or disagree:

   A. Most people who are important to me think that I should purchase produce directly using alternative procurement methods.
   B. The people in my professional life whose opinions I value would approve of me purchasing produce directly from farmers within the next year.
   C. Other school foodservice directors believe I should purchase produce using alternative procurement methods.
   D. The California Department of Education supports purchasing produce from alternative procurement methods.

19. Please indicate how STRONGLY you agree or disagree with the statements.
   A. Most California School Boards of Education believe alternative produce procurement methods should be used in school foodservice.
   B. Most School chief business officials believe alternative produce procurement methods should be used in school foodservice.
   C. Most California school district superintendent believe it is important to purchase produce from alternative procurement sources.
   D. Most students believe it is important to purchase produce using alternative procurement sources.
   E. Most parents believe it is important to purchase produce from alternative procurement.

Perceived Behavioral Control

Perceived behavioral control or the belief that the foodservice director has control over their ability to implement alternative produce procurement was measured in question 20, items A through D, as noted in Table 3.3. Using a 7 point Likert-type scale respondents were asked to indicate how strongly they agree or disagree with the statements, with 1 being strongly disagree and 7, being strongly agree.
Table 3.3

**Question 20 and Associated Items A through D Regarding Perceived Behavioral Control**

Perceived Behavioral Control: The items will be measured using a 7-point Likert type scale, with polar endpoints of 1, *strongly disagree* to 7, *strongly agree*.

20. For each statement below, please indicate how STRONGLY you agree or disagree:

A. It is my choice whether I purchase produce directly within the next year.
B. I will try to purchase produce directly within the next year.
C. I am able to purchase produce directly if I choose.
D. I plan to purchase produce directly within the next year.

**Attitude toward Food Safety in Traditional and Alternative Produce Procurement**

Foodservice Director attitude toward food safety in traditional and alternative produce procurement were measured in question 21, items A through D as noted in Table 3.4. Belief, confidence, and concern statements were used to measure attitude toward food safety in traditional and alternative produce procurement practices. Ajzen, 1985, describes attitude “is the degree to which a performance is positively or negatively valued.” Using a 7 point Likert-type scale respondents were asked to indicate how strongly they agree or disagree with the statements, with 1 being strongly agree and 7, being strongly disagree.

Table 3.4

**Question 21 and Associated Items A through D Regarding Attitude toward Food Safety**

Attitude towards Food Safety: The items will be measured using a 7-point Likert type scale, with polar endpoints of 1, *strongly disagree* to 7, *strongly agree*.

21. For each statement below, please indicate how STRONGLY you agree or disagree.

A. I am concerned about food safety associated with alternative produce purchasing.
B. I feel confident that I can manage food safety in alternative produce purchasing.
C. I believe there is no difference in food safety between traditional and alternate produce purchasing.
D. When compared to traditional produce purchasing alternative purchasing has more safety concerns.
Intention to Implement Alternative Produce Procurement Practices

Question 22 items A through D, assesses foodservice director’s behavioral intention to adopt alternative produce procurement as indicated in Table 3.5. Questions were developed by drawing from the literature review and utilizing “Constructing Questionnaires Based on the Theory of Planned Behaviour: A manual for Health Services Researchers” (Francis et al., 2004). According to Francis (2004) intention can be measured using questions including terms such as “expect, want and intend.” Using three of these types of terms can adequately demonstrate internal consistency (Francis, 2004). Intention was measured using a 7-point Likert type scale, with polar endpoints of 1, extremely likely to 7, extremely unlikely.

Table 3.5

Question 22 and associated items A through D Regarding Behavioral Intention to Implement Alternative Procurement

| Behavioral Intention: The items will be measured using a 7-point Likert type scale, with polar endpoints of 1, extremely unlikely to 7, extremely likely. |

22. For each statement below, please indicate how likely or unlikely you are:

A. I intend to use alternative produce purchasing in my operation during the next year.
B. I want to increase my alternative produce purchasing in my operation during the next year.
C. I do not expect to implement alternative produce purchasing in my operation during the next year.

Food Safety Knowledge

There were six questions related to the construct of food safety knowledge. The question development process including reviewing and selecting, from food safety training materials used to train school foodservice professionals (NFSMI, 2015) from the California Food Code 2015 (California Department of Public Health, 2015), and from USDA’s good agricultural practices (GAP) and good handling practices (GHP) materials (USDA, AMS, 2016). Food safety
knowledge was assessed by asking six questions (23 to 28). The items were scored as either correct or incorrect, with six points possible.


**Pilot Test**

To address questionnaire content validity and clarity a review process was conducted using ten school foodservice directors outside of the state of California recruited as a convenience sample through contacts with the lead researcher (APPENDIX C) To prevent cannibalization of the California school foodservice directors sample pool, another state in the USDA western region, Washington, was used for the pilot study. According to the national FTS website, Washington with 54 reported farm-to-school programs, has the second highest number (behind California), of farm-to-school programs in the USDA western region (NF2S network, 2015).

The Washington State Department of Education, Nutrition Services Director was contacted and agreed to distribute the pilot questionnaire (APPENDIX D) to Washington State school foodservice directors. Pilot study participants were provided an introduction containing informed consent (APPENDIX E) and asked to complete the questionnaire along with the accompanying form (APPENDIX F). Based on feedback (n=30), the questionnaire was modified an example was to include “don’t know” to questions related to their annual budget. Addition of the “don’t know” response option allowed respondents to move past this section to continue
survey completion. This potentially contributed to an increased number of respondents. Dillman et al. (2009) suggested pilot testing the survey tool to determine reliability and validity of the questionnaire.

**Data Collection**

Data were gathered using the web-based questionnaire posted using Qualtrics™. An invitation to participate in the study was sent via email (APPENDIX G). A cover letter which included informed consent (APPENDIX H) was provided to the participants outlining the purpose of the study and how they would participate.

The survey questionnaire was distributed following approval by the California Department of Education, Nutrition Services State Director, via e-mail using CDE’s List Serv to each school foodservice director (or designee as recorded in the database). Each potential research participant received the e-mail with a hyperlink to the questionnaire. A follow-up e-mail reminder was sent one week later, to the entire group, thanking those for their response and encouraging non-responders to complete the online questionnaire. This process was repeated an additional time, one week later. The follow-up e-mails included the hyperlink to the questionnaire. As recommended by Dillman et al. (2009), the final e-mail follow up was sent one week later with a deadline indicating it was the last day for online questionnaire to be completed.

An additional reminder was included for respondents to list their contact information in order to be notified if they won the $100 gift card drawing. The strategy to offer an incentive to increase response rate among sample participants was recommended in previous studies noted by Bosnjak and Tuten (2003), and Deutskens, De Ruyter, Wetzels, and Oosterveld (2004).
Data Analysis

Data gathered from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS) version 22 software. Frequencies were run to analyze, clean the data, and to check for proper coding. Missing data were coded to be excluded from the analysis. Descriptive statistics were utilized to analyze the data distribution to include frequencies, means, and standard deviations, for operational and foodservice director demographics. T-tests were used to compare differences in foodservice director knowledge and foodservice director demographic, school district and department operational characteristics, including variables of geographic region, free and reduced price meal eligibility, percentage of food budget spent on produce. Structured equation modeling (SEM) analyses were conducted using LISREL 8.71. A covariance matrix using eight variables corresponding to the TPB model, consisted of intention, attitude about food safety/department reputation, attitude about food safety/management responsibility, subjective norm, perceived behavioral control, behavioral beliefs, normative beliefs, control beliefs.

Reliability of the questionnaire for questions 15-22 relating to the TPB was measured using Cronbach’s alpha for internal consistency and was found to be: attitude towards food safety (maintaining department reputation) 0.93, attitude towards food safety (management responsibility) 0.84, subjective norm regarding food safety training 0.91, perceived behavioral control regarding food safety training 0.88, normative beliefs about alternative produce procurement 0.67, subjective norm for alternative produce procurement 0.91, perceived behavioral control for alternative produce purchasing 0.74, behavioral beliefs associated with alternative produce procurement 0.72, behavioral intention of 0.90 and control beliefs 0.90. The
desired threshold is 0.70 (Nunnally & Bernstein, 1994) which was not reached for normative beliefs and therefore findings related to this construct are limited.

Internal consistency reliability for knowledge questions (23-28) was measured using Kuder-Richardson 20 test with a value of 0.827 (with a range between 0 and 1). The reliability score was considered acceptable. The value indicates discernment between those who know the material versus those who do not. However, if the value is over 0.90 Kuder and Richardson (1937) indicated the test would not demonstrate any difference in knowledge, as if the same question was being asked in this example, six times.

References


CHAPTER FOUR: EXPLORING SCHOOL FOODSERVICE DIRECTORS’ INTENTIONS TO IMPLEMENT FARM-TO-SCHOOL PROCUREMENT METHODS CONSIDERING FOOD SAFETY PRACTICES

A paper to be submitted to the Journal of Foodservice Management and Education

Abstract

This study’s purpose was to explore school foodservice director’s (FSD) intentions to implement alternative procurement methods in Farm-to-School programs. A web-based questionnaire was distributed to 864 California school FSDs with 136 (16.4%) usable surveys returned. Findings revealed that FSDs indicated confidence in their ability to manage produce safety practices. Additionally, the importance of food safety training as part of their department reputation and management responsibility was noted. Despite willingness to procure produce using alternative methods, FSD’s capacity and intention to change their process was much weaker. This may be indicative of a need for more resources and supportive policy.

Keywords: Farm to school, alternative procurement, school foodservice directors.

Introduction

Farm-to-School Programs

The National Farm-to-School Network describes farm-to-school (F2S) as a program that includes the practice of sourcing local agricultural products, such as produce items for schools. F2S goals include connecting agricultural products to school foodservice using alternative procurement methods, to source as directly as possible to support local and regional farmers. Experiential learning in F2S such as school gardens, farm field trips, and cooking lessons enhance the curricular experience and connections to the cafeteria and community. F2S programs aim to improve student health and communities’ economic viability through local produce procurement practices (National Farm to School Network, 2015). The United States
Department of Agriculture (USDA) study conducted in 2015 found that 42,587 schools had self-identified as having F2S activities. The F2S effort has focused on connecting local farms with consistent and stable buyers; this relationship is the keystone to bringing local seasonal produce through direct marketing in an effort to support farm viability and fresh seasonal produce to school foodservice programs (Izumi, Ronstadt, Moss, & Hamm, 2006).

**Alternative Procurement Methods**

Alternative produce procurement methods as used in F2S programs consist of purchasing practices in which value along the supply chain for growers, producers and consumer within geographic boundaries occur. Examples include: grower direct, farmers market, community supported agriculture and regional food hubs (United States Department of Agriculture, Food and Nutrition Services, 2014).

Direct marketing, used in F2S projects, has perceived benefits such as financial gain to farmers and less travel time for products resulting in fresher foods and decreased fuel used for transport (Gregoire, Arendt, & Strohbehn, 2005). Perceived and articulated barriers to implementing F2S include cost, distribution, food safety, and legal liability (Conner, King, Koliba, Kolodinsky, & Trubek, 2011).

**Food Safety**

School foodservice has a responsibility to uphold and promote food safety to maintain student health and well-being. According to United States Federal Drug Administration Food Code, school aged children are considered a highly susceptible population and require additional safeguards (U.S. Food and Drug Administration, 2014).

School FSDs are responsible for complying with established procurement and food safety regulations and laws from a variety of local, state, and national jurisdictions. The National
School Lunch Act requires school foodservice programs to develop a comprehensive food safety management plan (USDA, FNS, 2010). Food safety knowledge and training is necessary for school FSDs to implement and manage food safety included in their procurement practices.

The need for addressing food safety in alternative procurement methods such as in F2S programs has been identified by USDA through programs, such as Produce Safety University (PSU) (USDA, FNS, 2013) and Serving Up Science: The Path to Safe Food in Schools (Serving Up Science, 2015).

Previous research has not explored the potential impact of altering procurement methods related to food safety practices as potential area of concern for the school FSD. Alternative produce procurement methods are integral to achieving objectives of local sourcing associated with farm-to-school programs. While school FSDs are responsible to maintain food safety in child nutrition programs, there is little research on how food safety practices impacts school FSD’s intentions to implement alternative procurement methods.

**Theory of Planned Behavior and Theory of Reasoned Action**

The purpose of this study was to explore California school FSD’s behavioral, normative, and perceived control beliefs regarding food safety in F2S programs using traditional procurement and alternative procurement practices, utilizing the theory of planned behavior (TPB) (Ajzen, 1985) and the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980) as the theoretical underpinning. The TPB is used to examine determinants of intentions as predictors of behavior. The TRA was utilized to expand subjective norms to include experts and other professionals. The TPB has been used in many behavioral studies, as well as extensively in hospitality management (Han & Sheu, 2012; Jalilvand & Samiei, 2012), local food procurement (Kang & Rajagopal, 2014; Pilling & Brannon, 2008; Roberts & Barrett, 2011; Robinson &
Smith, 2002), and food safety studies (Milton & Mullan, 2012; Redmond & Griffith, 2003; Roberts & Barrett, 2011; York, Brannon, Shanklin, Howells, Roberts, & Barrett, 2009) to identify and predict people’s behaviors based on several indicators, including attitude, subjective norms (influence of others) and perceived control of behavioral performance. The TPB proposes that behavioral performance can be predicted by the intentions to perform the behavior, the influence of others and their perceived behavioral control.

School FSDs’ behavioral intentions to adopt F2S practices may be impacted by their attitudes about food safety training and alternative produce procurement, subjective norm (the impact that experts’ and others’ opinions have), and their perceived behavioral control, regarding food safety in both traditional procurement and alternative procurement. The central question posed was “How do school FSDs’ behavioral, normative and control beliefs’ about food safety training impact the behavioral intentions to implement alternate procurement methods associated with Farm-to-school programs”?

Methods

Sample Selection

The population was California school FSDs or designees (n=864) on record with the California Department of Education (California Department of Education, 2016). Because produce safety requirements and procurement practices vary across state lines, a specific geographic region was chosen. California was selected due to the large number of F2S programs which is likely due to the long growing season and large crop variety available to school foodservices.

Questionnaire Content

A web-based questionnaire was used consisting of three sections and was posted in Qualtrics™. The first section included school district characteristics. Section two questions were
used to measure constructs associated with the TPB and the TRA. The third section addressed FSD demographics.

In section one, school district characteristics included F2S region, number of schools, and percentage of students qualifying for free or reduced price meals, and foodservice operational questions addressed type of management, production style, and foodservice budget.

Section two questions measured the constructs of attitudes, subjective norms (the degree of influence important others have on behavioral intentions) and perceived behavioral control. Attitudes, perceived behavioral control and subjective norm were measured using a 7-point Likert type scale (1= strongly disagree to 7= strongly agree). DeVellis (2012) notes Likert-type scales are used in studies measuring beliefs and attitudes. The TPB was used as foundation to develop questions that elicit school FSDs’ behavioral, normative and control beliefs’ about food safety training in school foodservice and F2S programs and to assess FSDs intentions to adopt farm-to-school procurement practices. In addition, the TRA was used to expand the categories of influencer’s reflected in subjective norm to include expert or professional opinions. The TPB refers to subjective norm as the influence that other person’s opinion impacts the individual to act (Ajzen, 1985). The TRA predates the TPB, and as a behavioral process provides a useful distinction (Ajzen & Fishbein, 1980) in that the TRA further delineates “other persons” into beliefs of what others think, what experts think and motivations to comply with others (Ajzen & Fishbein, 1980).

Section three comprised of ten FSD demographic questions. These included respondent FSD personal demographics including educational background, years in school foodservice, age, and sex. Attendance at USDA’s PSU as well as certification as a food safety protection manager (CFPM) was also asked.
**Pilot Test**

Pilot testing was conducted with a convenience sample of ten school FSDs, from outside California, to address questionnaire content validity and clarity, as suggested by Dillman, Smith, and Christian (2009). Based on feedback the questionnaire was modified to read more clearly. Following this, a pilot study was conducted in the State of Washington where there is also a strong F2S presence. Based on feedback from the pilot study (n=30), modifications were made to improve clarity of some questions and to add an option respond “don’t know”, where applicable. Adding the “don’t know” response option provided the opportunity for respondents to move past this section to continue with the survey completion. This potentially contributed to an increased number of respondents that may not have continued otherwise.

**Questionnaire Distribution**

The California Department of Education, Nutrition Services Division (CDE, NSD), distributed the hyper link to the questionnaire using their internal list serve of 864 school FSDs. Follow-up emails were sent as recommended by Dillman et al., (2009). A drawing for a $100 gift card was offered as an incentive to increase response rate (Bosnjak & Tuten, 2003; Deutskens, De Ruyter, Wetzels, & Oosterveld, 2004). Institution Review Board approval was received prior to contacting potential participants.

**Data Analysis**

Statistical Package for Social Sciences (SPSS) version 22 was utilized to analyze data. Descriptive statistics were utilized to analyze the data distribution to include frequencies, means, and standard deviations, for operational and FSD demographics.

Structured Equation Modeling (SEM) was selected due to its usefulness in depicting relationships between constructs (unobservable variables) and by using quantitative data to test
the theoretical model, as described by Schreiber, Amaury, Stage, Barlow, and King (2006). The TPB was used as the theoretical model. Unobservable variables are measured using a series of items as depicted in Table 4.5. SEM analyses were conducted using LISREL 8.71.

The TPB model and eight constructs are depicted in Figure 4.1: behavioral beliefs about food safety, normative beliefs about alternative procurement methods; control belief regarding adequacy of resources, attitudes toward food safety, subjective norm about alternative procurement methods, perceived behavioral control over alternative procurement methods, intention to implement alternative procurement methods, and implementation of alternative procurement methods (the desired behavior).

![Diagram of TPB model](image)


The questionnaire contained groupings of questions (items) to measure each construct. Table 4.4 displays the construct with corresponding items use to measure and an illustrative item example. Reliability of the questionnaire was measured using Cronbach’s alpha for internal consistency test for each construct: Attitude towards food safety department reputation (α=0.93),
attitude towards food safety-management responsibility ($\alpha=0.97$), perceived behavioral control ($\alpha=0.74$) and subjective norm (0.91), respectively. Nunnally and Bernstein (1994) cited the desired threshold for Cronbach’s alpha to be 0.70.

**Results and Discussion**

**FSD Demographics**

The total number of usable responses was 136, from 207 surveys started, representing a response rate of 16.4% (n= 864). Compiled demographics reveal 84.4% of respondents were female, 45.6% were over the age of 49, 60.9% had at least a bachelor’s degree and 67.2% had worked in school foodservice for at least seven years, and 61.4% had been in their current position for least 4 years (Table 4.1).

**School District and Foodservice Department Characteristics**

Each of the nine California F2S regions were represented (see Table 4.2). The results ranged from 3.0% of respondents indicating the Mother Lode region (located in the far north) to the southern-most portion of California, and San Diego region with 12.1% of respondents. F2S regions were compiled into three distinct geographic categories: Northern (n= 35, 26.5%), Central (n= 30, 22.7%), and Southern (n= 67, 50.8%).

School district settings were almost equally represented, approximately one-third form each setting, rural (38.4%), urban (28.5%), and suburban (33.1%). Two-thirds of districts included elementary, middle and high schools. Half of the school districts would be considered small, having less than 2,499 student enrollment, with 69.3% of districts having student eligibility for free and reduced price meals 50% and higher. The majority of foodservice operations (76.6%) had conventional onsite cooking facilities with 62.8% using a speed-scratch preparation type.
Table 4.3 displays labor costs with ranges similar when compared to food cost ranges with the majority (58.4%) of district’s spending less than $2,000,000 on labor. This is consistent with industry standards for operating ratios, where both food and labor percentages represent approximately equal percentages of the overall foodservice budget at about 45% each (Institute of Child Nutrition, [ICN], 2013). Annual food cost for the 2014-15 school year was under $2,000,000 for 62.3% of participating districts, this corresponds to the majority reporting as small districts (with 2,499 or fewer students). Fresh produce costs ranged between zero and over $10,000,000 with 70% of respondents spending less than $500,000 annually on fresh produce. Less than 10% of FSD respondents indicated that they spent half or more of produce budget on alternate procurement, such as in F2S program. Respondents were offered the option to respond “don’t know” on the annual budget information and therefore this data was not available for all respondents.

Theory of Planned Behavior

The TPB model (Figure 4.1) uses the constructs of behavioral beliefs, normative beliefs, and control beliefs as a basis upon which attitudes towards behaviors are founded (Ajzen, 1985). The constructs used in this study, as noted in the TPB model (Figure 4.1), and as listed in Table 4.4, include behavioral beliefs about food safety in alternative produce purchasing, normative beliefs related to support for alternative produce purchasing, and the control belief of whether respondents believe that adequate training resources and materials are available to support food safety in alternative produce procurement. Table 4.5 includes means and standard deviations for each question and reliability scores for each construct and items (grouping of questions).
Behavioral Beliefs

Behavioral beliefs related to food safety in alternative produce procurement were measured with two items. The highest level of agreement was with the statement “I feel confident I can manage food safety in alternative produce procurement (M= 5.39, SD= 1.54), with the lowest level of agreement with the statement “I am concerned about produce safety in alternative produce procurement” (M= 3.48, SD= 1.83).

Normative Beliefs

To address the construct of normative beliefs related to alternative produce procurement questions included “purchasing produce for an alternative source is supported by …” with a list of responses that includes professionals and experts. Those items with the highest level of agreement for normative beliefs among respondent FSDs included “professional whose opinion I value” (M= 5.65, SD= 1.48), with the lowest level of agreement for “other school FSDs” (M= 4.33, SD=1.66).

Control Beliefs

Control beliefs were measured by asking respondent FSDs if they believed there were adequate training resources and materials available to purchase produce safely using alternative procurement methods results supporting this were modest (M= 4.36, SD= 1.68).

Food Safety Training

The questionnaire used three constructs to assess school FSDs’ attitude, subjective norm (influence of others important to them) and perceived behavioral control toward food safety training. Respondent FSD’s were asked to rate their level of agreement with a list of items related to food safety training.
Attitudes Towards Food Safety Training

Attitudes toward food safety training were grouped into two categories: attitude that food safety training is important to the foodservice department reputation and FSDs’ management responsibility. Increasing employees’ awareness of food safety had a high level of agreement (M= 6.59, SD= 0.98; using a 7-point Likert-type scale) among respondents for maintaining department reputation. While positive attitudes toward keeping customers satisfied (M= 5.92, SD= 1.51) were noted for measures that were used to analyze the strength of respondent FSD’s attitudes towards food safety training.

Respondent FSDs indicated the highest level of agreement was with the health inspector (M= 6.59, SD= 1.18) for those experts and other professionals having the most influence. Perceived behavior control, looking at what makes it difficult to provide food safety training and the FSD respondents’ ability to manage this, was most often related to employee scheduling availability (M= 5.34, SD= 1.77) and time commitment for training (M= 5.08, SD= 1.83).

Subjective Norm

The same Likert-type scale was used to assess respondent FSD’s level of agreement related to using alternative procurement methods to purchase produce. Purchasing produce from alternative methods was supported by “parents” (M= 4.58, SD= 1.44) having the most level of agreement by respondents, yet “students” (M= 3.71, SD= 1.61) had the least. ‘The measure of perceived behavioral control over alternative produce purchasing that respondent FSDs most strongly agreed with was their willingness to try to purchase directly using alternative procurement methods (M= 5.44, SD= 1.74) with their actual “ability to procure directly” has the least agreement (M= 4.92, SD= 1.99).
Intention was measured by asking three questions about their likelihood to use alternative produce procurement. Respondents were found to have the highest level of agreement with the statement “I want to increase alternative produce procurement during the next school year” (M=5.16, SD=1.74) and the lowest level with “I intend to in the next year” (M=4.93, SD=1.96), possibly an indication that action would not actually be taken.

**Intentions to Implement**

A series of Structured Equation Modeling (SEM) analyses were used to test the adequacy of measures to explain the school FSD’s intentions to implement alternative procurement methods associated with F2S programs. Table 4.6 also displays a covariance matrix depicting how data varies between the eight constructs based on 137 observations. In the covariance matrix all the values are positive indicating a positive covariance between each pair. For example, as the level of agreement related to attitudes towards food safety training increases, so does the intention to implement alternative procurement methods to procure produce. However, because the results are small, this finding would suggest the relationship is not linear and therefore cannot be used to predict behavioral change.

Maximum likelihood estimates, using t-ratios, calculated using the unstandardized estimate at 1 degree of freedom and standard error, along with beta regression coefficients, are displayed in Table 4.6. The maximum likelihood for the pathway from attitude about food safety department reputation (t-ratio=0.557, β=0.038) and attitude about food safety management responsibility (t ratio= 0.557, β=0.078), to intention are not statistically significant (at $p \leq 0.05$) as a predictor of school FSD’s intention to purchase produce using an alternative procurement method.
When examining the pathway from subjective norm ($t$-ratio= 2.090, $\beta$= 0.146) to intention to implement alternative procurement methods, it is statistically significant (at $p \leq 0.05$) and suggests the influence of others (experts and professionals and those noted as important to respondents) positively relates to the intention to implement farm-to-school. Additionally, perceived behavioral control ($t$-ratio= 8.998, $\beta$= 0.621) is statistically significant (at $p \leq 0.05$) and indicates that perceived behavioral control positively predicts intention to implement alternative procurement methods associated with F2S.

R-Square values for each of the measures (Table 4.6), attitude towards food safety training related to department reputation ($r^2$=.011), attitude about food safety related to management responsibility ($r^2$=.008), subjective norm ($r^2$=.283), and perceived behavioral control ($r^2$=.045), were small, also indicating a weak linear relationship with intention to purchase produce using alternative procurement methods. Therefore, the hypothesis associated with the TPB that behavioral beliefs about food safety could not be substantiated and did not predict school FSD’s intention to use alternative procurement methods. The variance in intention ($r^2$= 0.418) is instead explained 41.8% of the time by perceived behavioral control.

These findings are further supported by additional analyses. To evaluate the overall goodness of fit, to determine how well the observed data matched expected data from the model, Chi-square and root mean square error of approximation (RMSEA) were used. The Chi-square value (154.894) further demonstrates a poor model fit. Additionally, RMSEA value (0.207) is outside the acceptable range. Less than 0.08 indicates a good model fit as noted by MacCallum, Browne, and Sugawara (1996).
Conclusion and Applications

This study explored school FSD’s intentions to implement F2S procurement methods considering food safety practices using the TPB (Ajzen, 1985) and TRA (Ajzen & Fishbein, 1980). This study may have been limited by the low response rate of 16.4% (136 from 864) potential respondents yielding 136 usable surveys. This could be reflective of over-surveying of California school FSDs or possibly that the survey was sent out too close to school districts Spring breaks. Considering the magnitude of changes in school nutrition programs in recent years (such as implementation of the Healthy, Hunger Free Kids Act, 2010), FSDs may not have prioritized completing the questionnaire.

The results may not be generalizable as laws and regulations vary across state lines and jurisdictions. Support, resources and training, are more robust in some states than others, and this may affect the generalizations that could be drawn from this study.

Findings indicate that respondent FSDs indicated confidence in their ability to manage food safety when using alternative produce procurement methods and were ambivalent about any differences with produce safety in alternative produce procurement. This would suggest FSDs had the capacity to manage food safety independent of the procurement method used, either through conventional or alternative procurement methods.

High mean scores were noted for normative beliefs related to the influence of professionals whose opinion the FSD valued; however, this influence did not extend to their peers (other FSDs). This was inconsistent with other studies. Chen, Arendt, and Shelley (2010) noted a strong relationship between the influences of peers on sustainable practices among college foodservice directors. Results were not conclusive for control beliefs, measured by
asking respondent FSD’s if they believed there were adequate training resources and materials available to purchase produce safely using alternative procurement methods.

Findings showed that FSD’s attitude regarding food safety training indicated that increasing employee’s awareness of food safety was important in maintaining the department reputation, highlighting the importance of food safety training for employees. While keeping customers satisfied was positively related to the FSD’s management responsibility. Respondent FSD’s indicated that the health inspector had the strongest influence of the subjective norm measures with regards to the importance of offering food safety training. At least two health inspections are required annually in each cafeteria (USDA, 2014) and the results are frequently posted on the internet, emphasizing the impact of the role of the inspector. Employee scheduling availability was noted as making it difficult for the FSD to provide food safety training as well as finding the time to train.

Parents were noted as having the greatest influence on the school FSD’s intention to use alternative produce procurement methods, while students were found to have the least. Students are generally considered to be the primary customer of the school foodservice operation; however, this finding would indicate the importance of parents’ influence regarding student meal participation. Stokes, Arendt, and Strohbehn (2014), in a study about foodservice employee’s perceptions about farm-to-school, found that school foodservice employee’s perceived that getting support from parents and students were equally important, in implementing farm-to-school programs (n=199-211). In another study, customers were noted as important to influencing decisions to implement sustainable practices, such as local purchasing, in colleges and university foodservice (Chen, Arendt, & Gregoire, 2011). School FSDs indicated a strong willingness to try to procure using alternative methods, yet their actual ability to procure
alternatively was weaker, possibly indicating a lack of capacity to change their process. FSDs indicated their desire to increase alternative methods usage; however, their intention was much lower. This could be interpreted that action would not be undertaken, despite their indicated desire.

The lack of a linear relationship in the SEM pathways indicates that while the TPB model did not perform well, as evidenced by the R-squared values, the measurements are valid and reliable for this study. The R-squared values indicated that attitudes and subjective norm explained little of the variance in intentions to use alternative procurement methods. However, the explained variance in intentions ($r^2 = .418$) is related to perceived behavioral control over alternative procurement methods, in so much as actions are taken based on administrative directives. The modest results are possibly more reflective of school FSD’s lack of decision making authority at the mid-level management position. Therefore, their behavioral, normative, and control beliefs are less contributory to the ability to implement alternative produce procurement methods as they are not the ultimate decision makers.

The TPB (Ajzen, 1985) did not perform well and did not explain determinants of intention. Therefore, conclusions based on the TPB could not be supported. The TPB model assumed that school FSD’s had control or perceived control, however the relationship between control beliefs and perceived behavioral control did not support this assumption and therefore the theory was interrupted. Future studies could include additional theory to address what is structurally inhibiting the relationship, such as inclusion of risk avoidance component.

These results would suggest if implementing alternative produce procurement methods is desirous, it would likely have to take place at a policy or mandate level or by giving more decision making ability at the school FSD level and identifying what is potentially flawed in the
existing system such as inclusion in the Healthy, Hunger Free Kids Act or as part of reauthorization of the Child Nutrition Act. The results also demonstrate a need for additional research to determine if findings are representative of other geographic regions across the United States.

References


<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Job Title</strong></td>
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<td></td>
</tr>
<tr>
<td>Foodservice Director</td>
<td>127</td>
<td>92.7</td>
</tr>
<tr>
<td>Other- Assistant Director, Chef, Business Manager</td>
<td>10</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34</td>
<td>20</td>
<td>15.8</td>
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<td>38.6</td>
</tr>
<tr>
<td>50-64</td>
<td>56</td>
<td>44.0</td>
</tr>
<tr>
<td>65 or older</td>
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<td>1.6</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>108</td>
<td>84.4</td>
</tr>
<tr>
<td>Male</td>
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<td>15.6</td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>10</td>
<td>7.8</td>
</tr>
<tr>
<td>Some college</td>
<td>40</td>
<td>31.3</td>
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<tr>
<td>Bachelor’s degree</td>
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<td>39.8</td>
</tr>
<tr>
<td>Graduate degree</td>
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<td>21.1</td>
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<tr>
<td><strong>Years worked in School Foodservice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 3</td>
<td>19</td>
<td>14.8</td>
</tr>
<tr>
<td>4 to 6</td>
<td>23</td>
<td>18.0</td>
</tr>
<tr>
<td>7 to 10</td>
<td>14</td>
<td>10.9</td>
</tr>
<tr>
<td>More than 10</td>
<td>72</td>
<td>56.3</td>
</tr>
<tr>
<td><strong>Years at current Position</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 3</td>
<td>49</td>
<td>38.6</td>
</tr>
<tr>
<td>4 to 6</td>
<td>23</td>
<td>18.1</td>
</tr>
<tr>
<td>7 to 10</td>
<td>18</td>
<td>14.2</td>
</tr>
<tr>
<td>More than 10</td>
<td>37</td>
<td>29.1</td>
</tr>
<tr>
<td>Food Safety Protection Manager Certificate a</td>
<td>108</td>
<td>84.4</td>
</tr>
<tr>
<td>USDA’s Produce Safety University a</td>
<td>16</td>
<td>12.6</td>
</tr>
</tbody>
</table>

*Note: a Yes responses*
<table>
<thead>
<tr>
<th>School District Setting</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>37</td>
<td>28.5</td>
</tr>
<tr>
<td>Suburban</td>
<td>43</td>
<td>33.1</td>
</tr>
<tr>
<td>Rural</td>
<td>50</td>
<td>38.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Enrollment School Year 2014-2015</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,499 or fewer students</td>
<td>53</td>
<td>50.0</td>
</tr>
<tr>
<td>2,500 to 9,999 students</td>
<td>40</td>
<td>37.7</td>
</tr>
<tr>
<td>10,000 or more students</td>
<td>13</td>
<td>12.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Students Eligible for Free and Reduced Price Meals</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-24%</td>
<td>19</td>
<td>13.9</td>
</tr>
<tr>
<td>25-49%</td>
<td>23</td>
<td>16.8</td>
</tr>
<tr>
<td>50-74%</td>
<td>51</td>
<td>37.2</td>
</tr>
<tr>
<td>75-100%</td>
<td>44</td>
<td>32.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types of Kitchens</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Onsite</td>
<td>105</td>
<td>76.6</td>
</tr>
<tr>
<td>Centralized (commissary)</td>
<td>10</td>
<td>7.3</td>
</tr>
</tbody>
</table>
### Table 4.2 continued

<table>
<thead>
<tr>
<th></th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Kitchen (onsite)</td>
<td>46</td>
<td>33.6</td>
</tr>
<tr>
<td>Central Production (no onsite)</td>
<td>18</td>
<td>13.1</td>
</tr>
<tr>
<td>Satellite Sites</td>
<td>50</td>
<td>36.5</td>
</tr>
<tr>
<td>Combination</td>
<td>22</td>
<td>16.1</td>
</tr>
</tbody>
</table>

#### Food Preparation Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed-scratch</td>
<td>86</td>
<td>62.8</td>
</tr>
<tr>
<td>Mostly Pre-prepared</td>
<td>42</td>
<td>30.7</td>
</tr>
<tr>
<td>All Pre-prepared</td>
<td>11</td>
<td>8.0</td>
</tr>
<tr>
<td>Assembly-serve</td>
<td>40</td>
<td>29.2</td>
</tr>
<tr>
<td>Combination/ Other</td>
<td>47</td>
<td>34.3</td>
</tr>
</tbody>
</table>

*a Greater than 100% due to multiple responses*

### Table 4.3 Foodservice Department Annual Costs for School Year 2014-2015 (n=127-137)

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0-$499,999</td>
<td>42</td>
<td>32.3</td>
</tr>
<tr>
<td>$500,000-$1,999,999</td>
<td>39</td>
<td>30.0</td>
</tr>
<tr>
<td>$2,000,000-$9,999,999</td>
<td>30</td>
<td>23.1</td>
</tr>
<tr>
<td>$10,000,000-$49,999,999</td>
<td>4</td>
<td>3.1</td>
</tr>
<tr>
<td>$50,000,000 and Above</td>
<td>9</td>
<td>6.9</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>6</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Total Fresh Produce Cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0-$24,999</td>
<td>30</td>
<td>23.1</td>
</tr>
<tr>
<td>$25,000-$99,999</td>
<td>31</td>
<td>23.8</td>
</tr>
<tr>
<td>$100,000-$499,999</td>
<td>30</td>
<td>23.1</td>
</tr>
<tr>
<td>$500,000-$1,999,999</td>
<td>18</td>
<td>13.8</td>
</tr>
<tr>
<td>$2,000,000-$9,999,999</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>$10,000,000 and Above</td>
<td>5</td>
<td>3.8</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>14</td>
<td>10.8</td>
</tr>
</tbody>
</table>

#### Alternative Procurement Produce Cost (% of Total Produce)

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency (n)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>38</td>
<td>29.7</td>
</tr>
<tr>
<td>1-24%</td>
<td>67</td>
<td>52.3</td>
</tr>
<tr>
<td>25-49%</td>
<td>11</td>
<td>8.6</td>
</tr>
<tr>
<td>50-74%</td>
<td>10</td>
<td>7.8</td>
</tr>
<tr>
<td>75-100%</td>
<td>2</td>
<td>1.6</td>
</tr>
</tbody>
</table>
### Table 4.3 continued

| Annual Labor Cost for 2014-15 |  |
|-------------------------------|---|---|
| $0-$499,999                  | 38 | 29.7 |
| $500,000-$1,999,999          | 37 | 28.7 |
| $2,000,000-$9,999,999        | 32 | 24.8 |
| $10,000,000-$49,999,999      | 5  | 3.6 |
| $50,000,000 and Above        | 7  | 5.4 |
| Don’t Know                   | 10 | 7.8 |

### Table 4.4 Constructs, Number of Items, and Item Example

<table>
<thead>
<tr>
<th>Construct</th>
<th>Number of Items (questions)</th>
<th>Example of Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral beliefs about food safety</td>
<td>2</td>
<td>I am concerned about food safety associated with alternative procurement methods.</td>
</tr>
<tr>
<td>Normative beliefs about alternative procurement methods</td>
<td>3</td>
<td>Most people who are important to me think I should purchase produce using alternative procurement methods.</td>
</tr>
<tr>
<td>Control belief regarding adequacy of resources</td>
<td>1</td>
<td>I believe there is adequate training resources available for me to purchase produce using alternative procurement methods.</td>
</tr>
<tr>
<td>Attitudes toward food safety related to department reputation</td>
<td>4</td>
<td>Offering food safety to my employees will ensure safe food.</td>
</tr>
<tr>
<td>Attitudes toward food safety related to management responsibility</td>
<td>4</td>
<td>Offering food safety to my employees will increase employee satisfaction.</td>
</tr>
<tr>
<td>Subjective Norm About Alternative Procurement Methods</td>
<td>3</td>
<td>Most parents believe it is important to purchase produce using alternative procurement methods in school foodservice.</td>
</tr>
<tr>
<td>Perceived behavioral control over alternative procurement methods</td>
<td>8</td>
<td>It is my choice whether I purchase produce directly from farmers during the next school year.</td>
</tr>
<tr>
<td>Intention to implement alternative procurement methods</td>
<td>2</td>
<td>I intend to use alternative procurement methods to purchase produce in my operation during the next school year.</td>
</tr>
</tbody>
</table>
### Table 4.5 Summary of Construct Measures for Behavioral Intention

<table>
<thead>
<tr>
<th>Construct Measure</th>
<th>M</th>
<th>SD</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behavioral Beliefs</strong></td>
<td></td>
<td></td>
<td>0.72</td>
</tr>
<tr>
<td>.... Food safety in alternative produce purchasing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel confident I can manage</td>
<td>5.39</td>
<td>1.54</td>
<td></td>
</tr>
<tr>
<td>Believe there is no difference with traditional</td>
<td>3.83</td>
<td>1.94</td>
<td></td>
</tr>
<tr>
<td>Has more concerns than traditional procurement</td>
<td>3.62</td>
<td>1.83</td>
<td></td>
</tr>
<tr>
<td>I am concerned about</td>
<td>3.48</td>
<td>1.83</td>
<td></td>
</tr>
<tr>
<td><strong>Normative Beliefs</strong></td>
<td></td>
<td></td>
<td>0.67</td>
</tr>
<tr>
<td>Purchasing produce from alternative sources is supported by</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionals whose opinion I value</td>
<td>5.65</td>
<td>1.48</td>
<td></td>
</tr>
<tr>
<td>California Department of Education</td>
<td>5.40</td>
<td>1.54</td>
<td></td>
</tr>
<tr>
<td>Most people important to me</td>
<td>4.35</td>
<td>1.76</td>
<td></td>
</tr>
<tr>
<td>Other school FSDs</td>
<td>4.33</td>
<td>1.66</td>
<td></td>
</tr>
<tr>
<td><strong>Control Belief</strong></td>
<td></td>
<td></td>
<td>0.90</td>
</tr>
<tr>
<td>Adequate training resources are available for me</td>
<td>4.36</td>
<td>1.68</td>
<td></td>
</tr>
<tr>
<td><strong>Attitude Related to Department Reputation</strong></td>
<td></td>
<td></td>
<td>0.93</td>
</tr>
<tr>
<td>Offering food safety training to my employees will ...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase employees’ awareness of food safety</td>
<td>6.59</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>Ensure safe food</td>
<td>6.56</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>Help maintain the department reputation</td>
<td>6.49</td>
<td>1.07</td>
<td></td>
</tr>
<tr>
<td>Decrease the likelihood of lawsuits</td>
<td>6.28</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td><strong>Attitude Related to Management Responsibility</strong></td>
<td></td>
<td></td>
<td>0.84</td>
</tr>
<tr>
<td>Keep my customers satisfied</td>
<td>5.92</td>
<td>1.51</td>
<td></td>
</tr>
<tr>
<td>Increase employee satisfaction</td>
<td>5.83</td>
<td>1.37</td>
<td></td>
</tr>
<tr>
<td>Keep my supervisor satisfied</td>
<td>5.70</td>
<td>1.67</td>
<td></td>
</tr>
<tr>
<td>Reduce food cost</td>
<td>5.39</td>
<td>1.76</td>
<td></td>
</tr>
<tr>
<td><strong>Subjective Norm about Food Safety Training</strong></td>
<td></td>
<td></td>
<td>0.91</td>
</tr>
<tr>
<td>Likelihood others think you should offer food safety training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Inspector</td>
<td>6.59</td>
<td>1.18</td>
<td></td>
</tr>
<tr>
<td>Immediate supervisor</td>
<td>6.25</td>
<td>1.36</td>
<td></td>
</tr>
<tr>
<td>District superintendent</td>
<td>6.20</td>
<td>1.26</td>
<td></td>
</tr>
<tr>
<td>Customers (students, parents, faculty)</td>
<td>6.15</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Board of Education</td>
<td>6.07</td>
<td>1.37</td>
<td></td>
</tr>
<tr>
<td>Table 4.5 continued</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term employees</td>
<td>5.87</td>
<td>1.48</td>
<td></td>
</tr>
<tr>
<td>Short-term employees</td>
<td>5.69</td>
<td>1.47</td>
<td></td>
</tr>
<tr>
<td>Vendors</td>
<td>5.30</td>
<td>1.69</td>
<td></td>
</tr>
</tbody>
</table>

**Perceived Behavioral Control Regarding Food Safety Training**

<table>
<thead>
<tr>
<th>What makes it difficult to provide food safety training …</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee scheduling availability</td>
</tr>
<tr>
<td>Time commitment for training</td>
</tr>
<tr>
<td>Manager’s time</td>
</tr>
<tr>
<td>Financial resources</td>
</tr>
<tr>
<td>Lack of on-site opportunities</td>
</tr>
<tr>
<td>Lack of off-site opportunities</td>
</tr>
<tr>
<td>Lack of targeted materials</td>
</tr>
<tr>
<td>Employees don’t practice what they learn</td>
</tr>
</tbody>
</table>

**Subjective Norm Regarding Alternative Produce Purchasing**

<table>
<thead>
<tr>
<th>Purchasing produce from alternative sources is supported by …</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
</tr>
<tr>
<td>Board of Education</td>
</tr>
<tr>
<td>School district superintendents</td>
</tr>
<tr>
<td>School chief business officials</td>
</tr>
<tr>
<td>Students</td>
</tr>
</tbody>
</table>

**Perceived Behavioral Control**

<table>
<thead>
<tr>
<th>…. Purchase produce directly in the next school year.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I will try to</td>
</tr>
<tr>
<td>It’s my choice</td>
</tr>
<tr>
<td>I plan on it</td>
</tr>
<tr>
<td>I am able to</td>
</tr>
</tbody>
</table>

**Behavioral Intention to Use Alternative Produce Procurement**

<table>
<thead>
<tr>
<th>Likelihood to increase alternative produce purchasing …</th>
</tr>
</thead>
<tbody>
<tr>
<td>I want to during the next school year</td>
</tr>
<tr>
<td>I do not expect to in the next school year (reversed)</td>
</tr>
<tr>
<td>I intend to in the next school year</td>
</tr>
</tbody>
</table>
Table 4.6  SEM Evaluation of Measures for Covariance Matrix, Maximum Likelihood Estimates and R² Values and Standardized Regression Coefficients (β) for Impact on Intention

<table>
<thead>
<tr>
<th>Measure</th>
<th>UEª</th>
<th>SE b</th>
<th>t -Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude: Department Reputation</td>
<td>0.069</td>
<td>0.123</td>
<td>0.557</td>
</tr>
<tr>
<td>Attitude: Management Responsibility</td>
<td>-0.108</td>
<td>0.096</td>
<td>-1.126</td>
</tr>
<tr>
<td>Subjective Norm (SN)</td>
<td>0.184</td>
<td>0.088</td>
<td>2.090*</td>
</tr>
<tr>
<td>Perceived Behavioral Control (PBC)</td>
<td>0.703</td>
<td>0.078</td>
<td>8.998*</td>
</tr>
</tbody>
</table>

*a Unstandardized Estimate at 1 Degree of Freedom
b Standard Error
* Statistically significant (at p ≤ 0.05) value above 1.96

R² Values and Standardized Regression Coefficients (β) for Impact on Intention

<table>
<thead>
<tr>
<th>Measure</th>
<th>R²</th>
<th>β</th>
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<tr>
<td>Attitude: Department Reputation</td>
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<td>Attitude: Management Responsibility</td>
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<tr>
<td>Perceived Behavioral Control (PBC)</td>
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<tr>
<td>Intention</td>
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CHAPTER FIVE. CHALLENGES TO IMPLEMENTING FOOD SAFETY AND PRODUCE HANDLING TRAINING IN SCHOOL MEAL PROGRAMS

A paper to be submitted to the *Journal of Child Nutrition Management*

**Abstract**

**Purpose/Objectives**

The purpose of this study was to explore one state’s school foodservice directors’ (FSDs’) attitudes, knowledge, and normative beliefs (the influence of others’) on produce safety training. Ajzen’s (1985) theory of planned behavior (TPB) was used to examine school FSD’s behavioral intentions to implement produce safety training.

**Methods**

The web-based questionnaire yielded usable responses of 16.4% (n= 136). The demographic data, knowledge scores, and attitudes were analyzed using descriptive statistics and t-tests.

**Results**

Most respondent school FSDs were female, between the ages of 35-64, with a least a bachelors’ degree and more than 10 years of school foodservice experience. Most districts were self-operated, small (1-9 schools), had free and reduced eligibility of 50% or higher, and had conventional kitchens with speed-scratch preparation type. School foodservice directors’ attitude towards offering food safety training to their staff yielded statements with highest level of agreement regarding maintaining department reputation including “increasing employee satisfaction” while lowest levels of agreement were related to management responsibility for “reducing food cost.” The health inspector and immediate supervisor were the individuals identified by school foodservice directors as having the greatest likelihood to think produce
safety training should be offered. The noted challenge to providing food safety training with the highest level of agreement was “employee scheduling availability.”

Findings identified 84.4% (n=108) of respondent FSDs had a Certified Food Safety Protection (CFPM) certification and 12.6% (n=16) reportedly attended USDA’s Produce Safety University (PSU) with no significant differences in knowledge scores based on either having attended USDA’s PSU or certification as a CFPM. Findings revealed 24.4% of responding foodservice directors answered all six questions correctly and 32.3% getting five correct (n=125-127).

Applications to Child Nutrition Professionals

Food safety is paramount in school nutrition programs. School foodservice staff needs adequate produce safety training as part of their food safety management plan. Produce safety training resources can be supported by State agencies and professional organizations.

Key words: food safety, training, professional development.

Introduction

School foodservice directors have a responsibility to uphold and promote food safety in school nutrition programs to maintain student health and well-being. According to United States Federal Drug Administration Food Code, school-aged children are considered susceptible to food borne illnesses and require additional safeguards (U.S. Food and Drug Administration, 2014).

The WIC Reauthorization Act of 2004 required school nutrition programs to implement food safety programs based on hazard analysis and critical control points (HACCP) principles (USDA-FNS, 2004). Two health inspections are required annually for each school (USDA, 2014). Specifically, the need to address produce safety in school nutrition programs has been
Preventing foodborne illness is integral to food safety management. Foodborne illness can be defined as an illness associated with consuming contaminated foods, which include bacteria, parasites, and viruses (Centers for Disease Control and Prevention, 2014). A foodborne illness outbreak is defined as two or more confirmed cases (FDA, 2014). These must be reported to the local health authority. In California this is handled by the Environmental Health Division of the Public Health Department (California Department of Public Health, 2015).

Using data from the U.S. Foodborne Disease Outbreak Surveillance System, Gould, Walsh, Vieira, Herman, Williams, Hall, and Cole (2013) identified the number of foodborne illness outbreaks in schools as 286; representing 17,266 illnesses from 1998 to 2008. While the number of outbreaks was far less in schools than in restaurants (7,939) or private homes (1,058), the median number of illnesses per incident (38 in schools, compared to 5 in restaurants) was much greater. This emphasizes the importance of minimizing foodborne illness risk in schools. CDC (2015) reported that most cases of foodborne illness go unreported or even undiagnosed.

Training is relevant in produce safety, as foodservice professionals are central to foodborne illness prevention. Foodservice professionals, including directors, managers, and employees require training to acquire job knowledge to perform their duties. Acquiring job knowledge and applying it in to practice supports organizational objectives, specifically in school foodservice this includes maintaining a safe food environment that protects student well-being. Jones, Punia, Young, Huegli, and Zidenberg-Cherr (2013) conducted a state-wide training needs assessment in California with 54.7% (n= 422) respondent foodservice directors and supervisors identifying food safety as being really needed or somewhat needed.
Professional standards for school nutrition programs became mandatory in July 2015 and include professional development requirements for all school foodservice staff (USDA, FNS, 2016). Specific standards include a minimum of six to twelve training hours depending on job category and cover four key topic areas with food safety and HACCP as training topics (USDA, FNS, 2016). All new school foodservice directors are now required to have eight hours of food safety training every five years (USDA, FNS, 2016).

The purpose of this study was to explore California school foodservice directors’ attitudes, knowledge and beliefs and to identify challenges to providing safety training in school foodservice programs. Ajzen’s (1985) theory of planned behavior (TPB) was used to examine school foodservice directors’ behavioral intentions to implement produce safety training which may be impacted by their attitudes, knowledge, and beliefs’ regarding food safety.

Methodology

Population
The population included all California school foodservice directors as identified using the California Department of Education database (California Department of Education, 2015). School district foodservice departments may not each have a position with the title of foodservice director; therefore, the sample included the staff person designated as responsible for oversight of the foodservice department. In the 2015/16 school year, 864 California public school districts had school foodservice programs (California Department of Education, 2016).

Because food safety and state department requirements/guidelines vary by jurisdiction, only one state, California, was selected for this study. California also has a long growing season and large crop variety that yields ample fresh produce.
Survey Instrument

This study used a quantitative approach to gather and analyze data through a web-based questionnaire. The survey instrument consisted of three parts: part one contained 14 operations demographic questions, part two contained eight questions related to attitudes, influence of others, and challenges related to food safety training and food safety knowledge, and part three was comprised of 10 foodservice director demographic questions. Not all data collected is reported in this manuscript as it is part of a larger study. Appropriate Institutional Review Board approval was received prior to data collection.

The questionnaire used three constructs to elicit school foodservice director’s attitude, influence of others, and perceived challenges related to food safety training. Questions related to attitude and influences of others’ were adapted from Roberts (2008) study examining restaurant managers’ behavioral intention regarding food safety training. A portion of the Roberts (2008) study questionnaire, regarding behavioral beliefs, was modified for school foodservice by adding stakeholders specific to the school district setting. DeVellis (2012) notes that Likert-type scales are used in studies measuring beliefs and attitudes.

Additionally, six multiple choice questions to assess school foodservice directors’ knowledge about produce safety and Good Agricultural Practices (GAP) and Good Handling Practices (GHP) were asked. The question development process for this knowledge section was derived from food safety training materials used to train school foodservice professionals (Institute of Child Nutrition, 2015), from the California Food Code 2015 (California Department of Public Health, 2015) and from USDA’s good agricultural practices(GAP) and good handling practices (GHP) materials (USDA, AMS, 2016). The items were scored as either correct or incorrect, with zero to six points possible.
Part three of the questionnaire included respondent foodservice director personal demographics and incorporated educational background, years in school foodservice, age, and sex. Attendance at USDA’s PSU as well as certification as a food safety protection manager (CFPM) was also ascertained. Dillman, Smyth, and Christian (2009) suggest placing more personal questions at the end of a survey.

**Data Collection**

To address questionnaire content validity and clarity, a review process was conducted using ten school foodservice directors outside of the state of California who were recruited as a convenience sample through contacts with the lead researcher. In order to prevent cannibalization of the California school foodservice directors sample pool, another state in the USDA western region, Washington, was subsequently used for the pilot study. The Washington State Department of Education distributed the pilot questionnaire to Washington State school foodservice directors. The questionnaire was modified based on respondent feedback; for example, a “don’t know” response option was added to questions related to annual budget. The suggestion to add “don’t know” as a possible response option allowed respondents to continue, potentially leading to an increased number of respondents completing the questionnaire.

**Data Analysis**

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 22 software. Descriptive statistics were utilized to analyze data distribution and included frequencies, means, and standard deviations for operational and foodservice director demographics. T-tests were utilized to analyze differences in mean scores between knowledge scores as well as operational and foodservice demographics.
Reliability of the questionnaire for questions relating to the TPB was measured using Cronbach’s alpha for internal consistency and was found to be: attitude towards food safety (maintaining department reputation) 0.93, and attitude towards food safety (management responsibility) 0.84. The desired threshold is 0.70 (Nunnally & Bernstein, 1994) which was not reached for normative beliefs and therefore findings related to this construct are limited.

Internal consistency reliability for knowledge questions was measured using Kuder-Richardson 20 test with a value of 0.827 (with a range between 0 and 1). The reliability score was considered acceptable. The value indicates discernment between those who know the material versus those who do not. However, if the value is over 0.90, Kuder and Richardson (1937) indicated the test would not demonstrate any difference in knowledge, as if the same question was being asked in this example, six times.

**Results and Discussion**

**School Foodservice Director Demographics**

The web-based questionnaire yielded usable response rate of 16% (n= 136). Table 1 contains respondent demographic characteristics. Close to half (45.6%) of respondents were over the age of 50, and 84.4% were female, with 60.9% of respondents holding a bachelor’s degree or higher. A foodservice director title was held by 92.7%. The majority of respondents (56.3%) had worked in school foodservice for over 10 years with 29.1% having been in the same position more than 10 years. Findings identified 84.4% (n= 108) of respondents had a CFPM certification and 12.6% (n= 16) had attended USDA’s Produce Safety University.

**School District Demographics**

Table 2 displays school district and departmental operational demographics. The number of schools per district ranged from one to 230, with over one-half (58.6%) having less than 10
schools. The highest percent of districts (92.0%) included elementary schools, 82.5% had middle schools, and 62% had high schools. School district enrollment size categories were determined from the USDA, FNS professional guidelines. USDA mandated professional development standards are based on these three school district size levels (USDA, FNS, 2016). District enrollment ranges were fairly equally distributed between the three categories, with 39.0% having 2,499 students or less, 29.4% of districts with 2,500-9,999 students and 31.6% having 10,000 or more students.

**Department Operational Demographics**

Department operational demographics are displayed in Table 5.2. Most (89.9%) school district foodservice departments were self-operated while only 10.1% were under contract management. Respondents were asked to indicate the types of kitchens in their departments as well as their methods of preparation. More than one selection was an option. Conventional onsite production was prevalent with 76.6% of respondents indicating they used this method. Additionally, 36.5% had satellite sites, 33.6% used a base kitchen with both onsite and distribution to site, 13.1% had central production with no onsite, 16.1% had a combination of types of kitchen production, and only 7.3% used a centralized commissary. The greatest number of respondents (62.8%) indicated using the speed-scratch method of preparation, while 30.7% used mostly the pre-prepared method, 8% used all-pre-prepared, 29.2% used assembly serve and the remaining 34.3% indicated they used a combination or another method of food preparation.

The greatest number of respondents (62.2%) served 500 or fewer breakfast meals daily with only 9.0% serving more than 3,000 per day. Just over half of the districts (51.2%) surveyed served more than 1,000 lunch meals. Less than half (47.2%) served between 301-3000 snacks daily and two-thirds (67.7%) of respondents served 350 or less supper meals.
Attitudes towards Food Safety Training

Survey questions addressed foodservice directors’ attitudes towards food safety training including benefits, influences, and challenges. Attitude was assessed using foodservice directors’ possible beliefs as to why food safety training should be offered, including department reputation, management responsibility, and stakeholder influence. Respondent school foodservice directors’ attitude towards offering their staff food safety training found statements with highest level of agreement regarding maintaining department reputation included “increasing employees’ awareness of food safety” (M= 6.59, on a seven point Likert –type scale, with 1 being extremely unlikely and 7 being extremely likely, SD= 0.97) and “ensure safe food” (M= 6.56, SD= 0.97), while the lowest levels of agreement were related to management responsibility for “reduce food cost” (M= 5.39, SD= 1.75), and “keeping my supervisor happy” (M= 5.69, SD= 1.67).

Normative Beliefs

Respondents were asked about the impact that other individuals (important to their work) had in influencing their attitude towards food safety training. The health inspector (M= 6.59, SD= 1.18) and immediate supervisor (M= 6.25, SD= 1.36) were the individuals identified by school foodservice director’s as having the greatest likelihood to think that food safety training should be offered. Two health inspections are required annually for each school (USDA, 2014) and are conducted by inspectors from the local public health departments. The Food and Drug Administration’s Food Code is the source used by health inspecting agencies to develop their food safety guidelines (FDA, 2014). The health inspections are unannounced and the results are made available to the public; major or repeat violations require corrective action, follow up visits, and potential facility closure and monetary penalties. It is not surprising that foodservice
directors ranked the health inspector highest in offering food safety training based on their potential influence on maintaining the departments’ reputation. Conversely, vendors (M= 5.27, SD= 1.69) and short term employees (employed less than two-years) (M= 5.68, SD= 1.46) were identified as least likely.

**Challenges to Providing Food Safety Training**

Survey results indicated that the challenge to provide food safety training with highest level of agreement was “employee scheduling availability” (M= 5.34, SD= 1.76) and “time commitment for training” (M= 5.08, SD= 1.82). The lowest level of agreement was “employees don’t practice what they learn from training” (M= 3.50, SD= 1.93) and “lack of targeted materials” (M= 3.69, SD= 1.97). These findings suggest that the challenges identified by school foodservice directors’ are more likely related to scheduling and time available for training rather than employees’ response to training or lack of targeted materials.

**Food Safety Knowledge**

School foodservice director knowledge was tested by answering a series of six produce safety and GAP related questions. Findings revealed only 24.4% of responding foodservice directors answered all six questions correctly and 32.3% got five correct (n= 125-127). The question most frequently missed was regarding fresh produce handling and storage with just over half (57.9%) of respondents answering correctly. Questions related to Good Agricultural Practices (GAP) regarding receiving fresh produce were answered correctly by 59.2% and questions about acceptable delivery practices were answered correctly by 66.4%. Temperature control, serving, and cross-contamination questions were answered correctly, 79.2%, 99.2% and 100% respectively.
Foodservice Director Demographics and Food Safety Knowledge

CFPM certification was held by 84.4% (n= 108) of respondent FSDs with 12.6% (n= 16) having attended USDA’s Produce Safety University. The school foodservice directors having attended PSU (n= 16) was associated with a mean produce safety knowledge score of 5.00 (SD= 0.89) in comparison with FSDs not having attended PSU resulting in a mean produce safety knowledge score of 4.64 (SD= 0.99). An independent samples t-test was performed, revealing no significant differences in knowledge scores of respondents based on either having attended USDA’s Produce Safety University (PSU) (p = .095) or having certification as a Food Protection Manager (CFPM), which includes certifications such as ServSafe® and the National Registry of Food Safety Professionals (p= .129). Other FSD demographics including education level, age, sex, and years in school foodservice did not yield any statistically significant difference in mean knowledge scores.

School District and Department Characteristics and Food Safety Knowledge

Foodservice directors in school districts with greater than 2,499 students were noted to have significantly (p ≤ 0.00) higher mean knowledge scores (M= 4.92, SD= 0.96) than their counterparts with fewer students (M= 4.27, SD= 0.92). Respondents identifying their district foodservice as self-operated (n= 115) had a significantly (p= .025) higher mean food safety knowledge score (M= 4.73, SD = 1.01) compared to districts (n= 12) contracting a management company (M= 4.25, SD= 0.62). However, these results are based on a small sample size and therefore may not reflect the greater population.
Conclusion and Application

Handling produce safely is important in school nutrition programs. School foodservice staff requires adequate training to maintain a food safe operation and is integral to their food safety management plan.

Foodservice professionals, including directors, managers, and employees, require training to acquire job knowledge to perform their duties. Acquiring job knowledge and applying it in practice supports organizational objectives. In the school district setting, organizational objectives include student well-being. Training in the workplace is imperative for staff at all levels and has been identified in the literature as essential to facilitate meeting organizational objectives (Bartel, 1991; Delaney & Huselid, 1996). Conversely, Poulston (2008) in a hospitality study noted that lack of adequate training was related to increased disciplinary problems and staff turnover. Knowledge acquisition can be acquired through training, but also occurs via observation of other employees, as well as with use of consultants and specialists. Previous studies with foodservice managers have noted that challenges to providing staff training include time, funding, and demographic differences (Arendt, Paez, & Strohbehn, 2013; Sneed & Strohbehn, 2008).

Most foodservice directors identified staff schedule availability and adequate time to train as challenges to providing produce safety training. While many resources and training materials were identified as being available for general food safety training, materials targeted to produce safety and GAP information may not be as well-known. The increased use of fresh produce and farm-to-school activities (USDA, FNS, 2016) demonstrates the increased need for availability of these resources in formats accessible and available to be delivered when time and scheduling are a challenge. Respondent school foodservice directors indicated recognition of the
importance to other key stakeholders of produce safety training. Communicating produce safety training provision to key stakeholders can be supported by State agencies and professional organizations.

While most school foodservice directors have a certified food protection manager certificate (84%), there is room for improvement. Knowledge testing indicated that there was no significant difference in food safety knowledge scores between directors with and without food safety certification. However, school foodservice directors are required to have food safety training and thus need this knowledge to operate a school nutrition program. Recent programmatic changes have increased produce available in schools via the Healthy Hunger Free Kids Act of 2010 (USDA, FNS, 2014), which requires increased fruits and vegetables to be available in the National School Lunch Program. In an Indiana study evaluating the methods and challenges in implementing the new NSLP regulations, methods noted by respondents to incorporate vegetables into the menu included 87.0% (n= 94) served as sides and 49.1% (n= 53) noted that they served vegetables in salad bars (Thiagarajah, Getty, Johnson, Case, & Herr, 2015). The proliferation of salad bars in schools and increased participation of school districts in F2S programs coincides with produce safety concerns and the recent associated foodborne illness rates. This increased use of fresh produce in schools has also increased the need for GAP/GHP awareness by school foodservice directors. FSD knowledge scores suggest that practice may have outpaced training and resources related to produce safety.

**Professional Development Needs**

Arendt, Paez, and Strohbehn (2013) noted that foodservice managers perceive staff turnover and limited time as barriers to making sure that staff adheres to established food safety practices. Sneed and Strohbehn (2008) noted as a trend that generational and ethnic diversity in
foodservice creates a need for the manager to customize food safety training and is facilitated by online and technology resources. Strohbehn, Jun, and Arendt (2014) found that 98.2% (n= 754) of school foodservice employee study participants had received some food safety training and concluded that tailoring the delivery method based on employee age group and number of hours worked could improve food safety practices. Technology continues to advance at a rapid rate and can support food safety training but also comes with an associated cost and an expected learning curve. Recognizing training strategies that apply to the needs of the adult learner can aid managers in improving training effectiveness. Strohbehn, Arendt, Ungku, and Meyer (2013) found that offering a variety of food safety training formats such as face-to-face delivery and computer based, could be used with adult learners. The authors noted that food safety tool kits used in a variety of delivery formats could be effectively used by foodservice managers.

**Food Safety Training**

Training is particularly relevant with food safety as foodservice professionals are central to foodborne illness prevention. According to the Centers for Disease Control and Prevention (2014), the three most common food safety errors contributing to unsafe food and foodborne illness are food handling errors, poor personal hygiene, and cross-contamination. Painter, Hoekstra, Tauxe, Braden, Angulo, and Griffin (2013) found that of the 17 food commodity categories, produce had the highest percentage (46%) of attributed foodborne illness cases; further emphasizing the importance of produce safety training.

The research findings comparing the effectiveness of training with food safety practice compliance have been conflicting. As with this study, foodservice director’s knowledge scores were essentially the same whether they had certification as a food safety protection manager (CFPM) or not. In one observational study conducted in 40 schools in Iowa concerning
foodservice operations, Henroid and Sneed (2004) reported that there was no difference in food safety knowledge noted between staff having taken a food safety certification course (64.4%) and staff not completing a course (35.6%). However, food safety practice scores were higher for staff (managers and employees) that had completed a food safety certification course. The authors found no significant differences in food safety practice scores based on personal demographics of age, education, or experience nor were there differences based on operational demographics such as number of schools or amount and type of staff.

FSD knowledge mean scores were found to be higher in medium and larger school districts (with more than 2,499), possibly indicating that smaller districts have less training and fewer resources available. Additionally, self-operated districts had a higher knowledge mean scores than the respondents with contract management; however the sample size was small and therefore may not be reflective of the population.

Professional standards for school nutrition programs became mandatory in July 2015 and include professional development requirements for all school foodservice staff (USDA, FNS, 2016). Specific standards include a minimum of six to twelve training hours depending on job category and cover four key topic areas with food safety and HACCP as one of six training topics (USDA, FNS, 2016). All school foodservice directors are now required to have eight hours of food safety training every five years (USDA, FNS, 2016).

Produce Safety University, a five-day program sponsored by USDA that provides in-depth hands on training for school nutrition programs, has not been widely available. Expanding participation opportunities and providing material in formats easily delivered to site staff may provide the additional produce safety specific materials to enhance school food safety training
plans. Additionally, GAP and GHP training topics can be incorporated into existing food safety training materials.

Foodservice directors’ behavioral intentions to implement produce safety training may be impacted by their attitudes, knowledge, and beliefs’ regarding food safety. According to Ajzen’s (1985) TPB, intentions are the best predictor of behavior. FSDs had the highest agreement scores with the health department inspector and their immediate supervisor had significant (p= 0.02) influence on their behavior. Therefore, maintaining the department’s reputation was found to have the greatest influence on FSD’s intention to over food safety training and their management responsibility to maintain employee satisfaction.

The challenge facing school foodservice directors is in both maintaining produce safety standards required to support student well-being and managing the operational objectives both fiscally and from a human resources perspective. There are opportunities for state agencies and professional organizations to develop, provide a variety of training formats, and make these materials widely available to school foodservice directors.

**Limitations of the Study**

This study is not without constraints due to the small response rate. Additionally, recent programmatic changes have possibly impacted FSDs workload and less focus for additional activities, such as participating in studies. Generalizations are therefore limited. The results found in one state may not be representative across other regions.

**Future Study**

Futures studies could expand the population to include other states and USDA regions and possibly compare regions nationally. Further expansion of the knowledge questions and
separating basic produce handling from GAP/GHP questions might also yield more insight regarding foodservice director knowledge in these topic areas.

References


Table 5.1 Questionnaire Respondent’s Demographics (n=124-137)

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<th>Category</th>
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*Note: ‡ Yes responses*
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<td>40</td>
<td>29.4</td>
</tr>
<tr>
<td>10,000 or more</td>
<td>43</td>
<td>31.6</td>
</tr>
<tr>
<td>Students Eligible for Free or Reduced Price Meals</td>
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<td></td>
</tr>
<tr>
<td>0-24%</td>
<td>19</td>
<td>13.9</td>
</tr>
<tr>
<td>25-49%</td>
<td>23</td>
<td>16.8</td>
</tr>
<tr>
<td>50-74%</td>
<td>51</td>
<td>37.2</td>
</tr>
<tr>
<td>75-100%</td>
<td>44</td>
<td>32.1</td>
</tr>
<tr>
<td>Management Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-operated</td>
<td>115</td>
<td>89.9</td>
</tr>
<tr>
<td>Contract</td>
<td>12</td>
<td>10.1</td>
</tr>
<tr>
<td>Types of Kitchens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional Onsite</td>
<td>105</td>
<td>76.6</td>
</tr>
<tr>
<td>Centralized (commissary)</td>
<td>10</td>
<td>7.3</td>
</tr>
<tr>
<td>Base Kitchen (onsite preparation and distribution)</td>
<td>46</td>
<td>33.6</td>
</tr>
<tr>
<td>Central Production (no onsite service)</td>
<td>18</td>
<td>13.1</td>
</tr>
<tr>
<td>Satellite Sites</td>
<td>50</td>
<td>36.5</td>
</tr>
<tr>
<td>Combination</td>
<td>22</td>
<td>16.1</td>
</tr>
</tbody>
</table>
Table 5.2 continued

<table>
<thead>
<tr>
<th>Type of Preparation</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Scratch</td>
<td>86</td>
<td>62.8</td>
</tr>
<tr>
<td>Mostly pre-prepared</td>
<td>42</td>
<td>30.7</td>
</tr>
<tr>
<td>All pre-prepared</td>
<td>11</td>
<td>8.0</td>
</tr>
<tr>
<td>Assembly-Serve</td>
<td>40</td>
<td>29.2</td>
</tr>
<tr>
<td>Combination and Other</td>
<td>47</td>
<td>34.3</td>
</tr>
</tbody>
</table>

Daily Average Number of Breakfasts Served

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>500 or less</td>
<td>69</td>
<td>62.2</td>
</tr>
<tr>
<td>501 -3,000</td>
<td>32</td>
<td>28.8</td>
</tr>
<tr>
<td>3001-12,000</td>
<td>7</td>
<td>6.3</td>
</tr>
<tr>
<td>12,001 or more</td>
<td>3</td>
<td>2.7</td>
</tr>
</tbody>
</table>

Daily Average Number of Lunches Served

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 or less</td>
<td>37</td>
<td>29.6</td>
</tr>
<tr>
<td>1001 -10,000</td>
<td>64</td>
<td>51.2</td>
</tr>
<tr>
<td>10,001-50,000</td>
<td>18</td>
<td>14.4</td>
</tr>
<tr>
<td>50,001 or more</td>
<td>6</td>
<td>4.8</td>
</tr>
<tr>
<td>10,001 or more</td>
<td>11</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Daily Average Number of Snacks Served

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>300 or less</td>
<td>34</td>
<td>27.6</td>
</tr>
<tr>
<td>301 -3,000</td>
<td>58</td>
<td>47.2</td>
</tr>
<tr>
<td>3,001-10,000</td>
<td>20</td>
<td>16.3</td>
</tr>
<tr>
<td>10,001 or more</td>
<td>11</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Daily Average Number of Suppers Served

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>350 or less</td>
<td>67</td>
<td>67.7</td>
</tr>
<tr>
<td>351 -2,000</td>
<td>21</td>
<td>21.2</td>
</tr>
<tr>
<td>2,001-10,000</td>
<td>7</td>
<td>7.1</td>
</tr>
<tr>
<td>10,001 or more</td>
<td>4</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Note: a Some school district have all three school types
b Greater than 100% due to multiple options possible
### Table 5.3 Influencers, Benefits and Challenges to Food Safety Training (n=133-137)

<table>
<thead>
<tr>
<th>(a) Likelihood the listed individuals will think that you should offer food safety training to your employees.</th>
<th>M*</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health inspector</td>
<td>6.59</td>
<td>1.18</td>
</tr>
<tr>
<td>Immediate supervisor</td>
<td>6.25</td>
<td>1.36</td>
</tr>
<tr>
<td>District superintendent</td>
<td>6.20</td>
<td>1.25</td>
</tr>
<tr>
<td>Customers (students, parents, faculty)</td>
<td>6.15</td>
<td>1.18</td>
</tr>
<tr>
<td>Board of Education</td>
<td>6.07</td>
<td>1.36</td>
</tr>
<tr>
<td>Long-term employees</td>
<td>5.87</td>
<td>1.47</td>
</tr>
<tr>
<td>Short-term employees (less than 2 years)</td>
<td>5.68</td>
<td>1.46</td>
</tr>
<tr>
<td>Vendor(s)</td>
<td>5.27</td>
<td>1.69</td>
</tr>
<tr>
<td>Total Influence of others</td>
<td>6.01</td>
<td>1.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(b) Food safety training will…</th>
<th>M*</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase employees’ awareness of food safety</td>
<td>6.59</td>
<td>0.97</td>
</tr>
<tr>
<td>Ensure safe food</td>
<td>6.56</td>
<td>0.97</td>
</tr>
<tr>
<td>Help maintain the department reputation</td>
<td>6.49</td>
<td>1.06</td>
</tr>
<tr>
<td>Decrease the likelihood of lawsuits</td>
<td>6.27</td>
<td>1.20</td>
</tr>
<tr>
<td>Keep customers satisfied</td>
<td>5.92</td>
<td>1.50</td>
</tr>
<tr>
<td>Increase employee satisfaction</td>
<td>5.82</td>
<td>1.37</td>
</tr>
<tr>
<td>Keep supervisor satisfied</td>
<td>5.69</td>
<td>1.67</td>
</tr>
<tr>
<td>Reduce food cost</td>
<td>5.39</td>
<td>1.75</td>
</tr>
<tr>
<td>Overall Benefit Mean Score</td>
<td>6.09</td>
<td>1.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(c) Challenges to provide food safety training</th>
<th>M*</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee scheduling availability</td>
<td>5.34</td>
<td>1.76</td>
</tr>
<tr>
<td>Time commitment for training</td>
<td>5.08</td>
<td>1.82</td>
</tr>
<tr>
<td>Managers’ time</td>
<td>4.89</td>
<td>1.94</td>
</tr>
<tr>
<td>Financial resources</td>
<td>4.80</td>
<td>2.01</td>
</tr>
</tbody>
</table>
### Table 5.3  continued

<table>
<thead>
<tr>
<th>Lack of on-site opportunities</th>
<th>4.77</th>
<th>1.99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of off-site opportunities</td>
<td>4.57</td>
<td>1.93</td>
</tr>
<tr>
<td>Lack of targeted materials</td>
<td>3.69</td>
<td>1.97</td>
</tr>
<tr>
<td>Employees don’t practice what they learn from training</td>
<td>3.50</td>
<td>1.93</td>
</tr>
<tr>
<td>Overall Challenges Mean Score</td>
<td>4.58</td>
<td>1.93</td>
</tr>
</tbody>
</table>

* Rating scale: 1= extremely unlikely to 7= extremely likely.

### Table 5.4  Food Safety Knowledge Compared to Respondent Demographics and District and Department Operational Characteristics and Influence of Others  (n=118-137)

#### Respondent Foodservice Director Demographics

<table>
<thead>
<tr>
<th>Foodservice Director Age (Years)</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50</td>
<td>19</td>
<td>4.68</td>
<td>1.01</td>
</tr>
<tr>
<td>50 or Older</td>
<td>106</td>
<td>4.63</td>
<td>0.90</td>
</tr>
</tbody>
</table>

#### Foodservice Director Education

<table>
<thead>
<tr>
<th>Education</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than a Bachelor’s Degree</td>
<td>77</td>
<td>4.90</td>
<td>0.96</td>
</tr>
<tr>
<td>Bachelor’s Degree or Higher</td>
<td>49</td>
<td>4.33</td>
<td>0.92</td>
</tr>
</tbody>
</table>

#### Years in School Foodservice

<table>
<thead>
<tr>
<th>Years</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 7</td>
<td>41</td>
<td>4.65</td>
<td>0.94</td>
</tr>
<tr>
<td>7 or More</td>
<td>86</td>
<td>4.68</td>
<td>1.01</td>
</tr>
</tbody>
</table>

#### Male vs Female

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>19</td>
<td>4.95</td>
<td>0.97</td>
</tr>
<tr>
<td>Female</td>
<td>107</td>
<td>4.63</td>
<td>0.99</td>
</tr>
</tbody>
</table>

#### Food Protection Manager Certification

<table>
<thead>
<tr>
<th>Certification</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>108</td>
<td>4.69</td>
<td>1.02</td>
</tr>
<tr>
<td>No</td>
<td>19</td>
<td>4.68</td>
<td>0.82</td>
</tr>
</tbody>
</table>

#### Produce Safety University Attendance

<table>
<thead>
<tr>
<th>Attendance</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Table 5.4  continued

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>16</td>
<td>5.00</td>
<td>0.89</td>
</tr>
<tr>
<td>No</td>
<td>111</td>
<td>4.64</td>
<td>0.99</td>
</tr>
</tbody>
</table>

District and Department Operational Characteristics

<table>
<thead>
<tr>
<th>Management Type</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-operated</td>
<td>115</td>
<td>4.73</td>
<td>1.01</td>
</tr>
<tr>
<td>Contract</td>
<td>12</td>
<td>4.25</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Number of Students

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1-2499</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2500 or more</td>
<td>77</td>
<td>4.92</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>4.27</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Knowledge Score versus Influence

<table>
<thead>
<tr>
<th>Influence of Others</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge score greater than 5</td>
<td>70</td>
<td>6.80</td>
<td>0.83</td>
</tr>
<tr>
<td>Knowledge score less than 5</td>
<td>55</td>
<td>6.55</td>
<td>1.14</td>
</tr>
</tbody>
</table>

* Knowledge scores range 0 to 6.
CHAPTER SIX. GENERAL CONCLUSIONS

The purpose of this study was to explore school foodservice director’s intentions to implement farm-to-school procurement methods considering food safety practices. A quantitative study was conducted via an electronic questionnaire to assess California school foodservice directors’ knowledge and behavioral beliefs regarding food safety in procurement practices for conventional and alternate produce procurement methods associated with F2S programs. Both the theory of planned behavior (TPB), as a theoretical framework, and a portion of the theory of reasoned action (TRA), were used to examine intentions as predictors of behavior (Ajzen, 1985). This chapter summarizes key findings, study results, limitations, recommendations for future research, and implications.

Summary of Results

The questionnaire was distributed to 864 California FSDs, with 207 completed online, yielding a response rate of 16.4%; 136 of questionnaires, were substantially completed to be included in the data analysis. Almost half of respondent FSDs (45.6%) were over the age of 50, and 84.4% were female, with 60.9% of respondents holding a bachelor’s degree or higher. Foodservice director title was held by 92.7%. The majority of respondents (56.3%) had worked in school foodservice for over 10 years with 29.1% having been in the same position more than 10 years.

School district settings were almost equally represented, approximately one-third from each setting, rural (38.4%), urban (28.5%) and suburban (33.1%). Two-thirds of districts included elementary, middle and high schools. Half of the school districts would be considered small, having less than 2,499 student enrollment, with 69.3% of districts having student eligibility for free and reduced price meals over 50%. The majority of foodservice operations
were self-operated (88.9%), with 76.6% having conventional onsite cooking facilities with 62.8% using a speed-scratch preparation type.

Ajzen’s (1985) theory of planned behavior (TPB) model was used to examine school FSD’s attitudes, knowledge, and normative beliefs (the influence of others’) as determinants of intention. School FSD’s intentions to implement F2S procurement methods considering food safety practices using the TPB (Ajzen, 1985) and the TRA (Ajzen & Fishbein, 1980) were explored. Behavioral beliefs are identified as determinants of intention and these determinants are considered predictors of future behaviors. Ajzen (1985) noted in the TPB that intention is the best predictor of behavior. The study was designed to answer eight research questions. Results are summarized for each research question.

1. Does school foodservice directors’ food safety knowledge impact their behavioral intentions to implement alternative produce procurement associated with F2S programs?

School foodservice directors’ food safety knowledge was assessed using a series of questions regarding produce safety handling, receiving and storage questions, and good agricultural/good handling practices (GAP/GHP) associated with alternative produce procurement methods. Comparisons were drawn between knowledge scores and school FSD demographics and district and department operational characteristics.

Findings indicated that only 24.4% of responding foodservice directors answered all six questions correctly with 32.3% getting only five correct (n=125-127). The question most frequently missed was regarding fresh produce handling and storage with just over half (57.9%) of respondents answering correctly. Questions related to Good Agricultural Practices (GAP) regarding receiving fresh produce were answered correctly by 59.2% and acceptable delivery practice questions were answered correctly by 66.4%. Temperature control, serving, and cross-
contamination questions were answered correctly, 79.2%, 99.2% and 100% respectively.

Findings identified 84.4% (n=108) of respondent FSDs had a Certified Food Safety Protection certification and 12.6% (n=16) having attended USDA’s Produce Safety University (PSU) with no significant differences in knowledge scores based on either having attended USDA’s PSU or possessing certification as a CFPM.

FSDs in school districts with greater than 2499 students were noted to have significantly (p <0.00) higher mean knowledge scores (M= 4.92, SD=0.96) than their counterparts with fewer students (M=4.27, SD= 0.92). Respondents identifying their district foodservice as self-operated (n=115) had a significantly (p=.025) higher mean food safety knowledge score (M=4.73, SD = 1.01) compared to districts (n=12) contracting a management company (M=4.25, SD=0.62). However these results are based on a small sample size and therefore may not reflect the greater population.

2. Does school foodservice directors’ attitude about food safety training impact their intention to implement alternative produce procurement associated with F2S programs?

Attitudes toward food safety training were grouped into two categories: attitude that food safety training is important to the foodservice department reputation and FSDs’ management responsibility. Increasing employees’ awareness of food safety had a high level of agreement (M= 6.59, SD= 0.98; using a 7-point Likert-type scale) among respondents for maintaining the department reputation. While positive attitudes toward keeping customers satisfied (M=5.92, SD=1.51) were noted for measures that were used to analyze the strength of respondent FSD’s attitudes towards food safety training.

Findings showed that FSD’s attitude regarding food safety training indicated that increasing employee’s awareness of food safety was important in maintaining the department
reputation, highlighting the importance of food safety training for employees. Keeping customers satisfied was positively related to the FSD’s management responsibility.

Respondent FSDs indicated the highest level of agreement with the health inspector (M=6.59, SD 1.18) for those experts and other professionals having the most influence with regards to the importance of offering food safety training. Perceived behavior control, looking at what makes it difficult to provide food safety training and the FSD respondents’ ability to manage this, was most often related to employee scheduling availability (M=5.35, SD 1.77) and time commitment for training (M=5.08, SD=1.83).

3. Does school foodservice directors’ subjective norm (the impact of other’s influence) impact their intentions to implement alternative produce procurement associated with F2S programs?

FSDs highest agreement scores were the health department inspector and their immediate supervisor had significant (p=0.02) influence on their behavior. Therefore maintaining the department’s reputation was found to have the greatest influence on FSD’s intention.

Purchasing produce from alternative methods was supported by “parents” (M=4.58, SD=1.44) having the highest agreement scores, yet “students” (M=3.71, SD=1.61) had the least. The measure of perceived behavioral control over alternative produce purchasing that respondent FSDs most strongly agreed with was their willingness to try to purchase directly (M=5.44, SD=1.74) while their actual “ability to procure directly” had the least agreement (M=4.92, SD=1.99).

4. Does school foodservice directors’ perceived behavioral control impact their intentions to implement alternative produce procurement associated with F2S programs?
Control beliefs were measured by asking respondent FSDs if they believed there were adequate training resources and materials available to purchase produce safely using alternative procurement methods. Results supporting this were moderate with a mean of 4.6 on a seven point Likert-type scale (M= 4.36, SD= 1.68).

5. Does school foodservice directors’ attitude regarding food safety differ for alternative produce procurement versus conventional procurement?

Findings indicate that respondent FSDs indicated confidence in their ability to manage food safety when using alternative produce procurement methods and were ambivalent about any differences with produce safety in alternative produce procurement compared to conventional produce procurement. This would suggest FSDs had the capacity to manage food safety independent of the procurement method used, either through conventional or alternative procurement methods.

6. What is the relationship between school district operational characteristics and foodservice directors’ intention to implement F2S procurement practices?

Foodservice directors in school districts with greater than 2,499 students were noted to have significantly (p ≤ 0.00) higher mean knowledge scores (M= 4.92, SD= 0.96) than their counterparts with fewer students (M= 4.27, SD= 0.92). Respondents identifying their district foodservice as self-operated (n= 115) had a significantly (p= .025) higher mean food safety knowledge score (M= 4.73, SD = 1.01) compared to districts (n= 12) contracting a management company (M= 4.25, SD= 0.62). However, these results are based on a small sample size and therefore may not reflect the greater population.
7. What is the relationship between foodservice director demographics and their intention to implement F2S procurement practices?

Certification as a food protection manager (CFPM) was held by 84.4% (n= 108) of respondent FSDs with 12.6% (n= 16) having attended USDA’s Produce Safety University. The school foodservice directors having attended PSU (n= 16) was associated with a mean produce safety knowledge score of 5.00 (SD= 0.89) in comparison with FSDs not having attended PSU having a mean produce safety knowledge score of 4.64 (SD= 0.99). An independent samples t-test was performed, revealing no significant differences in knowledge scores of respondents based on either having attended USDA’s Produce Safety University (PSU) (p = .095) or having certification as a CFPM (p= .129).

Other FSD demographics including education level, age, sex, and years in school foodservice did not yield any statistically significant difference in mean knowledge scores.

8. What are the challenges to implementing food safety training in California school meal programs?

Most foodservice directors identified staff schedule availability and adequate time to train as challenges to providing produce safety training. While many resources and training materials were identified as being available for general food safety training, materials targeted to produce safety, and GAP information may not be as well-known. These findings suggest that school foodservice directors’ identified challenges are more likely related to scheduling and time available for training rather than employees’ response to training or lack of targeted materials.

Limitations of the Study

A limitation of this study was the low response rate of 16.4% (136 from 864) potential respondents yielding 136 usable surveys. The questionnaire was distributed via the internet, and
despite the support of the California Department of Education, Nutrition Services Division promotion, and distribution of the survey link, the response rate was still low. Additional efforts were made to increase participation by a request through the California School Nutrition Association and the California Farm-to-School network. Both organizations were supportive and sent the introductory e-mail, including informed consent, to their membership to encourage participation in the study.

The questionnaire was circulated in March, and this time of year may have been near school district’s spring break. Therefore with schools closed, it is possible that directors may not have been available. It is possible that too many surveys have been conducted with this group and their time and interest may have been limited. Additionally, recent programmatic changes have possibly impacted FSDs workload and less focus for additional activities, such as completing questionnaires. Due to the low response rate, generalizations are therefore limited.

Additionally, as this study was conducted solely in California, the results may not be generalizable as laws and regulations vary across state lines and jurisdictions. The focus on one state may not be representative across other regions. Support, resources, and training are more robust in some states than others, and this may affect the generalizations that could be drawn as well.

**Recommendations for Future Research**

Future studies examining food safety knowledge and challenges to implementing alternative procurement related to food safety practices could expand the sample population to include other states and USDA regions to gain a national perspective as well as draw distinctions between regions and possibly identify ideal practices. This could include identification of the
various farm-to-school legislation to evaluate whether these are factors are influential in implementing alternative procurement methods.

Alternative procurement methods could be delineated in the questionnaire to provide participants the opportunity to make a selection. This could be used to evaluate if there are varying levels of food safety practice influence dependent on the type of alternative procurement method. For example, the school FSD may have a different attitude about food safety using farmer direct sourcing compared to a farmers market.

Further expansion of the knowledge questions and separating basic produce handling from GAP/GHP questions might also yield more insight regarding foodservice director knowledge in these topic areas. The results also demonstrate a need for additional research to determine if findings are representative of other geographic regions across the United States.

The six food safety knowledge questions were found to be reliable (KR-20= 0.827). Therefore, these questions could be used in future studies to assess food safety knowledge.

**Conclusion and Implications**

The Healthy, Hunger Free Kids Act of 2010 stipulated that school foodservice directors receive eight hours of food safety training every five years. Generally, participation in food safety certification programs can fulfill this requirement. The food safety knowledge outcomes indicated that school FSDs who had certification as a CFPM (having successfully taken the course and passed the exam) did not have significantly higher scores than the school FSDs who did not have certification as a food protection manager. Additionally, the question most frequently missed was related to produce safety, followed by GAP/GHP questions. This would suggest that additional emphasis on food safety training and knowledge acquisition to include
good agricultural (GAP) and good handling practice (GHP) content and reach be broadened for school FSDs.

The challenges facing school foodservice directors are in both maintaining produce safety standards required to support student well-being and managing the operational objectives both fiscally and from a human resources perspective. There are opportunities for state agencies and professional organizations to develop, provide a variety of training formats, and make these materials widely available to school foodservice directors.

Transition to an alternate system of procurement necessitates identification and evaluation of challenges and ideal practices. The research can be used to identify gaps in resources, training, and policy to support produce safety in F2S programs. One identified resource includes extension & outreach programs, such as Iowa State University for food safety and GAP/GHP training programs (ISU, 2016).

**Theoretical Implications**

While the TPB (Ajzen, 1985) model did not predict determinants of intention as predicted, future studies could include the addition of other theoretical model components. As an example, risk avoidance, could be used to explain the relationship between control beliefs and perceived behavioral control, which were not identified with the TPB model. Findings indicated that school foodservice directors perceived behavioral control was significant in so much as actions to implement alternative procurement methods are taken based on administrative directives, rather than self-directed. The modest results are possibly more reflective of school FSD’s lack of decision-making authority at the mid-level management position. Therefore their behavioral, normative and control beliefs, attitudes, subjective norm and perceived behavioral
control is less contributory to the ability to implement alternative produce procurement methods as they are not the ultimate decision makers.

These results would suggest that if implementing alternative produce procurement methods is desirous, it would likely have to take place at a policy or mandate level. For example, addition of F2S procurement practices in the Healthy, Hunger Free Kids Act or as part of reauthorization of the Child Nutrition Act. Additionally, improvements might be seen by giving more decision making ability at the school FSD level and identifying what is potentially flawed in the existing system.
APPENDIX A: HUMAN SUBJECTS APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Order: 1/19/2018
To: Sandra Cutwood
511 E View Drive
Banks Falls, CA 93506

From: Office of Responsible Research

Title: Exploring School Foodservice Directors' Intentions to Implement Farm-to-School Produce Procurement Considering Food Safety Practices

IRB ID: 15-088
Study Review Date: 1/19/2018

The project referenced above has been declared exempt from the requirements of the human subject protection regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

a. (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
   - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects, or
   - Any disclosures of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or being damaged in their financial standing, employability, or reputation.

The determination of exemption means that:

You do not need to submit an application for annual continuing review.

You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., methods of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, or any changes that may increase the risk to or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personal Change Form may be submitted when the only modification involves changes to study staff. If it is determined that exemption is no longer warranted, then an Application for Approval for Research Involving Human Subjects will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. Only the IRB or designee may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

Please be aware that approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4568 or IRB@iastate.edu.
APPENDIX B: QUESTIONNAIRE

The purpose of this study is to explore school foodservice directors’ intentions to procure farm-to-school produce based on food safety practices.

Definitions:
Alternative produce procurement: Purchasing practices within geographic boundaries include, but are not limited to, purchasing directly from a grower, from a farmers market, through community supported agriculture, or via a regional food hub (USDA-FNS, 2014).

Traditional produce procurement: Also termed “conventional” procurement, this is described as purchasing through a broadline or wholesale foodservice distributor.

Part I: Operational Demographic Information. Please answer the following questions based on your school foodservice operation.

Tell us about your district:

1. In which of the following farm-to-school regions is your district located?

   __ North Coast: Del Norte, Humboldt, Mendocino, Lake, Napa, Sonoma, Marin
   __ North Valley: Butte, Glenn, Tehama, Colusa
   __ Sacramento Valley: Sacramento, Yolo, Solano, Placer
   __ Mother Lode: Calaveras, Tuolumne, Amador, El Dorado
   __ San Francisco Bay Area: San Francisco, San Mateo, Alameda, Contra Costa
   __ Central Valley: San Joaquin, Stanislaus, Merced, Mariposa, Madera, Fresno, Kern, Tulare
   __ Greater Los Angeles: Los Angeles, Riverside, San Bernardino
   __ San Diego: San Diego, Orange
   __ South Central Coast: San Luis Obispo, Santa Barbara, Ventura

2. How would you describe the setting of your school district?

   ___ Urban (population of more than 100,000 residents) ___ Suburban (20,000-100,000 residents)
   ___ Rural (less than 20,000 residents)

3. How many students are enrolled in your district?

   ____ 2499 or fewer    ___ 2500-9,999    ____ 10,000 or more
4. How many total schools are in your district? _______
   Does your school district include: (check all that apply) [X] Elementary school [X] Middle School [X] High School
5. Is your school foodservice department:
   ___ Self-operated  ___ Contract foodservice management

6. Please indicate the number of kitchen types in your district.
   _____ Conventional Onsite Kitchen (food prepared and served onsite)
   _____ Centralized (Commissary)
   _____ Base Kitchen (food served onsite as well as distributed offsite) _________
   _____ Central Production Kitchen (no on-site service)
   _____ Satellite Kitchen (foods prepared offsite and delivered for onsite service)
   _____ Combination (Please describe):_________________________________________

7. How would you describe your preparation type? (Check all that apply)
   ___ "Speed-scratch"  ___ Mostly pre-prepared  ___ All pre-prepared
   ___ Assembly-Serve  ___ Combination (Please describe):_______________________
   ___ Other (Please describe):_______________________________________________

8. What was the district-wide percentage of students eligible for free and reduced price meals on October 1, 2014 (CBEDS day)?
   ___0-24%      ___25-49%      ___50-74%       ___75-100%

9. What was the average number of meals served daily in the 2014-15 school year?
   Breakfast? _________ Lunch? _________ Snacks? ________ Supper? _________

10. What was your total food cost in the 2014-15 academic year? ___________

11. What was your total fresh produce cost in the 2014-15 academic year? ___________

12. What percentage of your produce costs were from conventional procurement in the 2014-15 academic year? ___0%  ___25%  ___50%  ___75%  _______100%

13. What percentage of your produce costs were from farm-to-school (alternative) procured fresh produce in 2014-15? ___0%  ___25%  ___50%  ___75%  _______100%

14. What was your annual labor cost for 2014-15? ___________

Part II: Food safety training and produce procurement practices.
For each statement below, please indicate your level of agreement using the scale.

15. Offering food safety training to my employees will____________________.

<table>
<thead>
<tr>
<th>A. keep my supervisor satisfied</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. keep my customers satisfied</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. ensure safe food</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. reduce food cost</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>E. increase employees’ awareness of food safety</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>F. help maintain the department reputation</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
G. increase employee satisfaction 1 2 3 4 5 6 7
H. decrease the likelihood of lawsuits 1 2 3 4 5 6 7

16. Please indicate the likelihood the listed individuals will think that you should offer food safety training to your employees

<table>
<thead>
<tr>
<th>Individual</th>
<th>Extremely Likely</th>
<th>Extremely Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Your immediate supervisor</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. Your long-term employees</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. Your short-term employees (less than 2 years)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. Your customers (students, parents, faculty)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>E. The health inspector</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>F. Your vendor(s)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>G. Your board of education</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>H. District superintendent</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

17. Please indicate your level of agreement as to whether the listed item makes it difficult to provide food safety training.

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Employee scheduling availability</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. Managers’ time</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. Financial resources</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. Lack of off-site opportunities</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>E. Lack of on-site opportunities</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>F. Lack of targeted materials</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>G. Employees don’t follow what they learn from training</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>H. Time commitment for training</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

18. Please indicate how STRONGLY you agree or disagree with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Diagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Most people who are important to me think that I should purchase produce using alternative procurement methods.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. The people in my professional life whose opinions I value would approve of me purchasing produce directly from farmers within the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. Other school foodservice directors believe I should purchase produce using alternative</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
D. The California Department of Education supports purchasing produce from alternative procurement methods.

**19. Please indicate how STRONGLY you agree or disagree with the statements.**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Diagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Most California School <strong>Boards of Education</strong> believe alternative produce procurement methods should be used in school foodservice.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. Most California School <strong>chief business officials</strong> believe alternative produce procurement methods should be used in school foodservice.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. Most California school <strong>district superintendents</strong> believe it is important to purchase produce from alternative procurement sources.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. Most <strong>students</strong> believe it is important to purchase produce using alternative procurement sources.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>E. Most <strong>parents</strong> believe it is important to purchase produce from alternative procurement sources.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

**20. Please indicate how STRONGLY you agree or disagree with the following statements.**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Diagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. It is my choice whether I purchase produce directly from farmers during the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. I will try to purchase produce directly within the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. I am able to purchase produce directly if I choose.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. I plan to purchase produce directly within the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

**21. Please indicate how STRONGLY agree or disagree with the statements.**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Diagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I am concerned about food safety associated with direct produce purchasing.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. I feel confident that I can manage food safety in alternative produce purchasing.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. I believe there is no difference in food safety between traditional and alternate produce purchasing.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. When compared to traditional produce purchasing, alternative purchasing has more safety concerns.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

**22. For each statement below, please indicate how likely or unlikely you are to take action.**

<table>
<thead>
<tr>
<th>Extremely Unlikely</th>
<th>Extremely Likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I intend to use alternative produce</td>
<td></td>
</tr>
</tbody>
</table>
purchasing in my operation during the next year.  
B. I want to increase my alternative produce purchasing in my operation during the next year.  
C. I do not expect to implement alternative produce purchasing in my operation during the next year.  
D. I believe there are adequate training materials and resources available for me to purchase produce using alternative procurement methods.

Food Safety Knowledge (Based on the 2015 California Food Code and Good Agricultural Practices (GAP), please answer the questions below):

23. What food is NOT considered time /temperature controlled for safety (TCS)? (Select one)
   _____ Frozen corn       _____ Pizza       _____ Whole tomatoes       _____ Chopped lettuce       _____ Chicken nuggets

24. Select the TRUE statement. Unprocessed produce should be delivered:
   _____ in a new, single-use container.
   _____ in a reused cardboard produce box
   _____ in a plastic-lined sealed container.
   _____ loose in the back of a pickup truck.

25. Which of following practice is correct in a foodservice operation?
   _____ Store washed and unwashed fruits and vegetables together.
   _____ Wash fresh tomatoes before storing.
   _____ Handle ready-to-eat vegetables without gloves.
   _____ Use packaged, washed, ready-to-eat spinach without rinsing.

26. A salad bar with eight different items on it, must have how many serving utensils?
   _____ 2    _____ 4    _____ 6    _____ 8

27. What is the concern with storing raw chicken above romaine lettuce in the refrigerator?
   _____ Cross-contamination       _____ Poor personal hygiene
   _____ Time-temperature abuse     _____ Lettuce tastes like chicken

28. Which one of the following statements is FALSE: Unprocessed fresh produce should be rejected if:
   _____ specifications are not met       _____ there is evidence of product abuse
   _____ there is evidence of pests       _____ if the product temperature is over 41° F

Part III: Foodservice Director Demographic Information.
Tell us about yourself:

29. What is your job title?
   _____ Foodservice Director    _____ Foodservice Manager    _____ Foodservice Supervisor
   _____ Other: (list) __________________

30. Which of the following job duties do you perform? (Check all that apply)
   _____ Menu planning       _____ Recipe development       _____ Budget management
   _____ Staff hiring        _____ Staff training           _____ Staff supervision
   _____ Staff evaluation    _____ Purchasing of foods       _____ Receiving of products
___Preparation of meals  ___ Inventory management  ___ Marketing of the program
___ Other (please specify)_____________________________________________________

31. How many hours per week do you work in school foodservice?
   ___ Less than 10 hours  ___ 10 to 19 hours  ___ 20 to 29 hours
   ___ 30 to 40 hours  ___ More than 40 hours

32. How many years have you been in your current position?
   ___ Less than 1 year  ___ 1 to 3 years  ___ 4 to 6 years  ___ 7-10 years  ___ 10+ years

33. How many years have you worked in school foodservice?
   ___ 1 year or less  ___ 1 to 3 years  ___ 4 to 6 years  ___ 7-10 years  ___ 10+ years

34. Which of the following best describes your highest education level?
   ___ Some high school  ___ High school diploma (or equivalent)
   ___ Some college  ___ Bachelor’s degree  ___ Graduate degree

35. What is your sex?
   ___ Male  ___ Female

36. What is your age?
   ___ 18-25 years old  ___ 26-34 years old  ___ 35-49 years old
   ___ 50-64 years old  ___ 65 years old or older

37. Have you attended USDA Produce Safety University?  □ YES  □ NO

38. Are you a Certified Food Protection Manager (CFPM)?  □ YES  □ NO (for example:
   Servsafe®, National Registry of Food Safety Professionals).

Thank you very much for sharing your time and information. Please provide any additional
comments here: ____________________________________________________________
APPENDIX C: EMAIL FOR CONVENIENCE SAMPLE TO TEST QUESTIONNAIRE

Sandra Curwood <scurwood@iastate.edu>

Feb 1 at 4:08 PM

Dear Friends and Colleagues;

I greatly appreciate your willingness to provide feedback on my questionnaire. The link below will take you to the survey.

The purpose of this study is to explore school foodservice directors’ intentions to procure farm-to-school produce based on food safety practices.

Please complete the survey using your own school district data. Please complete the evaluation form at the end of survey. Your feedback will be used to improve the questionnaire before it is distributed to California school foodservice directors. Your information will not be used in the analysis. The data collected from your feedback will remain confidential.

Survey link: https://iastate.qualtrics.com/SE/?SID=SV_9ugiDyClzHs0Xm5

If you could complete the survey by February 15, 2016, I would be very grateful!

Sincerely,

Sandy Curwood, RDN, MS
Doctoral Candidate, Hospitality Management
Iowa State University
APPENDIX D: PILOT TEST QUESTIONNAIRE

This is a pilot test for a research study. The questionnaire and instructions will eventually be use
to survey other school foodservice directors concerning food safety in farm-to-school programs. 
We appreciate your comments and suggestions. 
Your input is valuable to this research and will be used to improve the readability and content of 
The survey. Following the survey you will be asked to complete a short evaluation.
The purpose of this study is to explore school foodservice directors’ intentions to procure farm-
to-school produce based on food safety practices.

If you agree to participate in the pilot study, you will be asked to complete a three part survey 
about your school foodservice operation, your beliefs and knowledge about food safety in 
purchasing produce. Your responses will be kept confidential and will be used to improve the 
questionnaire. There are no foreseeable risks from participating in this pilot. Your participation 
in this study is completely voluntary and you refuse to participate or leave the study at any time 
without penalty. You may skip questions you do not feel comfortable answering.

Do you agree to participate in the pilot study? Yes __ No_____

Part I: Operational Demographic Information. Please answer the following questions based 
on your school foodservice operation.

1. Geographic information omitted for pilot.

2. How would you describe the setting of your school district?
   ___ Urban (population of more than 100,000 residents) ___Suburban (20,000-100,000 residents)
   ___Rural (less than 20,000 residents)

3. How many students are enrolled in your district?
   ___ 2499 or fewer ___ 2500-9,999 ___ 10,000 or more

4. How many total schools are in your district? ______
   Does your school district include: (check all that apply) □Elementary school □Middle School
   □ High School

5. Is your school foodservice department:
   ___ Self-operated ___ Contract foodservice management
6. Please indicate the number of kitchen types in your district.
   _____Conventional Onsite Kitchen (food prepared and served onsite)
   _____Centralized (Commissary)
   _____Base Kitchen (food served onsite as well as distributed offsite) _____________
   _____Central Production Kitchen (no on-site service)
   _____Satellite Kitchen (foods prepared offsite and delivered for onsite service)
   _____Combination (Please describe)__________________________________

7. How would you describe your preparation type? (Check all that apply)
   _____“Speed-scratch” _____ Mostly pre-prepared _____ All pre-prepared
   _____ Assembly-Serve _____ Combination (Please describe):________________________
   _____ Other (Please describe):________________________________________________

8. What was the district-wide percentage of students eligible for free and reduced price meals on October 1, 2014 (CBEDS day)?
   ___0-24%                ___25-49%                 ___50-74%            ___75-100%

9. What was the average number of meals served daily in the 2014-15 school year?
   Breakfast? _________         Lunch? _________   Snacks? _______ Supper? __________

10. What was your total food cost in the 2014-15 academic year? ___________

11. What was your total fresh produce cost 2014-15? __________

12. What percentage of your produce costs were from conventional procurement in the 2014-15 academic year? ___0%   25% ___50% ___75% _______100%

13. What percentage of your produce costs were from farm-to-school (alternative) procured fresh produce in 2014-15? ___0%   25% ___50% ___75% _______100%

14. What was your annual labor cost for 2014-15? __________

Part II: Food safety training and produce procurement practices.
For each statement below, please indicate your level of agreement using the scale.

15. Offering food safety training to my employees will _________________.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. keep my supervisor satisfied</td>
<td>1  2  3  4  5   6  7</td>
<td></td>
</tr>
<tr>
<td>B. keep my customers satisfied</td>
<td>2  3  4  5   6  7</td>
<td></td>
</tr>
<tr>
<td>C. ensure safe food</td>
<td>1  2  3  4  5   6  7</td>
<td></td>
</tr>
<tr>
<td>D. reduce food cost</td>
<td>1  2  3  4  5   6  7</td>
<td></td>
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<tr>
<td>E. increase employees’ awareness of food safety</td>
<td>1  2  3  4  5   6  7</td>
<td></td>
</tr>
<tr>
<td>F. help maintain the department reputation</td>
<td>1  2  3  4  5   6  7</td>
<td></td>
</tr>
<tr>
<td>G. increase employee satisfaction</td>
<td>1  2  3  4  5   6  7</td>
<td></td>
</tr>
<tr>
<td>H. decrease the likelihood of lawsuits</td>
<td>1  2  3  4  5   6  7</td>
<td></td>
</tr>
</tbody>
</table>
16. Please indicate the likelihood the listed individuals will think that you should offer food safety training to your employees

<table>
<thead>
<tr>
<th>Individual</th>
<th>Extremely Likely</th>
<th>Extremely Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Your immediate supervisor</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. Your long-term employees</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. Your short-term employees (less than 2 years)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. Your customers (students, parents, faculty)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>E. The health inspector</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>F. Your vendor(s)</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>G. Your board of education</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>H. District superintendent</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

17. Please indicate your level of agreement as to whether the listed item makes it difficult to provide food safety training.

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Employee scheduling availability</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. Managers’ time</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. Financial resources</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. Lack of off-site opportunities</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>E. Lack of on-site opportunities</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>F. Lack of targeted materials</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>G. Employees don’t follow what they learn from training</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>H. Time commitment for training</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

18. Please indicate how STRONGLY you agree or disagree with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Strongly Diagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Most people who are important to me think that I should purchase produce using alternative procurement methods.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. The people in my professional life whose opinions I value would approve of me purchasing produce directly from farmers within the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. Other school foodservice directors believe I should purchase produce using alternative procurement methods.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. The California Department of Education supports purchasing produce from alternative procurement methods.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

19. Please indicate how STRONGLY you agree or disagree with the statements.
A. Most California School **Boards of Education** believe alternative produce procurement methods should be used in school foodservice.

B. Most California School **chief business officials** believe alternative produce procurement methods should be used in school foodservice.

C. Most California school **district superintendents** believe it is important to purchase produce from alternative procurement sources.

D. Most **students** believe it is important to purchase produce using alternative procurement sources.

E. Most **parents** believe it is important to purchase produce from alternative procurement sources.

20. **Please indicate how STRONGLY you agree or disagree with the following statements.**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Strongly Diagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. It is my choice whether I purchase produce directly from farmers during the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. I will try to purchase produce directly within the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. I am able to purchase produce directly if I choose.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. I plan to purchase produce directly within the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

21. **Please indicate how STRONGLY agree or disagree with the statements.**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Strongly Diagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I am concerned about food safety associated with direct produce purchasing.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. I feel confident that I can manage food safety in alternative produce purchasing.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. I believe there is no difference in food safety between traditional and alternate produce purchasing.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>D. When compared to traditional produce purchasing, alternative purchasing has more safety concerns.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

22. **For each statement below, please indicate how likely or unlikely you are to take action.**

<table>
<thead>
<tr>
<th></th>
<th>Extremely Likely</th>
<th>Extremely Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I intend to use alternative produce purchasing in my operation during the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>B. I want to increase my alternative produce purchasing in my operation during the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>C. I do not expect to implement alternative produce purchasing in my operation during the next year.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
D. I believe there are adequate training materials and resources available for me to purchase produce using alternative procurement methods.

**Food Safety Knowledge** (Based on the 2015 California Food Code and Good Agricultural Practices (GAP), please answer the questions below):

23. What food is NOT considered time/temperature controlled for safety (TCS)? (Select one)
   (Select one)  
   - Frozen corn  
   - Pizza  
   - Whole tomatoes  
   - Chopped lettuce  
   - Chicken nuggets

24. Select the TRUE statement. Unprocessed produce should be delivered:
   (Select one)  
   - in a new, single-use container.  
   - in a reused cardboard produce box  
   - in a plastic-lined sealed container.  
   - loose in the back of a pickup truck.

25. Which of the following practices is correct in a foodservice operation?
   (Select one)  
   - Store washed and unwashed fruits and vegetables together.  
   - Wash fresh tomatoes before storing.  
   - Handle ready-to-eat vegetables without gloves.  
   - Use packaged, washed, ready-to-eat spinach without rinsing.

26. A salad bar with eight different items on it, must have how many serving utensils?
   (Select one)  
   - 2  
   - 4  
   - 6  
   - 8

27. What is the concern with storing raw chicken above romaine lettuce in the refrigerator?
   (Select one)  
   - Cross-contamination  
   - Poor personal hygiene  
   - Time-temperature abuse  
   - Lettuce tastes like chicken

28. Which one of the following statements is FALSE: Unprocessed fresh produce should be rejected if:
   (Select one)  
   - specifications are not met  
   - there is evidence of product abuse  
   - there is evidence of pests  
   - if the product temperature is over 41º F

**Part III: Foodservice Director Demographic Information.**

**Tell us about yourself:**

29. What is your job title?
   - Foodservice Director  
   - Foodservice Manager  
   - Foodservice Supervisor  
   - Other: (list) __________________

30. Which of the following job duties do you perform? (Check all that apply)
   - Menu planning  
   - Recipe development  
   - Budget management  
   - Staff hiring  
   - Staff training  
   - Staff supervision  
   - Staff evaluation  
   - Purchasing of foods  
   - Receiving of products  
   - Preparation of meals  
   - Inventory management  
   - Marketing of the program  
   - Other (please specify) __________________

31. How many hours per week do you work in school foodservice?
   - Less than 10 hours  
   - 10 to 19 hours  
   - 20 to 29 hours
30 to 40 hours   More than 40 hours
32. How many years have you been in your current position?
Less than 1 year  1 to 3 years  4 to 6 years  7-10 years  10+ years
33. How many years have you worked in school foodservice?
1 year or less  1 to 3 years  4 to 6 years  7-10 years  10+ years
34. Which of the following best describes your highest education level?
Some high school  High school diploma (or equivalent)
Some college  Bachelor’s degree  Graduate degree
35. What is your sex?
Male  Female
36. What is your age?
18-25 years old  26-34 years old  35-49 years old
50-64 years old  65 years old or older
37. Have you attended USDA Produce Safety University?  YES  NO
38. Are you a Certified Food Protection Manager (CFPM)?  YES  NO (for example: Servsafe®, National Registry of Food Safety Professionals).

Thank you very much for sharing your time and information. Please provide any additional comments here: ____________________________________________________________
APPENDIX E: PILOT STUDY INFORMED CONSENT

PILOT STUDY INFORMED CONSENT

Pilot Study for a Questionnaire: The purpose of this study is to explore school foodservice directors’ intentions to procure farm-to-school produce based on food safety practices.

Investigators: Sandra Curwood, Susan W. Arendt, & Lakshman Rajagopal

This is a pilot study for a research study. The questionnaire and instructions will eventually be used to survey other school foodservice directors concerning food safety in farm-to-school programs. We appreciate your comments and suggestions. Your input is valuable to this research and will be used to improve the readability and content of the survey. Following the survey, you will be asked to complete a short evaluation.

If you agree to participate in this pilot study, you will be asked to complete a three part survey about your school foodservice operation, your beliefs and knowledge about food safety in purchasing produce. Your responses will be kept confidential and will be used to improve the questionnaire. There are no foreseeable risks from participating in this pilot test. Your participation in this pilot test is completely voluntary and you may refuse to participate or leave the study at any time without penalty. You may skip questions which you do not feel comfortable answering.

Having the following information from the 2014-15 school year available will expedite the process:

- Average number of breakfast, lunch, snacks and supper meals
- Total food cost
- Total fresh produce cost
- Annual labor cost

For further information about the study, please contact:
Sandra Curwood: scurwood@iastate.edu, 805-701-5989
Susan W. Arendt, sarendt@iastate.edu, 515-294-7575
Lakshman Rajagopal, lraj@iastate.edu, 515-294-9740

If you have any questions about the rights of research subjects, please contact the IRB administrator, 515-294-4566, IRB@iastate.edu or Director 515-294-3115, Office of Responsible Research, Iowa State University, Ames, Iowa 50011.

Please complete the survey by February 15, 2016. Thank you very much!

Do you agree to participate in this pilot test?
☐ Yes  ☐ No
APPENDIX F: PILOT STUDY EVALUATION FORM

Pilot Study Evaluation of Questionnaire
Please answer the following questions and provide any comments after completing the questionnaire.

1. Approximately how long did it take you to complete the questionnaire, in minutes? ____
2. Was the length of the questionnaire appropriate?
   ____ Yes
   ____ No

3. Were there any difficulties with the survey link?
4. Were there any difficulties with the online questionnaire?
5. Was any part of the survey not applicable to your operation?
6. Were any of the questions unclear or hard to understand?
   ____ No
   ____ Yes: Please indicate what question (s) and what needs to be clarified:

<table>
<thead>
<tr>
<th>Question number</th>
<th>Clarification</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

7. How could the formatting be improved?

8. Please provide any additional comments on how the questionnaire could be improved.

Thank you for participating in our pilot study.
APPENDIX G: INVITATION E-MAIL

Subject Line: Graduate student requesting assistance with farm-to-school research.

Dear California School Foodservice Director;
I am a doctoral candidate at Iowa State University, in the distance Hospitality Management program, and a fellow school foodservice director in California. I am asking for your participation in completing a questionnaire regarding direct produce procurement associated with farm-to-school programs and food safety.

The goal of the study is to explore food safety issues in produce procurement for traditional and alternative practices and results of the study can be used to identify gaps in resources, training and policy to support produce safety in farm-to-school programs.

I greatly appreciate your time and support with this research. Your opinions and feedback are essential to this body of work. The questionnaire should take about 15 minutes to complete.
Please complete the survey by March 25, 2016.

This project has been approved by Iowa State University (#15-766). Participation is completely voluntary and all information collected will be kept confidential and anonymous. Summary of results will be available upon request. As a show of appreciation, participants will have the opportunity to enter a drawing to win a $100 Amazon Gift Card.

If you would be willing to help with this research project, please click on the link below to provide your informed consent and begin the questionnaire.

Survey link:
https://iastate.qualtrics.com/jfe/form/SV_5zrSbKoP74OerLD

Thank you very much!
Sincerely,
Sandy

Sandy Curwood, RDN, MS
Director, Child Nutrition Services, Conejo Valley Unified School District
PhD Candidate, Hospitality Management, Iowa State University

If you have any questions, please don’t hesitate to contact me or my co-faculty advisors at the contact information listed below.
Sandy Curwood,scurwood@iastate.edu, 805-701-5989
Dr. Susan W. Arendt, sarendt@iastate.edu, 515-294-7575
Dr. Lakshman Rajagopal, lraj@iastate.edu, 515-294-9740
APPENDIX H: ONLINE QUESTIONNAIRE INFORMED CONSENT

The purpose of this study is to explore school foodservice directors’ intentions to procure farm-to-school produce based on food safety practices.

Investigators: Sandra Curwood, Susan W. Arendt, & Lakshman Rajagopal

This questionnaire is part of a research study. The questionnaire and instructions are being used to survey school foodservice directors concerning food safety in farm-to-school programs. We appreciate your time in completing this questionnaire.

If you agree to participate in this study, you will be asked to complete a three part survey about your school foodservice operation, your beliefs and your knowledge about food safety in purchasing produce. Your responses will be kept confidential. There are no foreseeable risks from participating in this study. Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time without penalty. You may skip questions which you do not feel comfortable answering.

Having the following information from the 2014-15 school year available will expedite the process:

- Average number of breakfast, lunch, snacks and supper meals
- Total food cost
- Total fresh produce cost
- Annual labor cost

If you do not have access to this data, you can estimate or enter that you don’t know, but please continue through the questionnaire. Your input is very valuable to this research.

For further information about the study, please contact:
Sandra Curwood: scurwood@iastate.edu, 805-701-5989
Dr. Susan W. Arendt, sarendt@iastate.edu, 515-294-7575
Dr. Lakshman Rajagopal, lraj@iastate.edu, 515-294-9740

If you have any questions about the rights of research subjects, please contact the IRB administrator, 515-294-4566, IRB@iastate.edu or Director 515-294-3115, Office of Responsible Research, Iowa State University, Ames, Iowa 50011.

Please complete the survey by March 25, 2016. Thank you very much!