AGRITOURISM IN KANSAS:

EFFECTS OF DISTANCE AND ECONOMIC OUTCOMES

By

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Abstract

The agritourism industry is an uneasy mixture of agriculture and tourism. Awareness and development of the industry has only become prominent since the 1980s and ‘90s, and is most developed in the European Union. This study examines the effect of distance on the economic fortunes of agritourism providers in Kansas through a geocoded survey. Gravity models are simulated using distance-modified regression variables. Survey results suggest certain business profiles (tourist traps) and visitor profiles (the day tripper, the RV traveler) are associated with relatively greater success. Model results indicate that distance variables are generally worse predictors of economic outcomes than business characteristics. Among distance variables, proximity to similar businesses and accessibility to major roads carried more weight than available income or population. Tested in alternate regions, results would likely vary due to alternate geophysical, settlement, and wealth patterns.

Acknowledgements

I am grateful for the many people that let this study move from an interesting whim to a full-fledged success; without them, it would never have been more than the simplest of ideas. Chief among them are my committee, including former member Dr. Jerome Dobson, who crafted this study into a polished, quality product; my parents and close friends, who have kept me sane even during my greatest writing struggles; and many loose acquaintances, who helped coalesce my ideas my means of constructive procrastination. Lastly, let me especially thank Natalya Lowther, owner of the Pinwheel Farm in Lawrence, KS. She taught me to appreciate the work of my own two hands, restored my appreciation for the deceptive quiet of nature, and gave me the swift kick to the rear that I needed to get myself in shape.

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Chapter I:

"A Capite ad Calcem" (*From Head to Heel*)

Rural (farm) tourism, often called agritourism[1], is gaining public recognition and support. It is predicted to substantially rise in popularity in coming years (Carpio *et al.* 2008; Eckert 2008; Das & Rainey 2010). In contrast to urban shopping malls and alpine ski slopes, agritourism features rural life itself as the tourism attraction. Agritourism promoters hope to make tourism the answer to the challenges of modern agriculture. In order to feed the large non-farming population, modern agriculture encourages maximum production over sustainability. The agricultural price and subsidy system rewards larger farms more than smaller ones (Dimitri *et al.* 2005; Gardner 2013). Most small farmers have trouble obtaining the capital required to become large farms, leaving them economically stranded. These farms are left with few options: struggle to survive, sell out, or reinvent themselves. Of these options, the most acceptable solution is often to diversify into tourism. Whether this reinvention is a good fit for most farms remains to be seen.

Opportunities in the U.S. farm sector are in long-term decline. Subsistence farming is one of the oldest fallback professions, but the barriers to entry today are quite high. While modern farms do earn more income than the typical U.S. family, this trend is not reflective of high crop prices but of other measures. Farming today makes up just 6% of rural employment, half that of the retail sector, and 90% of farm incomes derive from off-farm (non-food) sources. The majority (59%) of farms' product sales are less than $20,000 annually, an effective wage of less than $10 per hour (Dimitri *et al.* 2005; Irwin *et al.* 2010; Gardner 2013). Most crop sales and

[1]This is also called farm tourism and agricultural tourism in older documents. The term "agritourism" first appeared in the titles of literature in 1995, but only came into wide use after 2004.

subsidies are claimed by larger farms that stay profitable by leveraging political clout and strong distributor relationships (Veeck *et al.* 2006; Tanner 2011). By comparison, smaller and less well-connected farms often struggle to sell farm products for sustainable prices (Sharpley 2002; Alonso & O'Neill 2010; Pendleton 2012). The roots of the agricultural sector's struggles are decades long, and are largely caused by farm mechanization and urbanization. Small farms today represent both the trailing end of a dying way of life and a beginning of its reinvention. The future of rural America's reinvention will rely heavily on the understanding of the forces that eroded the old system.

Changes in the farming landscape are a legacy of urbanization. Urbanization results in large populations of non-farming people who need to be fed. In order to serve this demand, historic farm production efficiency has increased dramatically in modern times. Production efficiency is best accomplished by achieving economies of scale[2], which are in turn created by merging and mechanizing many smaller farms. As smaller farms have folded, the farming portion of the rural population has out-migrated, increasing urban populations and accelerating the cycle (Irwin *et al.* 2010). Reversing the cycle is impractical; no amount of economic incentives can fight the pull of urban economic opportunities. These migration and production problems are complicated by global crop markets.

Agricultural markets govern the prosperity of farms. Ranging widely in size, markets control the purchase and sale prices of farm inputs (e.g., fertilizer and winter hay) and products. Agricultural markets exist for logistical reasons, acting as the intermediaries between farms and cities. Overseen by a combination of local distributors, government agencies, and supranational

[2]Economies of scale are here defined as: "the optimization of the ratio between equipment, infrastructure, and land, with the goal of obtaining maximum production from those resources." (http://www.m-w.com)

organizations like the World Trade Organization, these markets ensure farm products are bought and sold at the prices most profitable to distributors (Veeck *et al.* 2006). In such competitive markets, farm subsidies may be the only reason U.S. farmers survive at all (Carte *et al.* 2010). To break even in such a system, producers must anticipate markets or leverage political power. Even the most competent farmer usually needs to rely on subsidies, however. Agritourism is an alternative to efficiency-oriented crop markets.

As a business model, tourism differs sharply from farming. It requires that one put up with people, instead of producing and working on one's own. For agritourism, the product sold is abundant: the countryside and rural life. Adopting tourism requires a service-oriented mentality and desire to engage regularly with the outside world (Che *et al.* 2005; Brandth & Haugen 2011). Tourism functions by selling an experience or idea and then following up with higher-cost, value-added goods (Comen & Foster 2006; Veeck *et al.* 2006; Das & Rainey 2010). In agritourism, products can include anything from overnight farm stays to educational seminars (Das & Rainey 2010; Phillip *et al.* 2010). Agritourism provides a supplemental income, slowly transforming the farm operator's life. It can also be a frustrating loss of time and energy. This study is focused on those circumstances that make agritourism a financial success (e.g. profitable enough to break even, support the operator, or both).

Agritourism is a combination of economic and social development strategies. Rural communities have suffered from social decline for many decades. Agritourism attempts to reverse this decline by promoting (re)connection by urban generations to the rural lifestyle. Rural connections matter because urbanization has created multiple generations who only rarely experience a natural environment. In an urban setting, open space is a precious and rare commodity. Suburban lawns and parks constitute most of the green space that urban residents

encounter. Fresh food can also be difficult to obtain, as people in inner city environments are often surrounded by convenience food (e.g., food deserts) (Roche 2013). The urban experience can cultivate a fear of nature and contribute to poor physical health. Repeated rural exposure and education are two means to combat this malady. Agritourism simultaneously promotes good health while economically benefitting enterprising farmers who choose to engage in it.

Economically, agritourism has a chance to reverse rural economic and population loss. Small towns have traditionally thrived based on the prosperity of farms around them. Over time small towns have adapted and diversified, but their economic development is still hindered by their distance from larger urban centers (Partridge *et al.* 2008; Irwin *et al.* 2010). Rural growth is perhaps best realized by using existing resources, such as farmland, in new and innovative ways (Tacoli 1998; Bair 2005; Partridge *et al.* 2009). By preserving and remaking some of the remaining small farms, agritourism can entice customers interested in more than just tourism. When that happens, both the farm and the associated community will benefit.

The obstacles faced by agritourism are formidable. Often located in low-population areas, agritourism operations are hindered in their ability to attract customers by distance from customers or inadequate advertising. As a result, the industry's ability to support farms is limited. The vast majority of operations see only a small income increase, about $5,000 – 15,000 annually (Hjalager 1996; Oppermann 1996; Che *et al.* 2005; Veeck *et al.* 2006; Panyik *et al.* 2011). As a stabilizing force, this income most affects farm families with surrounding towns experiencing relatively modest effects (Ilbery *et al.* 1998; Åke Nilsson 2002; Das & Rainey 2010; Forbord *et al.* 2012). For a lucky few, agritourism may reap great benefits, but for most it does not offer financial independence. A strong understanding of what makes agritourism work should render it more effective in the future.

Research Question and Study Design

This study examines the state of the agritourism industry in Kansas. Kansas is one of several states in the Great Plains that the general population tends to associate more with food production than tourism. Despite agriculture's income contribution, it does not generate the jobs needed for growth, a need that tourism might fill. Kansas is ranked third nationally in livestock and first in wheat production, but it generates few jobs in agriculture (3,550 or 0.3% of the labor force). By GDP, agriculture (4.8%) is surpassed by real estate (10.1%) and manufacturing (16.0%)[3] (Kansas Department of Agriculture 2013). As a flyover state, Kansas has few tourist destinations. For those U.S. counties dominated by agriculture (Figure 1) agritourism is a potential driver of economic growth, but it is more likely to have an impact in more populated places as these can supply more customers. Through an examination of the economic conditions that drive agritourism statewide, one can determine the places with the strongest potential for tourism.

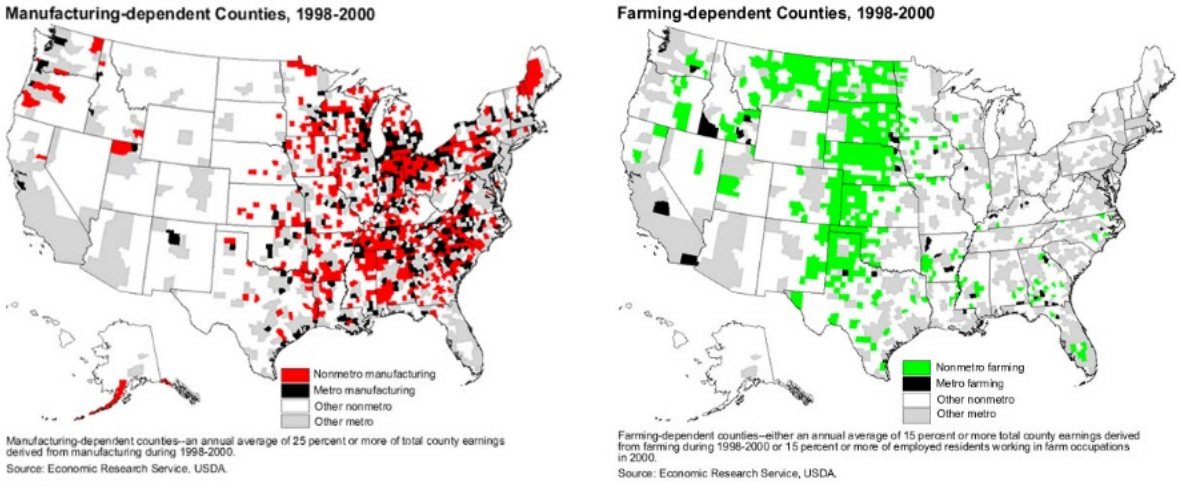

Figure 1: Counties sorted by dominant economic type (manufacturing, farming), 1998-2000[4]

[3] Additional data has been drawn from the Kansas Department of Commerce, "Economic Diversification of the Economy" table (http://www.kansascommerce.com/index.aspx?NID=438) and the Bureau of Labor Statistics, Occupational Employment statistics (http://www.bls.gov/oes/current/oes_ks.htm#45-0000). All data is current as of 2013. Both sites accessed on 23 September 2014.

[4] Drawn from the USDA's ERS page containing county typology maps: http://www.ers.usda.gov/data-products/county-typology-codes/descriptions-and-maps.aspx#.U87Xqij5fvI. Accessed 22 July 2014.

My study asks: "Do the economic outcomes of agritourism businesses in Kansas depend primarily on travel distance (e.g., from major roads or population centers)?" An alternative hypothesis is that economic outcomes have little to do with distance and are instead based on other variables (e.g., advertising, demographic diversity, or complimentary business characteristics). Distance decay forms the conceptual basis behind my major question. Distance decay describes a pattern in which places and objects have weaker interactions the greater the physical distance between them (Mckercher & Lew 2003; Hooper 2014). The corollary concept is Tobler's "First Law of Geography"[5], describing stronger relationships (Sui 2004). Models of business activity typically treat increasing distance as a hindrance to business, and this observation probably also applies to agritourism (Nicolau 2008; Marrocu & Paci 2013). Quantitative modeling, based on a web survey, is used to assess my research question, while interviews help explain the patterns found in the modeling. This study is intended to provide a mathematically robust view of the state of agritourism in Kansas for the purposes of future economic support and state policy.

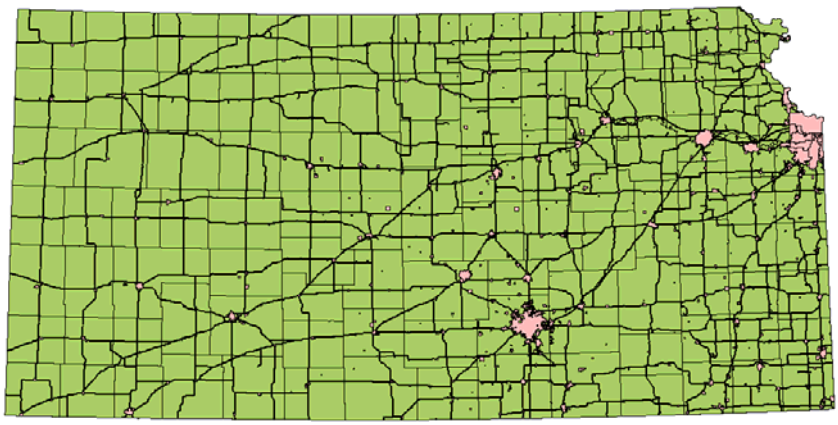

Figure 2: Kansas geography; urban areas are highlighted in pink and the road network in black.

[5] The first law was formally published in 1970, and observes that "Everything is related to everything else, but near things are more [*likely to be*] related than distant things." (Sui, 2004, p1). [*sic, emphasis added*]

This study examines agritourism as a manifestation of economic geography. Chapter II elaborates on the history and nature of agritourism, bestowing a context for future analysis. It also discusses tourism (including agritourism) as a spatial development strategy, and how this strategy has proceeded here and abroad. Chapter III delves into empirical distance models, ideas that aid in understanding and that predict the nature of space. Gravity models, which are economic constructs borrowed from physics, quantify the influence of travel distance. Chapter IV details the data sources used in this study as well as the techniques used to create regression variables in ArcGIS, a popular spatial modeling and visualization tool. Chapter V describes the patterns that emerge from the analysis: variables important (and insignificant) to linear regression, frequencies and correlations found in the survey responses, and comments made during interviews. Chapter VI concludes the study, reviewing key portions of the material and integrating the analyses. Finally, it outlines the directions for future studies and additional resources for those interested.

Chapter II:
"Ab Epistulis" (*From the Correspondence*)

Agritourism is a simple concept set within a storied context. Its emergence was the result of decades of cultural, economic, and residential changes, particularly urbanization. This chapter details agritourism's definitions and origins, as well as its different effects on landscapes, providers, and tourists. An in-depth exploration of how tourism and rural development interact with space follows. Ending the chapter is a discussion of known variables that influence economic outcomes, and of agritourism both in the United States and in Europe.

The "What" and "Where": Agritourism Characteristics, Definitions, and Locations

Tourism can take many forms. Often proposed as a panacea to spur growth in underdeveloped places, its most feasible form depends on the place. Tourism can be commerce-, culture-, or wilderness-based and includes exhibits, museums, parks, sea-and-sun vistas, and shopping (Kim *et al.* 2007; Hooper 2014). Central to the industry is the quote "If you build it, they will come"[6], often employing significant marketing to manage the travel-related Goldilocks effect (i.e., "It's too far, I can't go", "It's so close, I can go anytime"). In the countryside, tourism can highlight traditions and sell the landscape itself. Properly developed, tourism can be a boon despite the negative side-effects it brings (e.g., noise, traffic, pollution).

Agritourism is a form of rural tourism centered on farms[7] and other rural properties. Visitors to agritourism operations are greeted by farm animals and country life, not fast-paced attractions like casinos or roller coasters. There is little agreement on a clear definition of agritourism, despite its growing popularity (Carpio *et al.* 2008; Eckert 2008; Das & Rainey

[6] This oft misquoted quotation is from the 1989 film *Field of Dreams*, "If you build it, *he* will come."
[7] When this document uses the word "farm", it refers inclusively to fields of crops, ranches, orchards, and other miscellaneous rural properties. By extension, the word "crops" refers to cereal grains, fruits, nuts, vegetables, meat, eggs, and assorted other animal products.

2010). The definition used tends to be exclusive to a given agency or study, while the relevance of "farm authenticity" and the nature of a "working farm" are topics of debate (Barbieri & Mshenga 2008; Phillip *et al.* 2010). The definition for agritourism used here is "visits to farms, ranches, and other agricultural locations for the purpose of recreation"[8] (Carpio *et al.* 2008). I refine this definition by framing agritourism as an individual- or family-oriented business model, as distinct from municipally managed attractions such as campgrounds and county museums. I also exclude strictly corporate entities (i.e., massive agribusinesses) as their main goal consists of profits, not preservation or sustainability. The growth of the agritourism industry will depend on its ability to support smaller, less financially stable farmers rather than mega-farms.

Agritourism is a broad term that includes different activities. The activities included in official listings of agritourism enterprises vary by agency and researcher. Common activities include bed-and-breakfast accommodations, "u-pick" crops, renovated barn rentals, and seasonal corn mazes (Table 1). The list of available agritourism activities has more to do with what is financially viable and popular than what a farmer would enjoy offering (Phillips 2012). Finding profitable activities that attract tourists is an impediment to the industry's development. Farmers could offer new agritourism activities as these activities prove to be financially sustainable.

[8] This definition is cited on the 2nd page of Carpio et al., 2008.

Crop Attractions	Produce Patches ("u-pick", pre-picked), See-it-Made Tours (e.g., Pizza, Wine), and Vineyards
Animal Attractions	Exotic Animals (e.g., llamas), Sheep Shearing, Petting Zoos, Fish Ponds, and Horseback Riding
Food Attractions	Farm Restaurants, Farmer's Markets, Chuck Wagons, Direct (Internet) Sales, and Make-Your-Own (e.g., ice cream from milking)
Rental Attractions	Renovated Barns (e.g., conferences, weddings), Bed & Breakfast Accommodations, Dude Ranches, Camping Licenses, and Hunting Licenses
Landscape Attractions	Nature or Bicycle Tours, Bird Watching, and Landscape Tours (e.g., the Flint Hills of east-central Kansas)
Seasonal Attractions	Corn Mazes, Hay Rides, Haunted Houses, Pumpkin Launching, and Christmas-Themed Farms (e.g., Evergreen Trees and Cider)

Table 1: Agritourism attractions by broad category[9]

Typical agritourism operations are seasonal and small in scale. Seasonal activities can occupy places and times not in use by existing farm activities, and often produce income without requiring a great deal of space. The low spatial requirements allow agritourism to be present on farms of any size. Most operations are located on smaller[10] farms or portions of larger ones, and feature seasonal activities (Che *et al.* 2005; Veeck *et al.* 2006). Activities can encompass one or multiple seasons, as well as annual events such as the Kaw Valley Farm Tour, and are frequently offered in off-harvest seasons to extend farm income (Kronimer 2012; Metz 2012). Lodging and hosting activities are popular ways to develop vacant farm buildings, while hunting and other outdoor activities develop vacant properties (Ilbery *et al.* 1998; Das & Rainey 2010). Spatial and

[9] This initial grouping of agritourism categories was largely based on discussions with Dr. Jerome Dobson, an original member of my graduate committee and cultural geographer.

[10] "Smaller" is here defined as less than 500 acres, just under 1 square mile (Veeck et al., 2006). The average size of U.S. farms today is approximately 450 acres, though the actual size varies by state (Dimitri et al, 2005).

temporal flexibility permits agritourism to present a diversity of attractions for different customers. The seasonality of activities works in farms' favor, reducing labor requirements and pressuring customers to attend "while it's still open". In this respect, agritourism behaves much like a movie, albeit one with dirtier and smellier offerings.

Agritourism employs tactics common to retail and tourism. Retail businesses use the sale of popular products to drive the sale of less popular ones; tourism does the same with gift shops. Successful agritourism markets the farm experience first and sells value-added products afterwards. Direct sales of farm products (i.e., on-farm, farm market, or online stalls) nets a farm more money per unit sold when compared with wholesale operations (Veeck *et al.* 2006; Pendleton 2012). Marketing an experience (e.g., horseback riding or tours) lets farms charge a fee for the use of their products. Conversely, more attractive prospects (e.g., cropping subsidies) can also displace tourism entirely, returning the farm to an exclusively wholesale entity (Sonnino 2004). For individual farms, the decision of what to sell depends on the net income support from that activity. The same land can be used for multiple, different activities if one does not succeed. While the conversion of land between activities is often difficult, the interactive nature of agritourism activities gives them an appeal that no manufactured good can match.

Agritourism is a form of participatory tourism. As the name suggests, participatory tourism goes beyond passive activities (e.g., visiting museums or attending concerts) and actively involves tourists in their own entertainment. The motivations for engaging in participatory tourism differ by economic role (i.e., tourists and providers). Tourists frequently participate because of the relative calm of the countryside and the low cost of most agritourism activities (Oppermann 1996; Carpio *et al.* 2008). Providers often begin agritourism operations to generate additional income, but many are also motivated by career changes and the chance to

interact with people regularly. Selling coffee to tourists, for example, is both easier and more lucrative than raising livestock (Comen & Foster 2006; Brandth & Haugen 2011). Participatory tourism is more difficult to design than passive tourism but is often more engaging. Customers are more likely to return for horseback riding than pictures of horses being ridden. As long as farmers are willing to provide entertainment and tourists demand it, agritourism will be mutually beneficial for both groups.

The "When" and "Why": The Origins of Agritourism

Popular agritourism exists because of the 20th century transformation of agriculture. In the U.S., the systematic study of agriculture has dramatically improved farm productivity and reduced labor requirements. The resulting migration to cities set off waves of changes. For example, researchers have developed chemical additives (e.g., fertilizers and pesticides), new animal and plant breeds, soil conservation techniques, and increasingly advanced lines of motorized farm equipment. Further, beginning in the 1930's the U.S. government enacted a series of farm bills to financially support farmers (Dimitri *et al.* 2005; Gardner 2013; The Heritage Foundation 2013). With reduced labor needs, many farmers left farming behind. The resultant waves of urbanization led to generations of people for whom the countryside was foreign, allowing entrepreneurs to market it as a tourist destination. Urbanization also increased the demand for food, ensuring that agricultural research would displace rural populations for some time to come.

Alteration of the rural-urban dynamic has changed the employment and place of residence of the U.S. population. People who would once have been farmers now have a chance to choose different careers and live in different places. In addition, active farmers often supplement their income with off-farm labor. In 1900, 41% of the U.S. population was employed

on farms and 60% of the population lived in rural areas (Figure 2). By 2000, less than 2% of people worked on farms, less than 25% of the population lived in rural areas[11], and farming contributed less than 2% to GDP. Among active farmers, 30% earned off-farm income for 100 days or more in 1930, while 93% did so in 2000 (Dimitri *et al.* 2005). These population statistics reflect the increasing efficiency of U.S agriculture and the ability of urban centers to absorb rural migrants. The off-farm income statistics demonstrate the increasing need for cash income by farmers to purchase chemical inputs, equipment, and consumer goods. Agritourism can displace the need to perform off-farm labor by providing a source of on-farm income.

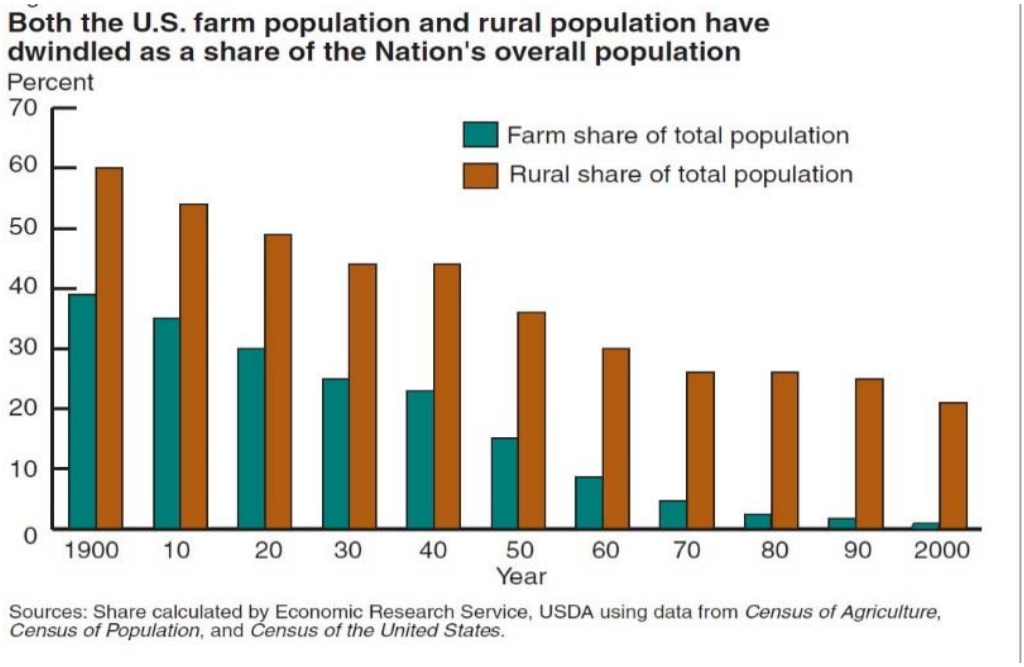

Figure 3: The rural share of the national population (Dmitri et al. 2005)

The movement and retraining of the population have changed the appearance of the rural landscape. As recently as the Great Depression, the term "family farm" meant a piece of land

[11] Rural "townies" continue to make up 20-25% of the total population. This is true in both the U.S. and the E.U., and has been true for over a century. Where the rural population has decreased, it has been the farmers who have moved away (Irwin et al., 2010).

large enough to sustain a family and a variety of animals to provide labor. Today that same family farm is increasingly an incorporated entity with several thousand acres, worked by tractors or organized into massive feed lots. In 1900 there were approximately six million farms with an average size of 150 acres, producing an average of five food commodities. In 2000 there were approximately 2 million farms with an average size of 450 acres, predominantly specializing in one food commodity (Dimitri *et al.* 2005; National Agricultural Statistics Service 2006). Despite changes in their appearance most modern farms remain family-owned, and the amount of agricultural land in the U.S. has not substantially changed over the 20th century (Dimitri *et al.* 2005; Gardner 2013). The decline of the smaller family farms has allowed larger farms to reorganize and realize economies of scale, maximizing production efficiency. Consequently, the rural landscape is now dominated by larger farms with identical of rows of genetically-modified crops. Agritourism can both remind visitors of the landscape that was and acquaint them with the landscape that exists today.

Steady increases in farm productivity have led to a decline in income received from food commodities. Agricultural markets respond to changes in ways that maintain their profits, adjusting the price of bulk crops and farm inputs according to supply and demand. Even if global demand dramatically outpaces global food supply, farms will have difficulty making a profit. From 1900 to 2000, U.S. farms increased average productivity by 2% but farmers received 1% less money for their crops annually. The largest 10% of farms (by acreage) produced 70% of all crop sales in 1992[12], while 60% of farms had food sales of less than $20,000 in 1997 (Gardner 2013). Farm bills intended to aid the smallest farmers, through programs such as commodity support and crop insurance, mostly target crop sales (not capped by acreage) and thus have seen

[12] By 2012, production was even more concentrated; 12% of farms grew 85% of all crops (Gardner 2013).

most of their benefits captured by the largest farms (Dimitri *et al.* 2005; Environmental Working Group 2012; Gardner 2013; The Heritage Foundation 2013). As with other sectors of the economy, the largest farms are effectively beneficiaries of government socialism while smaller farms have to contend with the so-called "free market." Farmers are shortchanged as intense competition among middle-men inevitably transforms the profits from high productivity to lower prices for consumers (and crops). Agritourism is an important development for small farms – the places farm bills and global markets have helped the least.

The recent popularity of agritourism arose most directly from the Farm Crisis. The latest in a series of agricultural debt crises, the Farm Crisis affected the U.S. in the early 1980s. While century-long trends created the conditions for agritourism to exist, the Farm Crisis created the political drive behind the formation of agritourism. In the early 1970's the agricultural export market was booming, commodity and land prices were high, and many farmers took out large loans. By the early 1980's markets and prices had returned to normal, the world was in economic recession, and banks were foreclosing on farms. Commercial farms (with sales between $40,000 and $250,000[13]) failed to farm their way out of debt, while large commercial farms (with sales greater than $250,000) could make their loan payments and purchase foreclosed farms (Manning 2008). The Farm Crisis resulted in a rapid burst of farm consolidation and urban growth, forcing the search for alternative means of income support for struggling farmers. Early proposed solutions included alternative crop production and the support of farmers markets. Over time different business strategies would be integrated into mainstream agritourism.

[13] The categories are derived from the USDA's National Agriculture Statistics Service (http://www.nass.usda.gov/)

The "Who" and "How": Visitors, Owners, and Landscapes

Non-economic reasoning affects how and where people engage in tourism. Economics provides one lens of understanding through which to view consumption decisions, while culture and personality provide entirely different ones. Understanding the impact of these variables can increase the power of marketing dollars. Individualistic cultures (e.g. Australia) tend to visit culturally similar destinations, while collectivist cultures (e.g., China) tend to visit different places (Ng *et al.* 2007). Once they arrive, tourists' personalities control how they consume a destination. Whether tourists are willing to explore or have a travel experience, for example, changes how much and where they spend money (McKercher *et al.* 2006). Even a rudimentary understanding of regional culture can aid in the targeting of advertising. A business might pitch a traditional hunting trip as an adventure experience to the urban dweller, for example. It pays to develop different sorts of businesses in an area to cater to different sorts of people.

Visitor demographics affect which destinations are most patronized. Each person's preferences are affected by their career, family, and parents. When consumption preferences are matched with tourism attraction types, useful patterns emerge. Nationwide, increasing education and income predict higher attendance at musical and cultural attractions. Youth are most attracted to musical and commercial attractions, while middle-aged people favor local festivals. Women are slightly more likely than men to attend all attractions (Ryan *et al.* 2006; Kim *et al.* 2007). Those with a rural or suburban residence, and those with children, were also likely visitors broadly (Oppermann 1996; Carpio *et al.* 2008). Some of these observations are well-known among the business community; for example, those with graduate degrees outnumber janitors at art galleries. Individual business can use these observations to build customer profiles and cater to them. Just because single, young people on a budget are less likely to attend one type

of attraction does not mean this observation holds true for others groups.

Farm owners start agritourism operations for different reasons, with motivations that may be both economic and social. The most commonly cited reasons relate to income diversity and stabilization, reflecting the unpredictable nature of crop markets and weather. Agritourism stabilizes annual incomes, making farm income more predictable and extending its schedule (Kronimer 2012). Income is thus the most often cited reason for starting an agritourism operation, but other reasons include a retirement activity and the chance to work with people more often (Åke Nilsson 2002; Comen & Foster 2006). While some argue that tourism is no more reliable than farming, certain agritourism activities can be. Adding a wedding-hosting operation to a farm, for example, allows that farm to plan its annual budget more easily.

Adopting agritourism requires a shift in identity and orientation. In farming one works for oneself and on one's own schedule, but in tourism one works for others. In transitioning to agritourism, both the farm operator and property inevitably change. In tourism, the business and staff must adopt a customer-focused orientation and be willing to welcome outsiders (Che *et al.* 2005; Veeck *et al.* 2006; Brandth & Haugen 2011). People, place, product, and traditions all form part of the context that customers associate with the business (Panyik *et al.* 2011). Each business operator reacts differently to the tourism transition, forming an occupation-based identity that can last long after the associated activity has ended (Brandth & Haugen 2011). Identity and personality appear to be influential in overall agritourism success. Just as an optimistic cancer patient is more likely to recover than a suicidal one, extroverted farm owners and those willing to change are more likely to reap more success. The result is a spectrum of agritourism operations that range from mostly-farm to mostly-tourism.

Agritourism draws from and affects the landscape. Agriculture is a production-oriented

activity whereas agritourism is a consumption-oriented activity. The ongoing debate over the value of production (farming) and consumption transforms the physical landscape and the people who live there. Landscapes are characterized by their unique atmosphere, lifestyle, residents, and structures (Daugstad 2008). Outsiders and insiders value different aspects of the landscape; indeed, outsiders tend to romanticize it (Åke Nilsson 2002; Daugstad 2008). For outsiders, the atmosphere created by the rural landscape forms a substantial percentage of the economic value of agritourism (Carpio *et al.* 2008). For insiders, agritourism is another activity that could develop the landscape (Daugstad 2008; Brandth & Haugen 2011). The community's opinion on economic development issues dictates the potential for economic growth there. Those places favoring the continuation of rural life are the ones best positioned to benefit from agritourism and the ones where something like agritourism is most needed.

Agritourism is only one reaction to long-term economic change. The dominance of pro-growth ideals has generated alternative development proposals. Among the most controversial proposals in Kansas has been the Buffalo Commons, Frank and Deborah Popper's 1987 call for land-use change in the Great Plains. The Buffalo Commons proposes returning huge tracts of land to native vegetation and rangeland, to be used for tourism and hunting. Due in part to flawed assumptions regarding ecological and rural decline, the study was unappreciated by both academics and land owners (De Bres & Guizlo 1992). Effectively a call for managed rural decline, the study's ideals have since been adopted to promote rural conservation (Great Plains Restoration Council 2014). The Buffalo Commons promotes the idea of large-scale community development over privatized futures, and in bleaker landscapes the idea has merit. In places where farming continues to thrive however, the deliberate abandonment of land is not likely to be welcomed. Community support for agritourism is much more likely in these places.

The expansion of canoeing is another viable tourism development. Canoeing, camping, and float trips are enjoyed throughout much of the eastern half of the U.S., but are relatively rare in Kansas. In *Meek vs. Hays* (1990), an Arkansas canoe outfitter challenged a Kansas land owner who was putting up electric fences over his stream access. The final court ruling gave total access rights to the land owner, including travel over free-flowing streams; only three water bodies were exempted (the Arkansas, Kansas, and Missouri Rivers). State tourism has suffered as a result. In the absence of state action, individual cities have occasionally built ramps to access these areas[14]. In the defense of private land owners, some canoeists have been known to be disrespectful. However, a change in riparian water laws would open up a great deal of incidental tourism in Kansas. It could also lead the way to dedicated river-side campgrounds as a means of farm income, on both private and public properties.

Promoting conservation through agritourism will likely be difficult. Agritourism conserves agricultural and natural heritage, but does so through economic development. Accomplishing both goals simultaneously creates a logistical challenge. One cannot simultaneously preserve and develop a resource; development necessarily changes it (Ryan *et al.* 2006). Pitching conservation for the sake of conservation is a difficult and lonely road. Conservation, through agritourism or range land development, is only possible when economic gains offset losses and when local actors are involved (Sonnino 2004; McMillion 2014). Conservation is an issue because the goal of agritourism, in many cases, is to perpetuate the rural atmosphere and way of life. Increased construction, noise, and traffic necessarily disrupt both

[14] Credit for these ideas goes to undocumented discussions with Natalya Lowther, owner of Pinwheel Farm in Lawrence, KS and an anonymous melon farmer with property bordering the Kansas River. For web links regarding this case, review the following:
The Kansas Canoe and Kayak Association: http://www.kansas.net/~tjhittle/kcamembe.html
The full legal ruling from Justia.com: http://law.justia.com/cases/kansas/supreme-court/1990/63-145-3.html
A primer for Missouri Water law: http://styronblog.com/law/missouri-water-law-primer-streams/

atmosphere and lifestyle. Compared to other forms of development agritourism is low-impact, but for some even a low-impact change is too much of an alteration.

Spatial Understanding of Tourism

Distance from population centers negatively affects tourism demand. As the distance between population sources and tourist destinations rises, the cost of travel increases, decreasing overall demand. Economic modeling of this trend is characterized by the pattern of distance decay. Distance decay is observed widely in spatial studies, and best describes the relationship between distance and tourism demand (Mckercher & Lew 2003; McKercher *et al.* 2008; Hooper 2014). In tourism, demand curves typically peak some distance away from (not *at*) an entertainment source and rapidly tail off, but they can also take two other forms: a wide plateau near the source, or a series of shrinking peaks (Figure 4) (Mckercher & Lew 2003). The decaying "tail" of the curve can be explained by travel costs (e.g., time, money, effort) or by intervening opportunities (McKercher *et al.* 2008). Tourism demand curves show that the trips are most often taken to nearby locations, making long-haul tourism relatively rare (with exceptions like Disney World). This logic dictates that the greatest number of attractions should be nearest to population centers. An abundance of a commodity can sometimes be a hindrance, however.

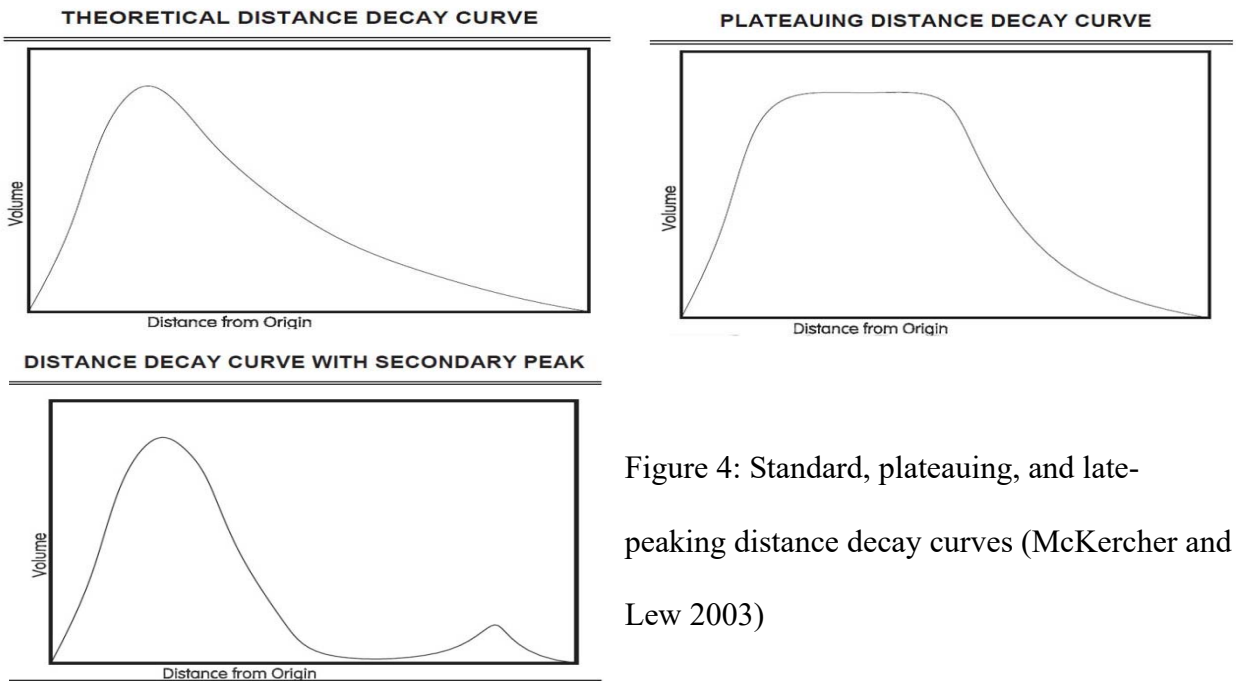

Figure 4: Standard, plateauing, and late-peaking distance decay curves (McKercher and Lew 2003)

Market access and mode of travel affect tourism demand. The relative ease of access to commodities and convenience of traveling affect the distance people will go to obtain them. Access can thus complicate simple distance decay models used to predict future demand. Market access is the relative availability and attractiveness of a commodity, and controls each business's market share – that is, the percentage of local patronage it receives, grouped by business type (McKercher *et al.* 2008). Market access and preferred mode of travel combine to create situations where the most desired destination may not be the most abundant or proximal one (Mckercher & Lew 2003; Lee *et al.* 2012). Abundant commodity availability frequently decreases individual competitiveness, but can instead change visitor demographics; e.g., from well-off couples to less well-off families with kids (Mckercher & Lew 2003). The effect of market access suggests there is a critical range of commodity access that supports the maximum number of businesses of a given type and geographic range. As more efficient transportation becomes available, this geographic range expands outwards. For more isolated, underdeveloped

regions these transportation improvements may represent the only real tourism access they have.

Source markets do not have equal access to tourism. In the competitive world of tourism, most places lack the resources to develop into a high-class attraction. The resulting regional absence drives up local demand for distant tourism attractions. For every source market, there are places that are sufficiently inaccessible, undeveloped, or uninteresting as to attract visitors (Mckercher & Lew 2003; Shoval *et al.* 2011). These tourism exclusion zones can be cultural in addition to physical, the result of excessive cultural similarity or dissimilarity (Mckercher & Lew 2003; Ng *et al.* 2007). Their effect on source markets depends on their position and size: if large and proximal, they drive up local and extremely distant demand; if either small or far away, they have little effect (Mckercher & Lew 2003; McKercher *et al.* 2008). Tourism exclusion zones exist for both domestic and international tourism, in effect creating classes of tourism demand, each with its own demographic profile. Extremely popular or notable attractions (e.g., Disney World) may draw visitors that more numerous or low-key attractions (e.g., agritourism) would not. The traits and abundance of any destination thus play a role in its economic outcomes.

Characteristics of population sources control the strength of demand and choice of destination. Tourism caters simultaneously to groups and individuals. In aggregate, each person's lifestyle and upbringing modifies the group's ability to engage in tourism; where one chooses to go is largely a personal choice. Also called pushes, a source market's characteristics can modify the negative coefficient associated with demand decay over distance (Mckercher & Lew 2003; Nicolau & Mas 2006; Nicolau 2008). Socio-economic variables either hinder or enable travel, while motivations and media exposure determine their destination choice (Keating & Kriz 2008; Nicolau 2008; Hooper 2014). Nearby destinations are more associated with relaxation, while distant ones call to the curious, the climate-seeking, or those with long-distance personal

connections (Nicolau 2008; Lee *et al.* 2012). Though each person's tourism profile is different, the factors that encourage tourism are similar: family, novelty, and relaxation. Those with greater means and motivation will frequently seek more distant locations. Applied over a region, a source market's tourism profile creates a tourism profile that planners can use to their advantage.

Destination characteristics influence each person's destination image. Destinations, unlike source markets, can be directly manipulated to create or highlight certain attractive traits. The development and marketing of these traits shapes a destination's popular image. Destination image informs visitors' perceptions via the marketing of local traits. Also called pulls, destination traits appeal differently depending on the demographic profile and culture, and can include attractions (e.g., natural, commercial, culture), infrastructure (e.g., general, hospitality), and politics (Keating & Kriz 2008; Lee *et al.* 2012). The uniqueness of an attraction can also play a significant role in making it appealing (Hooper 2014). Along with actual development, destination image is one of the few things a tourism operator can control, at least partially. A well-constructed marketing effort can go a long way towards encouraging (pulling) visitors to spend money. That said, pulls are effective only if matched by similar pushes.

The relative effect of pulls and pushes is affected by travel distance. Travel is never free; thus, travel distance and cost can never be ignored. A complex balance of means, motivation, destination image, and perceived value determines not only whether a person will travel, but how far and to what destination. In tourism models travel distance governs the weight of secondary variables (e.g., use of package tours), with source (push) variables having more weight for closer trips and destination (pull) variables for farther ones (McKercher *et al.* 2008; Marrocu & Paci 2013). As the enjoyment of travel, perceived destination value, or ability to travel increase, the negative coefficient ("friction") of distance decreases (Nicolau & Mas 2006; Nicolau 2008). In

practical terms, these findings mean that destinations near source markets should cater closely to that market. All destinations should focus on improving themselves, but especially the more prosperous ones that are relatively distant from population centers, as those places have smaller local markets to draw on and must rely more on long-haul tourists.

The distance of a destination from source markets controls its market share. Tourists make choices based on limited resources and information, most often choosing those destinations that are less expensive in either cost or travel time. People most often patronize places close to home. In maximizing the use of their limited resources visitors undertake more than 70% of their trips nearby[15] (Mckercher & Lew 2003; McKercher *et al.* 2008; Marrocu & Paci 2013; Hooper 2014). As distance traveled increases, so does length of stay, time at main destination, and number of destinations visited (Lee *et al.* 2012). Very distant locations usually earn less than 1% of a source market's share, however (McKercher *et al.* 2008). As observed with pull and push variables, travel distance shapes the fortunes of a tourism destination. Destinations specializing in local patrons take on vastly different appearances from destinations looking to attract long-haul visitors. Success in the latter arena can lead to windfalls; for instance, 1% of Los Angeles visitors may seem like a small number, but it constitutes a large body of people.

Spatial Understanding of Rural Development

Agritourism is both tourism and rural development. The goal of rural development is to better the economy and job prospects of small towns. Rural development, like tourism, is spatially selective but along different lines. Relative to larger cities, small towns usually have difficulty attracting investments. This issue limits the conventional development options that are

[15] "Nearby" means different things, depending on the spatial scale of the study. In domestic studies, it usually refers to day trips or short vacations. In international studies, it refers to travel to adjacent (or nearly adjacent) countries. In either case, a shorter travel distance is much more frequent than a longer one.

open to rural places. Those projects that do generate employment create fewer jobs than if they had been in larger cities. Combined, these factors result in most investment going to more profitable cities. Some tourism (and hence agritourism) can subvert this trend, instead drawing income to where it is needed most.

Agglomeration economies are central to the understanding of economic space. Agglomeration economies can form when capital (i.e., infrastructure, money) and labor are pooled in a central location, usually cities. Agglomeration increases production efficiency by reducing the cost per unit distance (spatial friction) of communication and transportation (Vorley 2008). Production efficiency stimulates profits, creating a demand for jobs, housing, and wages (Partridge *et al.* 2008). It also encourages process specialization, pushing firms to perform some steps while contracting for others (Coase 1937; Stigler 1951). Agglomeration economies are and will continue to be central to most economies, their financial connections crossing political borders with ease. Maximizing investments requires an understanding of agglomeration.

Rural regions often have difficulty attracting investments. Rural regions are characterized by low, dispersed populations and small towns. Challenged by history, they have trouble generating those incentives that would attract businesses. The countryside has historically developed as a resource extraction site serving larger urban centers (Irwin *et al.* 2010). Relative to cities, most country towns have a reduced ability to attract investment through customers, infrastructure, labor, and services. Absent natural amenities or close proximity to cities, there is often little incentive to invest in country towns (Olfert & Partridge 2010). While technology has reduced many spatial limitations and has indirectly increased rural agglomeration, most country towns cannot rival the economic power of larger cities. Rural investment must instead rely on government grants and projects funded locally.

Rural and urban development are intrinsically linked. Rural economic strength comes from basic foods, lumber, minerals, and fibers, while urban strength comes from advanced products and services. Developing rural services and tourism affects both sites and alters the resulting economic relationship. Rural hinterlands depend on urban centers for business connections and advanced services, creating the strong inward business tide that sustains cities. Focused urban development excludes these hinterlands, rarely spreading farther than the suburban fringe (Tacoli 1998; Hinderink & Titus 2002; Olfert & Partridge 2010). Export-oriented rural projects (e.g., mining) are poor at creating broad growth[16] and can ignore the growth in services that many country towns have experienced (Tacoli 1998; Hinderink & Titus 2002; Irwin *et al.* 2010). Planners would be wise to question historical economic assumptions. To create a mutually beneficial economic relationship, hinterlands would be better off cultivating urban tastes or favorable production contracts. It can also be worthwhile to cultivate long-distance business connections in addition the traditional local ones.

Technology has exacerbated the rural-urban imbalance. Better communication and transit connections (e.g., Google Fiber) have been placed in and between established power centers. Because of their placement, these technologies have reorganized rather than equalized economic space. Since the 1970's telecommunications technology has allowed jobs to be relocated. Front-office (public) jobs have congregated downtown, while back-office (routine) jobs have migrated to suburban office parks or overseas (Warf 1995). The Internet has only encouraged this trend, deploying early and most prominently to cities, encouraging new business and settlement there (Leamer & Storper 2001; Partridge *et al.* 2008). Better technology has thus strengthened the

[16] Broad growth occurs most often with labor-intensive, not capital-intensive, industries that pay their employees comparatively well and shop local. Major export projects today tend to be capital-intensive (e.g., oil rigs), employ many non-local suppliers and services, and compete with global (not domestic) markets, limiting profits and wages.

status quo while altering the rules of competitiveness. In pursuit of profits, many companies have moved well-paying jobs and they are unlikely to return. With absolute distance taking a back seat to relative connectivity, underdeveloped regions will continue to languish.

Economic growth is hindered by relative remoteness. Small towns primarily have a competitive advantage in cheap land and low wages, but the farther a region is from larger urban centers the less these advantages matter. Choice of business location then becomes a compromise between access and costs. Choosing a rural location means lower payroll costs and rent, and reduced competition. As distance from urban centers increases, these benefits are lost to higher shipping costs and local monopolies (i.e., reduced competition) (Kilkenny 2010). Investing in a rural location can both help and hinder a business, but if the profits are high enough it can be worthwhile. Since they frequently are not, rural counties tangibly suffer from their remoteness.

The rate of job growth decreases as the distance from urban centers increases. Business location choice is influenced by available amenities, which are more abundant in larger cities. As the distance between any place and its next largest neighbor increases, investment in that place decreases. From 1970 to 2000, county job growth declined rapidly with increasing distance from urban counties. Relative to urban counties the job growth rate in rural counties was 0.31% lower per km, and in less populated urban counties the rate was 0.19% lower per km (Partridge *et al.* 2008). New jobs in rural communities favor locals (50-60%) in the short term, with minimal effect from commuters or migrants in the long term (Partridge *et al.* 2009). These statistics illustrate that isolation is an economic challenge with a measurable impact on growth prospects as the distance from cities increases. Overcoming this isolation has much more to do with creating amenities and business connections than it does with low taxes.

Agritourism Factors and Financial Expectations

Agritourism can sometimes pay well, but typically does not. As a growing industry concentrated in low-population regions, it often lacks the larger, more proximal customer base enjoyed by other businesses. Even when it has the support of developed institutions, agritourism cannot easily support the farmers who undertake it. Studies find that the financial impact of agritourism is limited, with the majority of farms deriving only small income increases (e.g., up to 10%) or $5,000 – 15,000 annually (Hjalager 1996; Oppermann 1996; Che *et al.* 2005; Veeck *et al.* 2006; Panyik *et al.* 2011). Agritourism is best seen as a stabilizing economic force, providing a supplemental income that is optimally paired with active farms (Ilbery *et al.* 1998; Das & Rainey 2010; Forbord *et al.* 2012). Its beneficiaries are most likely to be farm owners (especially farm women), with little measurable increase in local retail business (Åke Nilsson 2002; Comen & Foster 2006; Das & Rainey 2010). Agritourism is not the economic panacea that many had hoped it would be. Struggling rural economies are not likely to stop struggling, but they do have a business model to pursue if they wish to simply persist. A minority of farms, however, can make a good living from rural tourism.

Some farms can attract tourists better than others. Certain farms, usually larger or better-located ones, can outperform others and defy trends[17]. These farms highlight the causes associated with agritourism's economic outcomes. Operations that cater to schools, sell value-added goods (e.g., fresh-baked pies), and have long business tenures often have higher profits. Farms with greater assets (e.g., land) also do well, as expressed through advertising budgets, employees hired, and wages paid. Certain oft-cited variables do not influence income as greatly:

[17] The most profitable types of agritourism operations are often outfitters (hunting), wineries, or full-time tourist operations that only bear a passing resemblance to a farm.

education, startup capital, and other support services (Comen & Foster 2006; Veeck *et al.* 2006; Barbieri & Mshenga 2008). Some variables, usually financial ones, seem only to reinforce the fact that successful farms are successful. For everyone else, the most promising trend seems to be catering to education and copying retail business practices. Students could provide a renewable audience and the label "fresh-baked" can add dollars to the sticker price.

Owner and property characteristics can influence economic outcomes. Any farm can undertake agritourism, but some will fare better than others. As with farm assets, certain personal traits can strongly influence the income from agritourism. For owners, success stems from having a diversity of life experiences, veteran staff, and managerial tenure (Barbieri & Mshenga 2008). Being able to think "off-farm", beyond immediate farm management needs (e.g., innovation, networking), also contributes (Veeck *et al.* 2006; Barbieri & Mshenga 2008; Daugstad 2008). Their farm assets can be augmented by access to local pools of human capital (Hjalager 1996; Barbieri & Mshenga 2008). The influence of owner experience on farm income can be difficult to predict. Experience clearly affects crop production, but does not always translate well when a farm transitions to tourism. The willingness of farmers to jump into something new goes a long way towards making the transition viable, however.

Smart advertising and branding can bring in revenues. To garner customers and income, farms must make a name for themselves by spreading information to potential customers. Based on the method chosen and an operation's business reputation, advertising can reap significant returns. Advertising has been found to generate up to 2.5 times its cost in benefits, spread between farm and town (Veeck *et al.* 2006). In particular, local advertisements have been found to increase business far more effectively than deep discounts (Panyik *et al.* 2011). More importantly, advertising can create name brands, a key tool for establishing a place- and

reputation-based identity, especially when the advertising highlights regional business clusters or their offerings (Che *et al.* 2005; Panyik *et al.* 2011). Many businesses can get away with only sparse advertising because of their history or location, but this is not a luxury that other operations have. Faced with limited budgets, operators have to choose wisely. Another significant option is group advertising through institutions or other farm networks.

Social and business networking allows farms access to tourism markets. Farm-related businesses can suffer a rough transition when they move out of bulk farming and into tourism. Agritourism operators benefit from lowering trust barriers and collaborating, forming mutually-beneficial connections. Standard business networks for rural tourism are few and far between; in order to draw attention, rural tourism providers must either band together to form their own trade network or aggregate to form a large enough group to compete (Sonnino 2004; Che *et al.* 2005; Alonso & O'Neill 2010). Such collaboration requires sharing capital, expertise, and knowledge (e.g., through inter-farm purchases and references) (Che *et al.* 2005; Daugstad 2008; Panyik *et al.* 2011). The reason for collaboration is simple: for any businesses with larger competitors, cooperation yields more benefits than competition (Forbord *et al.* 2012). No matter how halting progress is, the success of collaborative planning is evidenced in the European farm tourism industry and smaller, regional groups in the United States. A few clear winners may be able to survive independently, but the rest would be wise to attempt networking. Given sufficient time, these personal networks can evolve into well-managed, helpful institutions.

Agritourism in Europe and the United States

Agritourism has existed in Europe for at least a century. From its roots in farm visits and winery tours, it can now be found across the continent. Certain factors common to the region have promoted and encouraged agritourism (farm tourism) there. As far back as 1900, well-paid

German civil servants took farm stay holidays to escape urban stress (Oppermann 1996; Forbord *et al.* 2012). After WWII, European interest in farm tourism grew from a combination of a changing economy, rural development funding, and war fatigue (Busby & Rendle 2000; Åke Nilsson 2002; Panyik *et al.* 2011). Farm tourism investment began in earnest in the 1970's, and the current European tourism leaders are Austria, Britain, and France (Busby & Rendle 2000; Barbieri & Mshenga 2008; Forbord *et al.* 2012). Europe is not alone in fostering farm tourism conditions: any population that is decently-paid, industrialized, and urbanized can form the industry. Some countries such as Austria recognized the trend early and have a well-developed industry today. Therefore, these places have more experienced institutions that guide and shape farm tourism across the region.

In Europe, farm tourism has become institutionalized. Institutions are collections of agencies, individuals, and organizations that share a common culture and set of experiences. Early European investments in rural tourism have allowed the industry to cross the threshold from individual tourism (on farms) to organized farm tourism. Institutions are the product of time, knowledge, and seasoned operators (Busby & Rendle 2000; Forbord *et al.* 2012). Europe's farm tourism industry arose when enough farmers chose to engage in tourism, a decision influenced by the relative profitability of agriculture and tourism (Ilbery *et al.* 1998; Busby & Rendle 2000). The shape of those institutions controls the development paths of their members, with programs implicitly encouraging or discouraging certain modes of expression (Ilbery *et al.* 1998). In times of need, institutions of all size and scope provide an established route that a collection of individuals could not. Such a path is not always good; it can lead to a dead end or preserve failing policies. In this capacity, institutions are both the cause and the symptom of ongoing economic malaise.

Institutions form the basis of Europe's farm tourism success. Institutions help individual businesses by providing services and stabilizing tourism markets. Participation in and integration of farm tourism operations into these institutions varies regionally. National or provincial in scope, they may have participation requirements and different levels of regulation. Those institutions that are most open to non-mandatory membership and that establish a strong brand identity tend to be the most successful in connecting farmers to markets (Forbord *et al.* 2012). These institutions coordinate services such as business education, branding and marketing, lobbying, quality assurance, and pricing standards (Ilbery *et al.* 1998; Forbord *et al.* 2012). Institutions help bridge gaps in knowledge and professional connections, giving entrepreneurs what they need. Despite institutional benefits, there are many people who would prefer to be left alone. For those people who choose to participate, the funding for their regional institutions is often derived from super-regional and national institutions.

Large-scale funding programs help grease institutional wheels. Holding stakeholder meetings about assistance and services is not the same thing as being able to provide them, however. Government-funded programs such as LEADER[18] are one such means of funding. LEADER is an ongoing E.U. farm tourism program that originated in 1991. It provides grants for individual farms and attending organizations, favoring a bottom-up approach that addresses local needs like vocational training (Busby & Rendle 2000). The similar Objective 5b program was tasked with creating and maintaining rural jobs, largely through lodging renovation and creative product development (Hjalager 1996). No matter whether it originates from taxes or local dues, funding is the breaking point that distinguishes the committed member from the reluctant one.

[18] For more information on this program, see https://eufunds.gov.mt/en/EU%20Funds%20Programmes/European%20Agricultural%20Fund/Pages/LEADER.aspx

Although some argue that government should simply assist active regional institutions with finances and studies, there may yet be a role for national institutions in guiding regional policy.

The United States has hosted farm tourism for nearly a century. Led by rural amenity development and resettlement, U.S. farm tourism (agritourism) is a growing industry. Leading with farm stays (bed and breakfasts today), U.S. agritourism has expanded in variety and intensity (Veeck *et al.* 2006; Carpio *et al.* 2008; Eckert 2008; Das & Rainey 2010; Brandth & Haugen 2011). First becoming popular near densely-populated areas in the East and spreading in the 1970's with the suburban boom, it seeks to fulfill the demand for inexpensive, family-friendly entertainment (Carpio *et al.* 2008; Irwin *et al.* 2010). Unlike its European counterpart, U.S. agritourism has the advantage of a great deal of open space to sell as its main product. Efforts to develop the industry have been undertaken for more than a decade by regional and state institutions, with varying results.

Statewide efforts with respect to rural tourism share many similarities. Programs range from structured government plans to simple website registrations, and may include outreach to non-governmental institutions. The level of tourism support reflects how much the state is invested in active rural development. As of 2000, 30 states had specific rural tourism policies, half of which were integrated into overall tourism plans (Sharpley 2002). The effort put forth by each state varied: Colorado, for example, had only a registration website, while Connecticut built a website and a glossy map guide with detailed travel directions. Other states such as California and Illinois hosted a collaborative, multi-actor approach to building tourism policies (Pittman 2006). State tourism programs fluctuate over time, but they illustrate that more than one "right

way" exists to promote rural tourism. The most common state approach seems to cater to self-guided day trippers, but several specific state actions are noted below[19]:

- Indiana's working group, formed in 2003, opened a dialogue with agritourism organizations, agricultural educators and organizations, chambers of commerce, and regional tourism groups. A survey was constructed for agritourism providers to build the foundation for future agritourism plans. Specific challenges were identified using the survey: marketing, finding new markets and qualified employees, and legal liabilities. Two permanent positions implemented specific policies: a master plan, a central website, education and outreach, support for successful strategies, and a permanent funding source for regional organizations.
- Tennessee formed a working group in 2003 to create an agritourism registry, training and outreach, marketing, and continual oversight. Kentucky, Vermont, and Virginia were used as models. Separate surveys of agritourism providers and their customers, established data for later policy implementation. Educational outreach was provided to nearly 3,500 participants, who further propagated the education to others. Promotional efforts introduced customers to agritourism and continue to be effective.
- Kentucky's working group, formed in 2000, was a result of many inquiries from interested operators. It has goals and policy recommendations similar to those of Indiana's working group, but with a specific emphasis on assisting displaced tobacco farmers. The state established an office of agritourism with an advisory board whose members are drawn from across the state. Notably, the Pittman report implies that

[19] All notes are drawn from Pittman (2006). For more such documents, go to (http://scholar.google.com/), type in the report name, and click on "Related Articles". Many more states have conducted studies of agritourism.

different policies were implemented for each of several geographic regions within the state, indicating an attention to the spatial variance in those regions of the state.

- Kansas is driving the development of agritourism through the Kansas Agritourism Initiative, launched in 2004. The project is jointly run by the Kansas Department of Commerce and the Kansas Agritourism Advisory Council, the latter being composed of 18 members representing producer, regulatory, and tourism interests.

Regional and state institutions can learn from the best among them. Farmers embarking on tourism in the United States suffer from the same logistical issues as European farmers, and seek similar expertise. Above all, diligent and responsive agritourism institutions need to address common barriers to entry. Problems commonly cited by farmers include lack of expertise, land use regulations, legal and labor liabilities, poor marketing, and remote geography (Ryan *et al.* 2006). States can address technical needs by promoting regional coordination, knowledge sharing, and startup funds, along with streamlining bureaucracy and providing training programs. The need for geographic information can be addressed via readily-available, detailed directions, good maps, and well-placed signs (Busby & Rendle 2000; Ryan *et al.* 2006; Veeck *et al.* 2006). Whether implemented by local farm cooperatives or disseminated by a state tourism office, best practices in tourism do exist and should be adhered to where applicable. By providing what entrepreneurs need and without imposing an excess burden, agritourism institutions can be useful and appreciated.

Chapter III:
"Fundamenta Inconcussa" (*Unshakeable Foundation*)

Spatial theory forms the basis of this study's methodology. Geography explains why things occupy a given space and place, and how they got there. To illustrate these ideas, three quantitative methods are described that attempt to explain spatial patterns. Of these, gravity models are the most foundational, underlying the theoretical construction of many regression variables as well as a discussion of the conceptual and mathematical construction of distance.

Spatial Interaction Models

This study is predicated on the idea of empirical modeling. Empirical models of the social sciences (e.g., sociology, economics, and geography) grew dramatically in prominence from the 1950's through the 1970's in an approach later called the Quantitative Revolution. This approach posited that research must move past simple description, instead using empirical metrics and explanatory, unifying theory (Barnes 2012). Quantitative geographers explored many spatial interactions, including economic, hierarchical, migration, and land use models. The move to social theory reintroduced qualitative methods, questioning the hegemony of quantitative data and methods and expanding the valid types of knowledge (Thrift & Olds 1996; Hartwick 1998; Bair 2005; Sunley 2008). This study employs older quantitative models, while cautiously appreciating their assumptions and applicability. It is my belief that such models can paint an accurate portrait of the agritourism industry in Kansas.

Spatial interaction models attempt to understand the way space is produced. Geographers describe space using the physical characteristics of a location and the nature of the people

there[20]. These reflect the sum of a long history of localized actions. Spatial interaction models attempt to explain and predict space using a wide array of variables and iterative analyses. Von Thunen pioneered one of the earliest spatial interaction models in 1826, modeling land use and rent according to the difficulty of transporting goods to market (Hooper 2014). Many other models followed, each attempting to explain landscapes based on variables such as income or personal choice. Three common models are discussed below: central place theory (CPT), input-output (I-O) models, and gravity models. Spatial interaction models help reveal the complex milieu that is the physical world. Despite issues of accuracy and applicability, each grants greater understanding. From land use to home ownership rates, spatial interaction models continue to guide current growth and development policies across the globe, for better or for worse.

CPT is a hierarchical model of business locations. The model describes the frequency and placement of business goods and services, both within and among urban centers. It explains why nearly all towns have gasoline stations, but relatively few have car dealerships or jewelry shops. CPT ranks urban centers and neighborhoods into hierarchies based on the diversity and number of business types present. Each business type has a threshold of customers it needs to make a profit, with higher-priced goods being rarer but also attracting customers from farther afield. Urban form is explained by optimizing business location (e.g., customers, rivals, and suppliers). Despite the absence of social variables, CPT's conclusions are largely validated by ground truth[21] (Irwin *et al.* 2010; Theo 2011; Barnes 2012; Mulligan *et al.* 2012). Central place theory remains a relevant tool in retail, transportation, and urban planning. As with market access

[20] Space does not simply appear suddenly; each aspect has its own history. People's experience (i.e., emotions and memories) of space creates a personalized sense of place (i.e., "home").

[21] Ground truth refers to the data used to validate model predictions, collected on-site or remotely. An example of CPT-related ground truth is illustrated by a study of billboard placement. Common businesses (e.g., hotels, fast food) typically advertise only one highway exit away, while large, relatively rare tourist sites advertise at far greater distances (Theo, 2011).

(Chapter 2), the model explores the idea that product clustering and diversity can influence business profits. If people are willing to travel for unique products, then a well-advertised agritourism business with rare activities should have some success despite its location.

I-O models are tools of regional analysis. These models and their descendants track movements across boundaries, both industrial and municipal, and continue to be valuable research tools. Initially used to track industrial material dependencies to maximize production rates, today I-O models are employed in predicting regional growth and migration patterns. They have laid the foundation for more advanced regional models such as LCLUC, IMPLAN, and GIS[22] models that are heavily used today (Das & Rainey 2010; Irwin *et al.* 2010). I-O models mark the early conception of the economy as movement, not accumulation (e.g., currency, land, population). This principle suggests that the relative size of an agritourism business may not matter as much as its relative position in economic space.

Gravity Models

Gravity models quantify the effects of distance on interactions. As described by Tobler's Law (Chapter 1), distance influences behavior and movement, including disease, migration, consumption, and flows of information. Gravity models quantify this influence using demographic and economic variables. Gravity models are an economic adaptation of Isaac Newton's equation of gravitational force (Table 2, Equation 1). Called one of the "great success stories in empirical economics"[23] the equation was explained and tested during the Quantitative Revolution. Explorations included model complexity and choice of variables, especially alternate

[22] *LCLUC*: land-cover, land-use change. These models mostly examine patterns of crop planting and urban growth.
IMPLAN: impact analysis for planning. This is a processor-heavy method for regional analysis.
GIS: geographic information systems. These software suites allow for easy calculation of geographic metrics and overlays of multiple geographic "layers" of the same space, each containing separate data sets, for visual analysis.
[23] This quotation is derived from Wang, Wei and Liu 2010, p8.

masses and expressions of distance (Table 2, Equations 2-3) (Gordon 2010; Keum 2010; Wang *et al.* 2010). Just as distance does not have a uniform effect over space, there is no single gravity model that best fits every research question. The individual variations within the models fit the data available to a given study.

Equation 1: Isaac Newton's equation	$F = gM_1M_2 \times Dist^{-2}$
Equation 2: Basic gravity model	$F_{od} = \alpha M_d M_o \times Dist_{od}^{-x}$
Equation 3: Current gravity model (The Entropy model is similar to Equation 3)	$F_{od} = \alpha M_d \times \beta M_o \times f(Dist_{od})$
F is total force, g is gravitational force, M is the mass of individual bodies, and Dist is distance. F_{od} is flow, M_d and M_o are the masses of the destination (d) and origin (o), α and β are constructed, location-specific coefficients, and f(Dist) is a complex distance function. Such complex functions are separate equations, often unique to each study.	

Table 2: Basic and advanced gravity model equations

Gravity models test geographically-specific coefficients and variables. By rearranging or transforming these pieces, one can either work backwards from known data to isolate variance or seek the optimal solution given fixed conditions. Examples of model variations include the entropy-based model, which uses distance as the exponent ($X^{(Dist)}$), and trade models, which may employ the sum of variables as a measure of economic mass (e.g., $GDP_{(D+O)}$ vs. $GDP_{(DxO)}$). Transformations may be employed to normalize and simplify terms (e.g., $Dist^{(-2)}$ to $-2 \log_{10} Dist$). Models that test fixed conditions typically minimize total distance traveled[24] (Gordon 2010; Keum 2010; Wang *et al.* 2010). Like other linear analysis, gravity models testing variables for goodness of fit and statistical weight (coefficients); unlike them, there is an explicit geographic focus. The strength of the model is its ability to highlight the power of movement.

Gravity models simulate flows over space. Flows define and are defined by spatial

[24] This problem is broadly known as the traveling agent / salesman problem. A single salesman must visit multiple houses in varying locations. The optimal moves to visit each location with the lowest total travel time change based on the initial placement of the houses and the salesman. The simplest solution is found using linear programming.

variables associated with origins, destinations, and the spaces in between. Models of flows vary in their predictions based on the number and type of variables included. Flow is typically measured in discrete items (e.g., produce shipments), with entropy-based models using probability-of-flow instead. Locations can both compete with and contribute to one another; the inclusion (or exclusion) of location-specific variables controls net flows (Gordon 2010). Regardless of intervening ground features, there will always be some flow between regions or over routes (Taplin & Qiu 1997; Gordon 2010). Studying flow shows that spatial context matters: a model examining a dozen small cities changes dramatically when a metropolis is included in the analysis. The mathematical treatment of flow can also vary based on the way distance is approximated and measured.

Distance is relative. In models, distance is rarely absolute (Euclidian) but instead is often modified to reflect economic or landscape traits. The selection of a distance measure is subjective and dependent on the research question. Representations of distance are manifold; for example, accessibility, financial cost, information access, opportunity cost, or time spent. These measures are each approximated differently, such as using distance to major roads or airports in lieu of accessibility (Nicolau 2008). Because landscape features are not uniform, people's responses to traveling a given distance vary widely; therefore, absolute distance matters less to a study's results than does relative distance. The implication is that any distance measure can work as long as its inclusion is well-justified and there is enough data to analyze.

Products are differentially sensitive to the friction of distance. Market access (Chapter 2) and CPT suggest that certain goods or services, depending on their type and quantity, can attract people from farther afield. The demand decay (friction) of these products is influenced by distance and non-distance variables. The exponent of distance ($Dist^{-X}$) in economic gravity

models[25] has been found to be lower than in physics ($Dist^{-2}$); typically, the value of X is at or below 1. Hence, products do not typically experience exponentially decreasing demand, especially when bulk shipping is employed. In general, the exponent of demand decay is closer to zero (i.e., distance has no effect) when there is great variety, when a good is not easily obtained (i.e., is popular), or when it is a luxury. People will also purchase large quantities of low-value goods at a distance (Storper & Venables 2004; Gordon 2010). In other words, people are willing to travel farther for something that motivates them, be it popularity or the thrill of the hunt. For example, antiquing can be enjoyable both as an adventure and for the joy of finding that one piece. If people needed antiques to survive, they would be far less excited or particular.

Measures of mass vary among gravity models. Early research into gravity models assumed that population was the driving factor of trade and tourism. Instead, economic development and income are often better estimates of mass. Regions vary in their level of development (e.g., opportunities, prices) and income; the latter is typically approximated by gross domestic product (GDP), median income, or a cost-of-living measure like the consumer price index (CPI). Despite the abundance of economic data, simple population remains a popular measure because it accounts for customers, migrants, and workers (Taplin & Qiu 1997; Storper & Venables 2004; Nicolau 2008; Keum 2010). Additional variables with respect to mass include border and island effects, the commercial sector mix, cultural differences, historical ties, political policy, and resource endowment (Wang *et al.* 2010). The economy and population size are both appropriate estimates of mass, as they greatly overshadow most other variables. They are one of

[25] In economic literature, studies of demand decay are frequently referred to as the *price elasticity of demand* instead. Such studies may or may not include distance as an important variable.

the most abundant data types and their relative value says much about the ability of a place to participate in the economy, with income effects governing population effects.

Chapter IV:

"Pro Studio et Labore" (*For Study and Work*)

This study uses geographically-linked survey data to analyze the economic outcomes of agritourism operations in Kansas. Data were collected through existing online resources (e.g., the Census Bureau), an Internet-based survey of agritourism operations, and interviews. Survey information was linked to geographic data layers using geographic information systems (GIS). GIS was used to create distance-linked data via repeatable models (scripts). These data were then analyzed using statistical software, with a focus on regression modeling and spatial interpolation. Finally, interview data were employed to help interpret the patterns detected during the analysis. The combined analysis produced equations modeling the economic outcomes of agritourism and a snapshot of the industry in Kansas.

Data Sources

Data for this study came from both public and private sources. Publicly accessible data were obtained from state and federal government websites, while private data were derived from a customized Internet survey (Table 3) and interviews. The Census Bureau[26] provided demographic information, the Kansas Data Access and Support Center[27] provided GIS data layers[28], and the Kansas Department of Tourism provided an initial version of the agritourism business database. The Web-based survey was administered to over 400 businesses in summer 2013, returning 61 responses (14%). Five completed surveys were rejected, leaving 56 entries:

[26] U.S. Census Bureau: http://www.census.gov/.
Data can be directly downloaded from: http://www.census.gov/geo/maps-data/
[27] Kansas Data Access and Support Center (DASC): http://www.kansasgis.org/
[28] All layers and shapefiles were (re)projected to the UTM Zone 14N coordinate system, which covers Kansas.

one with an unmatchable address and missing lots of data, and four from irresolvable responses to question 8. Lastly, several interviews were conducted in the spring and summer of 2012.

1. Is your property a working farm, ranch, or similar property?
2. Approximately how many years has the tourism portion of your business been open?
3. Why did you get involved in agritourism?
4. In what season(s) do you do the majority of your tourism-related business?
5. Approximately how many tourists (not groups of tourists) do you get annually?
6. What demographic characteristics do you notice most about your customers?
7. What agritourism activities do you offer?
8. Approximately how much money does each tourist spend at your business, on average?
9. Approximately what percentage of your revenue comes from internet contacts or sales?
10. Approximately what percentage of your gross income comes from agritourism?
11. How do you feel about the future of agritourism in Kansas?
12. Would you like to see the state of Kansas do more to support agritourism through advertising, road signs, or financial-logistical support?
13. Would you like your business added (or removed) from the state agritourism database?
14. For the purposes of mapping survey data, what is your contact information?
15. To which charity would you like $2 donated?

Table 3: Survey questionnaire

Geographic information systems formed the basis of the study data. ArcGIS, a widely-employed GIS software suite, was used to overlay multiple datasets and generate geographic analysis. Data layers used included census block data at the county scale (e.g., population[29], education, and economic information) and basic map layers (e.g., roads, urban areas, and political borders). Median household income was included using a separate census estimate, matching county codes to county names and then using county names to match records in the

[29] The population data could be made more spatially accurate by using LandScan (http://web.ornl.gov/sci/landscan/). Landscan is a probability-weighted map of the global population using variables such as nighttime light pollution. Processing via Landscan would be more difficult, however: Resampling the raster (grid) data to different cell sizes, converting the table to a vector format (e.g., point, line), and then transferring all relevant census fields (columns) to the new file. In addition, the model would take much longer to run because of the larger number of entries (rows), as compared with the county-level census table. In short, a lot of work for little payoff.

census table[30]. Existing GIS data layers allowed me to analyze my research question with less layer construction. Survey data completed the necessary information.

The survey was sent based on a modified agritourism database. As with many such listings, both this database and more limited ones I found online were often out of date. Businesses in the database had their records corrected and were contacted via email. The initial database was obtained in 2011 from the Kansas Department of Tourism[31] and then updated using Internet searches to find Web-active agritourism businesses. The completed table contained approximately 500 businesses, their contact information (e.g., business name, ZIP code), and my best guess at their current agritourism offerings (Table 4). Of these 430 had valid email and street addresses, forming the basis of my study group. The focus on Web-active businesses was chosen because the Internet is one of the most important sources of information for travelers; further, links to Web-based surveys were simpler to send than paper surveys. Valid street addresses, which nearly all businesses possessed, allowed me to map them electronically.

[30] The main website for census income estimates is http://www.census.gov/hhes/www/income/income.html. The specific income data derived from the American Community Survey (2012, 5-Year Estimate), located using the Census Bureau's American FactFinder, The county income estimates used was "Median income in the last 12 months – Total: Population 15 years or older in the United States (Estimated)" [B06011e1].

[31] Kansas Department of Tourism, Agritourism Division: http://www.travelks.com/industry/agritourism/

Farm Experience / Animals	Petting zoos, sheep shearing, exotic animals, and other attractions nominally for children (but occasionally enjoyed by adults). Note that sheep shearing events are usually associated with county or state fairs, not daily operations.
Hosting	Houses or other farm structures renovated to allow for the hosting of wedding groups, business or church conferences, birthday parties, or related activities. Often paired with lodging attractions.
Lodging (Rural or Urban)	Houses or other farm structures renovated for short-term residence. Note that bed-and-breakfasts can be both urban and rural, depending on the nature of the site developed, but the definition of rural does include very small towns.
Horseback Ranching and Riding (R/R)	Guided rides through rural properties, training for new riders, horse boarding, and occasionally cattle drives (and similar "working farm" or chuck wagon experiences) for ranches with sufficient space.
Hunting / Nature	Guided hunting or nature tours, usually including some sort of camping or on-site lodge (flagged as a Lodging attraction). Camping sites may be included, including RV "camping." Hunting can include both privately owned land and land leased from nearby rural properties.
Seasonal	Typical autumn attractions such as hay rides or haunted houses. This blanket category also includes the occasional Christmas attraction or harvest festival. Non crop gift shops are often associated with such attractions.
Tours / Education	Educational farm tours, usually for grade-school children but occasionally given for international groups and for interested adults. This category can also include how-to and sustainable living classes taught on the property.
U-Pick / Sales	Produce patches available for customer picking, stands of pre-picked produce, or both. This category also includes direct sales of farm goods over the Internet. Non-crop gift shops are often associated with such attractions.

Table 4: The agritourism categories used for the survey

The survey was designed with a focus on predicting income. People do not vacation just to window-shop; therefore, rises in tourist foot traffic directly increase income. The survey was designed to determine business income indirectly using a series of broadly-related questions. Formally constructed using the site InstantLy.com[32], the survey asked 15 questions, each

[32] The formal survey link is https://www.instant.ly/?gclid=CJHRhNKe-boCFeJF7AodmmsA-A

designed through personal discussions and readings. The primary hypothesis was addressed by asking businesses about tourist count (Question 5) and average money spent per visitor (Question 8). Secondary questions resolved ancillary ideas, such as the types of activities businesses actually offered (Table 4). Despite many revisions, I am sure it could have been improved using short-run tests that included feedback. Even limited data were considered useful however, so I am pleased with the amount of data eventually collected.

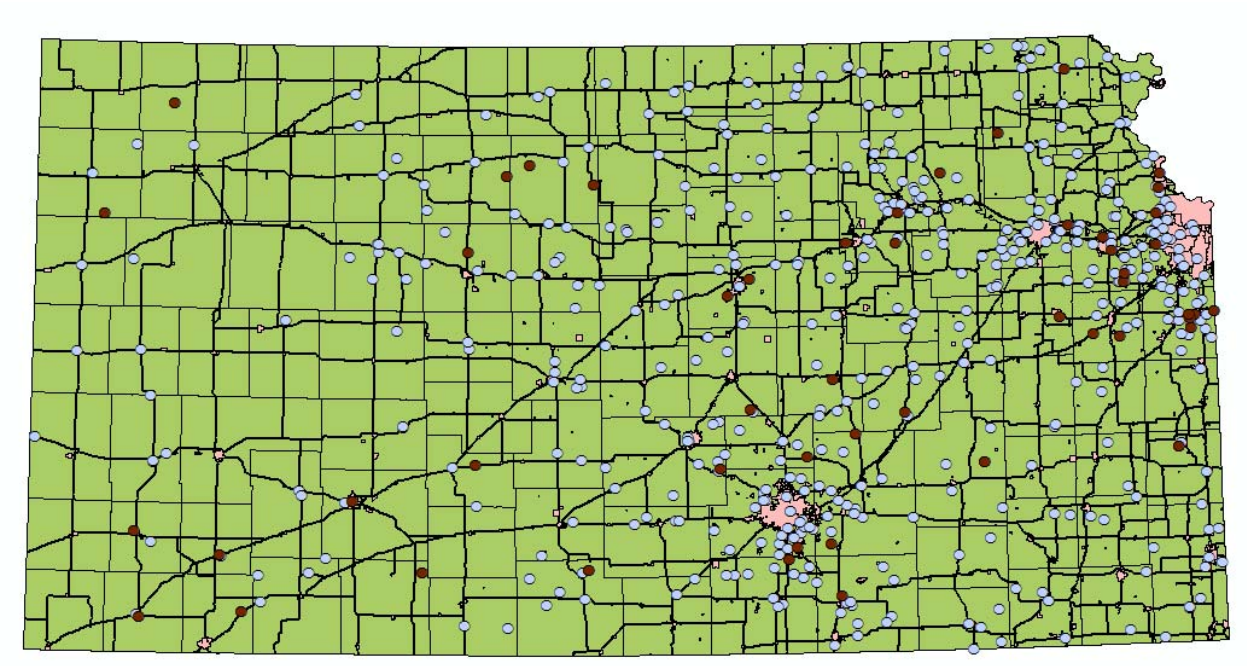

Figure 5: Survey business, with total (light blue) and responding (dark red)

Interviews were conducted to supplement other forms of analysis. These interviews were structured on the questions from the survey and featured open-ended discussions with each owner, often discussing history and current events. Five interviews were conducted in 2012 with agritourism business owners; further interviews were planned, including with agritourism planners and politicians, but not executed. These interviews helped explain the patterns I

discovered in the quantitative and survey analyses. In addition, discussion points raised by interviewees suggested new lines of inquiry for economic policies and studies.

Regression Analysis

This study employs linear regression as its primary analysis method. Regression analysis determines the capacity of many variables to predict the variation in a single one. Individual variable strength is reflected by coefficients, while overall predictive capacity is measured using goodness of fit (often R^2). The most common model is ordinary least-squares (OLS) regression, which predicts and primarily employs continuous[33] variables. In contrast the logit, interval, and probit versions are appropriate when using nominal, ordinal, and categorical variables (Barbieri & Mshenga 2008; Carpio *et al.* 2008; Nicolau 2008). Geographically weighted regression (GWR), in which nearby data is given more predictive weight than distant data, could also be employed. This study employs OLS regression analysis for its ability to rank variable importance, suggesting correlation and causation for future studies to pursue.

Regression Variables

Regression variables were primarily derived from the GIS modeling and spatial theory. Two main types of variables were created: gravity and zonal (Tables 5). The 3 zonal variables were based on I-O models and measured regional agglomeration effects. These variables were limited to the total number of nearby businesses (e.g., NrBis [*xx*]) within a certain radius of a responding business, corresponding to 16, 32, and 64 km (or 10, 20, and 40 mi). The 32 gravity

[33] Data types include continuous (e.g.., 1, 2, 3), nominal (e.g., "Yes or no; Do you like ice cream?), ordinal (e.g., 1st place among 10 runners in a race), and categorical (e.g., "Strongly disagree, somewhat disagree, no opinion"). Dummy variables can replace the latter three types by introducing a new variable for each question. For example, a membership question with up to three possible "Yes-No" responses becomes three new variables whose value is either 0 or 1. The new categories can be interpreted by most statistical measures.

variables (e.g., *Field* [*xx*]) measured the response of travel distance (decay) on population traits. There were created by reading the value of a chosen column from the census table, then dividing that value by the distance between a business and the center of a county (i.e., value / distance ^{x}). This was done for every county and summed to create a unique measure for each business. Distance decay was varied by raising the travel distance to some power (e.g., 0.25, 0.5, 1, or 2), which modified the variable name (e.g., Pop050 or Wh100; see Table 5). Lastly, the distance from each business to a major road (e.g., RoadDist) was also included. Model-derived distance factors such as these formed the basis of the experimental portion of this study. Although there are other ways to model distance, such as gravity models that measure flow, my study focus was on examining in what way distance most affected the economic outcomes of agritourism.

Gravity Variables (e.g., *Pop025, 050, 100, and 200*) – Measures of population characteristics and travel distance. The numbers correspond to the distance exponent. Census categories measured included 2010 population (*Pop*), median income (*Inc*), gender (*Xy*, *Xx*), ethnicity (White only, or *Wh*), and age categories (Youth – ages 1-34 – or *Yth*, Middle-Aged – ages 35-64 – or *Mid*, and Elderly – ages 65 and older – or *Eld*).
Survey Variables (e.g., *Q5*) – The geocoded responses to qualitative survey responses. These included business tenure (Q2), number of seasons open per year (TotalSeason), tourist count (Q5), average tourist spending (Q8), percentage of business derived from internet contacts (Q9), percentage of gross income from tourism (Q10), and gross annual tourism income (AnnTourInc).
RoadDist – The distance from each business to major Kansas roads (*interstates, Kansas highways, and U.S. highways*).
NrBis (e.g., *NrBis16, 32 or 64*) – The total number of all proximal businesses at a distance of 16, 32, and 64 Km (or10, 20, and 40 mi)
GrossAvg, PerctAvg – The average gross income, and category of gross income (Table 3), from tourism of all proximal businesses to each responding business. These were ultimately *excluded* due to the difficulty in realizing clusters of responding businesses.
TourSum, TourAvg – The total and average number of tourists of all proximal businesses to each responding business. These were ultimately *excluded* due to the difficulty in realizing clusters of responding businesses.

Table 5: Independent regression variables employed

Survey variables complemented the model-derived variables. These were composed of 6 quantitative responses among the survey questions (Table 3), with qualitative responses being analyzed separately. Survey variables included the business tenure (Question 2), number of seasons open per year (TotalSeason), tourist count (Q5), average tourist spending (Q8), percentage of business derived from internet contacts (Q9), and percentage of gross income from tourism (Q10). TotalSeason was created by splitting Q4 into four dummy variables, then summing them. Categorical responses (Q2, Q8-10) were coded by using the midpoint values of each category, listing "Other" responses without modification. Other survey responses either pertained to observation, opinion, or record keeping (Q1, Q3, Q6-7, Q11-15), making them hard to measure for a quantitative study. Collectively, the survey variables made up the destination factors to complement the source factors expressed by model-derived variables. The relative predictive weight assigned to each group of variables was thus also under examination.

Certain variables could not be created due to practical concerns. Limited by the availability and point locations of data, both diversity and zonal variables were mostly excluded (Table 5). Diversity variables comprised a third group of theory-derived predictors, theoretically based in CPT and practically derived from Q6-7 (Table 3). The nature of the responses to these questions, either from personal observations or responses that did not match what websites advertised, prevented in-depth exploration of consumer and product diversity. Further zonal variables (e.g., TourSum or TourAvg) were excluded due to the scattered location of the responses over space; most responding businesses had few, if any, responding businesses nearby. Even though they were not included as model variables, other analysis hinted at the predictive potential of diversity and zonal factors. Nonetheless, I managed to create a broad set of distance and survey metrics that allowed me to test my hypothesis.

There were three dependent variables in this study. Separate models (Table 6) were created with the goal of ranking overall factor strength, not predicting dependent variables. Q5 and Q10 were drawn from the variables above as they were the best measures of foot traffic and overall tourism income among the survey responses. Gross annual tourism income (AnnTourInc[34]), the product of Q5 and Q8, was a direct measure of financial achievements. Due to their status as both dependent and independent variables Q5 and Q10 had the potential to produce unusual model equations, but they retained their dual role because they greatly improved the predictive accuracy (i.e., R^2) of the models. AnnTourInc was never included as an independent variable due to the inclusion of Q5, a parent variable.

Questions 5 and 10 (*Q5, Q10*): The estimated annual tourist count and percentage of gross income derived from tourism. These are approximations, as there were no existing state data to use for these questions.
Annual Tourism Income (*AnnTourInc*): The gross, estimated annual income from agritourism in the state. This question was derived from other questions as it was impossible to obtain a definitive answer.

Table 6: Dependent regression variables employed.

My hypotheses differed by variable and groups of variables. Not all variables had a hypothesis associated with them, due to the exploratory nature of this study. I hypothesized that: (a) increasing demand decay would limit the influence of far-away populations compared to closer ones; (b) clusters of businesses would create an incentive to cooperate and travel to multiple sites, increasing foot traffic and income; and (c) closer access to major roads would increase foot traffic and income, but only for closer distances. Among survey variables, my hypotheses were: (d) the better established a business is, the less need it has for internet contacts

[34] Annual Tourism Income's histogram produced different results depending on whether transformations were performed before multiplication (normal) or after (bimodal normal). The same pattern is true for Q8. This derives from a few very high-value responses forming a second peak. For this study, the former version was used.

and sales; (e) the number of open season was not related to income; (f) the money spent per tourist would have a non-uniform effect on all dependent variables, due to population and source characteristics. Mathematically, these predictions can be rewritten as following:

- Gravity variables would be a significant variable in the models, but *Field*100 and 200 would be better predictors than either *Field*025 or 050. Further, the literature indicates that *Field*200 would likely be a worse predictor than *Field*100.
- NrBis[*xx*] would have a positive relationship with the dependent variables. NrBis16 and 32 would have a stronger relationship than NrBis64.
- RoadDist would have a negative relationship with the dependent variables.
- Q2 would have a negative relationship to Q9.
- TotalSeason would have no relationship to either Q10 or AnnTourInc.
- Q8 would have a mixed-to-negative relationship with all dependent variables, as different activities are aimed at different types of consumers of different means.

Regression Techniques

Analyses are only as useful as their predictive accuracy. OLS regression is based on parametric assumptions (e.g., normality, equality of variance). When variables violate these assumptions they must be transformed or removed from the analysis entirely. In general, most variables required transformation; only the *Field*50 and *Field*100 gravity variables, broadly, avoided this need (Table 5). Most adjustments were to correct positive skew, using the Shapiro-Wilk test to generate descriptive statistics. Often, similar distributions would appear normal but

tests (e.g., box plots, or a skew less than or equal to standard error) showed otherwise[35]. In these cases the least-skewed distribution was chosen as the most accurate transformation.

Variable collinearity was a major concern for my analyses. Collinearity occurs when independent variables are not independent from each other. Selecting the best variable for each model proved challenging due to common construction schemes. The gravity variables were based on four distance cohorts (e.g., Xy025, 050, 100, and 200) and eight census fields (e.g., Inc050 through Wh050). Zonal variables were also collinear, tracking previous data points as search radius increased (e.g., NrBis32 -> 64). Simple regressions were employed to select the most correlated variable among each group; however, when automated methods (e.g., backwards or stepwise regression) failed to produce consistent results I used the manual (entry) method instead. The main problem was that nearly every variable predicted Q5 well, while only income variables predicted Q10 and AnnTourInc well. Among the zonal variables NrBis64 was clearly the worst choice, but the selection of gravity variables was much more nuanced; the *Field*100 distance cohort was slightly better than all others in most cases. Aside from NrBis16 or 32, few distance variables were entered into the models, reducing issues of collinearity.

[35] Statistical non-normality sometimes arose from bimodal distributions (e.g., NrBis32, NrBis64, and normalized Q8), and from data that did not contain enough varied responses to complete a curve (e.g., Q2 and TotalSeason). Q9, Q10, and TotalSeason could not be corrected, but were mostly linear and included despite their skew.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Inv_IG200	.082	56	.200*	.971	56	.199
Log_PG200	.081	56	.200*	.991	56	.945
Log_Xy200	.080	56	.200*	.991	56	.956
Log_XX200	.081	56	.200*	.990	56	.935
Log_Yth200	.078	56	.200*	.991	56	.946
Log_Mid200	.053	56	.200*	.993	56	.990
Log_Eld200	.076	56	.200*	.988	56	.833
Log_Wh200	.061	56	.200*	.991	56	.958
sum_ig25	.123	56	.034	.972	56	.219
Five_Pg25	.091	56	.200*	.969	56	.158
Five_Xy25	.091	56	.200*	.969	56	.157
sum_xx25	.094	56	.200*	.967	56	.133
Five_Yth25	.096	56	.200*	.968	56	.135
Five_Mid25	.093	56	.200*	.970	56	.171
Five_Eld25	.135	56	.013	.950	56	.021
Five_Wh25	.099	56	.200*	.968	56	.137

Figure 6: Sample variable transformations. Note that variable names were slightly modified during analysis (e.g., *Field*25 and 50 -> Field 025 and 050; Pg[*xx*] and Ig -> Pop[*xx*] and Inc)

Spatial dependence did not worry me in this study. Spatial dependence (autocorrelation) occurs when data points within variables (or their residual errors) are not independent of each other, forming clusters of similar values. This trait is desirable when interpolating data (e.g., rainfall maps), but when modeled autocorrelated data can artificially inflate the significance of findings. Spatial dependence is commonly tested using Moran's *I*, likelihood ratios, or the Lagrange multiplier (Anselin *et al.* 1996; Anselin & Moreno 2003). I did not test for autocorrelation because my data was so widely dispersed across the state, including the census

counties and both the non-responding and responding business. Furthermore , the economic outcomes of business are frequently independent of others, even when they share a common line of business (Phillips 2012). For these reasons I do not believe spatial dependence was relevant for my variables. If it were to arise among the survey data, the zonal variables were designed to account for it. Had my study been more focused on interpolation (e.g., Kriging) over variable exploration, I would made a point to test for autocorrelation.

The final section of model variables relied on multiple tests. The most important measures utilized were the standardized correlations (Pearson's *r*), the net R^2 change, and the retention of statistical significance (Sig values) for those variables already entered. Manual (entry) regression methods were employed to test significant variables. Models tested each variable individually, selecting the variable that most increased R^2 values. Further iterations of the process retained previous best variables while testing all others for inclusion, stopping only when the new variables failed to improve R^2 or rendered existing variables insignificant (i.e., redundant). In some cases, a similar process was run to test distance-only variables. Tests of collinearity were largely not employed, as both VIF and Tolerance values were closely mirrored by changes in variable significance and were thus unneeded. The three models resulting from this variable selection process are discussed in the following chapter.

Modeling Techniques

This study uses GIS to visualize and geographically analyze data. The spiritual and digital descendant of overlaid transparencies, GIS allows one to join geographic pattern analysis to statistical analysis. GIS software displays data linked to a common location such as grid coordinates or latitude-longitude. The visual rendering GIS offers can reveal hidden patterns that statistical analysis would miss. This technology is employed across many professions and

sciences, including open-source applications such as Open Street Map[36] (Partridge *et al.* 2008; Gordon 2010; Shoval *et al.* 2011; Theo 2011). The studies cited here are but a small sampling of the works that employ GIS. It is already an indispensable tool of the modern world, and its unique capacities are what allowed this study to be conducted effectively.

ArcGIS was employed to perform geographic modeling analysis. Model Builder, available through ArcGIS, lets users visually connect preassembled analysis tools (scripts) to create a customized, repeatable model. It replaces direct programming code (e.g., Microsoft Basic, Python, C++) and is a boon for those who lack the ability or time to master coding. Four simple models were created for this study. The use of models was central to this project both because they reduced the number of interface-clicks (several thousand per full model iteration) and because they could be modified quickly to fine-tune analysis. The tools employed by this study are noted below (Table 7).

[36] Open Street Map is a collaborative mapping project that seeks to improve geographic data, particularly in less-mapped parts of the world. See http://www.openstreetmap.org/ for more information.

Append: Add the contents of secondary table to a primary table.
Calculate Field: Using a programmed expression, usually an equation, (re)calculate the value of a field (column) in a table.
Create Field (Delete Field): Used to create a new field (column) within a table.
Create Layer: Convert a shapefile into a layer file.
Feature Class to Feature Class: Given a selection of entries (rows) within a shapefile, or an entire shapefile upon which unsaved changes have been made (e.g., display colors or symbols), create a new shapefile.
Field Join: Using a field (column) common to two tables, permanently add (copy) a field from the accessory table to the primary table.
Iterator: Moves sequentially through a table, selecting one entry (row) at a time.
Near: Find the distance from each entry (row) in a shapefile to any valid location (e.g., point, line, polygon edge) that defines another shapefile.
Spatial Selection: Using a selected entry (row) and search criteria (e.g., 12 miles and "all features that intersect the selection"), expand the initial selection to include all valid entries that meet those search criteria.
Summary Statistics: Perform common analysis (e.g., mean, median, standard deviation) on a field (column) of data.
Table Join (Remove Join): Using a field (column) common to two tables, temporarily join two tables together.

Table 7: An explanation of model tools

The census data required additional work to prepare. Efforts were undertaken to integrate income data, which is collected separately from responses on age, ethnicity, gender, and housing. Efforts were also made to reduce distance inaccuracy in census polygons. Income estimates were found through the Census Bureau and joined onto the census table using fields common to the two tables. While it is clear why the Census Bureau measures income separately from its once-per-decade survey, the artificial divide remains inconvenient. Separately, distance inaccuracies were reduced by converting the census table from a polygon to a point shapefile[37]. This change meant that distances were measured from a uniform center point, not the nearest polygon edge.

[37] To accomplish this, open the table associated with the shapefile in the main window (ArcMap). Add two numeric fields, CEN_X and CEN_Y. Right-click on the top of each column, select Calculate Geometry, and select either "X Coordinate" or "Y Coordinate" as appropriate. Export the table as a database (.dbf), then add that file to ArcMap. Right-click on the new database and select "Display XY Data". From this temporary shapefile, right-click again and select "Export to Shapefile", creating a new name and selecting the point data type.

With both preparation steps completed, my study could proceed.

Four procedural models were designed for this project. The overarching goal of the models was to generate values that would otherwise be cumbersome or impossible to calculate manually. The first model served to create and fill multiple fields (columns), within both the census and survey tables. The second model linked copies of the third and fourth models, and contained the iterating function to complete the process. The third model generated zonal statistics, measuring the number of and values associated with businesses near each other. The fourth model determined the distance from the selected businesses to the center of each county and then generated regression variables based on that distance. Upon completion, the final data table was exported to SPSS for a series of statistical tests.

The first model was quite simple, employing only two tools. Designed as a setup model, it added fields (columns) to both the census and survey tables. Most of these fields were placeholders for later regression variables I wished to investigate (Tables 5-6). Individual fields that contributed to the design of this model design are noted below (Tables 8-9). The first model was not the focus of my development efforts, but is noted below.

1. Add Field
2. Calculate Field

Table 8: Workflow of the first model, focusing on table construction (*repeated*)

Cen_X, Cen_Y – The respective X- and Y-coordinates of the most-central point in each census polygon.
Fid_Copy – A copy of the survey table's feature identification (FID). This preserved the unique value of an entry (row) through iterations of a shapefile, allowing me to properly match pre- and post-processed version of the entry (row). By means of the *Append* and *Field Join* tools, this field became unnecessary.
JoinFld – A dummy field for joining tables with a value of 12345.
Dummy – A dummy field for calculating business count, with a value of 1. Used to calculate NrBis (*see below*).
Near_Dis – The distance from each entry (row) of the source table to the nearest entry of the secondary table. In the census table, this distance refers to an entry from the survey table.
Near_Fid – The feature ID associated with the nearest entry in the secondary table.
RoadDist – The distance from each business to major Kansas roads (*interstates, Kansas highways, and U.S. highways*).
Gravity Variables (e.g., *Pop025, 050, 100, and 200*) – Measures of population characteristics and travel distance. The numbers correspond to the distance exponent. Census categories measured included 2010 population (*Pop*), median income (*Inc*), gender (*Xy*, *Xx*), ethnicity (White only, or *Wh*), and age categories (Youth – ages 1-34 – or *Yth*, Middle-Aged – ages 35-64 – or *Mid*, and Elderly – ages 65 and older – or *Eld*).
TotalSeason, AnnTourInc – Variables derived from survey questions; the former by summing all four subsets of Question 4 (e.g., spring, summer), the latter by multiplying survey questions 5 and 8.
NrBis (e.g., *NrBis16, 32, or 64*) – The total number of all proximal businesses at a distance of 16, 32, and 64 Km (or10, 20, and 40 mi).

Table 9: Fields added to the survey and census tables

The second model managed the third and fourth models. Created to better streamline the use of parameters and for logistical reasons, the second model contained inset copies of the following two models (Figure 23). Each cycle of this model iterated through the survey table to create a new reference shapefile, then used using this reference to run three copies of the third model and one copy of the fourth model. Parameters central to all the models were set initially and kept uniform (e.g., the destination table and intermediate data folder). The nested design of this second model primarily allowed me to avoid unnecessary code duplication. Further, given

the many unforeseen program errors I encountered, it is likely prevented analysis delays.

The third and fourth models were similar in design. Working off parameters established in the second model these generated regression variables (Tables 5-6), modified the reference shapefile, and used the reference as the new entry in the destination table. The third model (Table 10, Figure 24) queried nearby survey (business) responses for information, creating zonal variables. Due to design constraints, it was easier to make this model focus on one search distance (e.g., 16 km) than to change that distance within the model. The fourth model (Table 11, Figures 25-26) queried data from the census table, creating gravity variables. Upon completion, this model appended the reference shapefile onto the destination table. Notably, I had previously attempted to Table Join the reference shapefile onto the original survey table using Fid_Copy. Only after repeated table mismatch errors was this successful workflow arrived upon, allowing analysis to proceed.

1. Iterator - Select the first (next) entry (row) of the survey table.
2. Feature Class to Feature Class - Makes the selection a separate shapefile for reference.
3. Feature Class to Layer – Make a temporary layer file out of the full business dataset (including non-responding businesses).
4. Spatial Selection – Select a local subset of entries (rows) from the full business dataset (layer file required).
5. Feature Class to Feature Class – Make the selection a separate, zonal shapefile.
6. Summary Statistics – Calculate values based on fields in the zonal shapefile. For this study, only Sum was used.
7. Add Field – Place a new dummy field in the Summary Statistics table (JoinFld).
8. Calculate Field – Make the value of JoinFld 12345.
9. Field Join – Using JoinFld, add the Sum_Dummy field from the Summary Statistics table to the reference shapefile.
10. Calculate Field – Copy value fields from Sum_Dummy to a better-named field in the survey table (e.g., NrBis16, 32, or 64).
11. Delete Field – Remove the Sum_Dummy field from the survey table.

Table 10: Workflow of the third model, focusing on zonal statistics (repeated thrice)

1. Iterator – Select the first (next) entry (row) of the Survey table.
2. Feature Class to Feature Class – Makes the selection a separate shapefile for reference.
3. Near – The distance to the reference shapefile is added to the census table.
4. Calculate Field – Generate initial regression variables (e.g., Inc025), stored on the census table.
5. Summary Statistics – Calculate values based on the new census data fields (columns). For this study, the value of the columns was summed to produce Sum_*Field*[*xx*].
6. Add Field – Place a new dummy field (JoinFld) in the Summary Statistics table.
7. Calculate Field – Make the value of JoinFld 12345.
8. Field Join - Using JoinFld, add all Sum_*Field*[*xx*] fields from the Summary Statistics table to the reference shapefile.
9. Append – Add the reference shapefile as a new entry (row) to a new table. This table must be manually generated by partially running the whole model to generate the correct field name agreement.

Table 11: Workflow of the fourth model, focusing on demographic variables

Chapter V:

"Cum Hoc, Ergo Propter Hoc" (*With This, Therefore on Account of This*)

The patterns described by the analysis are noted in this chapter. This includes the relative predictive strength of regression variables for each model run, the correlations and statistics of the survey data, and the comments made by business owners during interviews.

Regression Analysis

The clearest prediction arose from the first analysis. This model sought to predict the number of travelers to a given agritourism operation (Question 5, Figure 7). All variables except income (e.g., Inc025, 050, 100, and 200) and RoadDist displayed positive correlations with dependent variable, and only a few had weak ones (Inc[*xx*], Q2, Q4, and TotalSeason). Excluding gravity variables, the best predictors were Q8 (r = .412), Q10 (r = .395), and NrBis16 (r = .293) for a net R^2 value of 0.539. Nearly all distance variables had similar correlation values ranging from 0.375 to 0.485, on par with the stronger survey variables. However, overall R^2 values for distance variables alone typically peaked at or below 0.250. In both the mixed and distance-only models, NrBis16 and 32 were effectively equal in strength. These analysis indicate that tourist count is most influenced by the available population, the balance of farming and tourism, presence of nearby businesses (within 32 km), and prices charged. Consistently strong correlations among population variables meant that no definitive gravity variable emerged. Of all the models, this one most confirms the results in the literature and to my hypothesis.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	Sig. F Change
1	.403[a]	.163	.147	.96656	.163	10.496	.002
2	.494[b]	.244	.215	.92710	.081	5.695	.021

a. Predictors: (Constant), sum_xx100

b. Predictors: (Constant), sum_xx100, Log_IG100

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.867	.308		6.066	.000
	sum_xx100	6.794E-5	.000	.403	3.240	.002
2	(Constant)	26.364	10.270		2.567	.013
	sum_xx100	8.705E-5	.000	.517	4.021	.000
	Log_IG100	-5.861	2.456	-.307	-2.386	.021

a. Dependent Variable: Log_Q5

Figure 7: Regression results, first model

The prediction of self-reported income was far less reliable. In contrast to the previous model this analysis sought to predict broad categories of tourism-related income (e.g., 0-20%), i.e., the balance of farming and tourism (Q10, Figure 8). In descending significance the best predictors were Q5 (r = .571) and NrBis32 (r = -0.230), with an R^2 value of 0.226. There were no other good predictors, though Q2, Q9, and the gravity variables measuring income were very close to being significant individually, carrying negative correlations on all but Q2. Note that NrBis32, statistically insignificant on its own, entered the equation only following Q5 suggesting that it has a much weaker relationship with income than with population. These results indicate that the most profitable operations tend to be spatially isolated, have a higher number of lower-income customers, be well-established, and favor non-internet advertising. Overall, the most

"touristy" agritourism venues seem to behave in a similar manner to other major tourist attractions like theme parks.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	Sig. F Change
1	.504[a]	.254	.226	22.224467121	.254	9.017	.000

a. Predictors: (Constant), Fourth_NrBis32, Log_Q5

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.786	13.146		1.125	.266
	Log_Q5	13.786	3.258	.571	4.231	.000
	Fourth_NrBis32	-12.691	7.463	-.230	-1.700	.095

a. Dependent Variable: Q10_AInc

Figure 8: Regression results, second model

The final model was similar to the second one. This model focused on annual tourism income but through total gross income, i.e. the ability of agritourism to financially support an entrepreneur (AnnTourInc, Figure 9). Most distance variables were not highly correlated with the dependent variable except income (e.g., Inc[*xx*], excluding Inc200). In the model, the best predictors were Q10 (r = 0.370) and Q2 (r = 0.244). Two gravity variables beat out NrBis[*xx*] to take third place; Inc050 and Inc100 were nearly tied with an r value of -0.222 and an R^2 value of 0.273. Unlike the other models, distance variables held much more influence here than most survey variables. Generally, the most successful businesses were usually the ones that garnered (or expect to garner) the most tourism income and had been established the longest. Available income strongly contributed to profits, but available population did not.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	Sig. F Change
1	.553[a]	.306	.266	.68576	.306	7.627	.000

a. Predictors: (Constant), Sqrt_Q2, Log_NrBis16, Q10_AInc

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.365	.321		10.477	.000
	Q10_AInc	.012	.004	.385	3.251	.002
	Log_NrBis16	.388	.218	.208	1.783	.080
	Sqrt_Q2	.170	.073	.276	2.319	.024

a. Dependent Variable: Log_AnnTourInc

Figure 9: Regression results, third model

Overall, distance variables were not that important in my models. Despite having moderately significant correlations individually, they turned out to be weaker predictors than survey responses. Sub-models with only distance variables typically produced R^2 values less than half that of the main models. The best predictors among the gravity variables were *Field*100 and *Field*050 (for population and income, respectively). Among non-gravity variables, NrBis16 and NrBis32 were consistently the strongest, with RoadDist placing a close second in predictive weight. In retrospect, the choice of gravity variables (Table 5) could have been broader in type, but the focus on income and population highlights an obvious conclusion: the best predictor of a type of variable is often itself (e.g., income predicts income). In economic geography, however, traditionally important variables (e.g., income, population, and prices) still reign supreme.

Maps of the variables displayed these patterns. Variables tended to be either

geographically skewed or completely unaligned, with spatial patterns paralleling their predictive power. Nearly all variables relating to business location and available population (Figures 12-14) had higher values near larger urban centers, usually located in the eastern part of the state. Only Xx025 (Figure 15), which was miscoded, broke this mold by displaying an identical pattern to Inc050 (Figure 16) with more central areas having the highest values. In contrast, Inc100 (Figure 17) mirrors a chain of urban centers. Unlike population, median income is more evenly distributed across the state. Thus, the best geographic explanation for the pattern of Inc050 is that more central cities have access to greater population pools than those on the edge of the map.

Secondary variables displayed more random patterns. As noted in the survey analysis below, many variables correlated with each other to create larger meta-patterns. Some patterns formed more obvious patterns than others; for example, those businesses that most relied on tourism for their annual income (Q10, Figure 18) were typically those that derived the most income from that trade (AnnTourInc, Figure 19). The locations that tourists spent the most money at per person (Q8, Figure 20) only partially overlapped with those where business relied heavily on internet advertising (Q9, Figure 21). Finally, the distribution of long-duration business (Q2, Figure 22) was evenly distributed across the state. Each of these patterns displays relatively little geographic bias, likely having more to do with business characteristics (e.g., type of offering, years of experience, owner personality) than patterns of urban settlement or road location. A more thorough study of these variables and their relationships would likely require a separate, more focused study.

The behavior of the distance variables confirms most of my hypothesis. Distance measurably affected the economic outcomes of agritourism, influencing population much more than income. This was true for the demand decay as measured by gravity variables; the distance

from major roads (RoadDist); and the presence of nearby businesses (NrBis[*xx*]). Against expectations, there were mixed correlations with NrBis[*xx*] (positive for population, negative for income). For the former, moderate distances (e.g., 16 or 32 km) were the best predictors, as anticipated. All correlations with RoadDist were negative. I suspect that income was less influenced than population because income is a travel enabler, while population must be is enabled (Keating & Kriz 2008; Nicolau 2008; Hooper 2014). The effect of business agglomeration is less easy to explain. It may be that by choosing to measure individual business outcomes instead of grouped business outcomes conceals close parallels between them.

My hypothesis for the survey variables can be more simply stated. Each of my predictions were confirmed: Q2 and Q9 had a negative relationship, TotalSeason was a poor income predictor, and Q8 had a mixed relationship with the dependent variables. Q8's relationships were influenced by its bimodal nature, and could have been better explored here had I broken it into separate variables before analysis (as with NrBis32 and 64). Long business tenure correctly went hand-in-hand with word-of-mouth advertising, while long open seasons were confirmed to be more of a convenience to customers than businesses. Overall, my hypothesis and the results from the literature were confirmed by the survey responses.

Negative relationships between available income and realized income were somewhat puzzling. One would expect rising fortunes to be associated with greater tourism patronage, but that was not the case with agritourism. The best explanation may be that tourism as a whole benefits from rising available income, but that different portions of the tourism market benefit differently. Recall that when discussing market access (Chapter 2), increasing availability of a type of tourism can shift patronage instead of decreasing market share (Mckercher & Lew 2003). Most likely customers patronize new types of entertainment as they become wealthier, a

supposition supported by the low spending favored by most agritourism patrons (Q8) in this study. Despite some outliers (e.g., hunting outfitters or wineries), the lower-income demographic seems to be the best market to target by agritourism operators, even "touristy" ones.

Survey Analysis

The survey contained twelve informative research questions. Two of them were important for my primary hypothesis: estimated tourist count (Question 5) and money spent per tourist (Q8). These allowed me to estimate annual tourism income, my initial dependent variable. Both questions exhibited highly skewed responses with most of the data falling on low values, resulting in a similarly skewed product (AnnTourInc). If the values reported by business owners were correct, the results seem to confirm the observation found in the literature that most agritourism operations do not produce high profits (e.g., $5-10,000 annually). Survey responses were inconsistent enough to confirm sub-groupings of provider types (Q7), however; this is a problem that could be remedied with a better-understood classification scheme that more closely matched advertised offerings.

Estimated tourist count (Q5, Figure 10) covered a wide a range of values. Due to the difficulty in guessing appropriate categories, the only available answer to this question was "Other". Respondents were armed only with the instruction to count groups as individuals, not groups. Results varied wildly, with values a low as 4 (horseback riding) and as high as 30,000 (a winery). Duplicated responses (two surveys, one business) were often wildly disparate, such as 35,000 and 100,000. The median value was 500 tourists. Low counts could indicate a very poor business, a business that catered mostly to groups (e.g., weddings or hunting) that did not follow instructions, wild guesses, or some combination of the three. For future surveys, it would probably be worthwhile to determine categories for this question, no matter how difficult.

Statistics

Q5_ToCnt

N	Valid	56
	Missing	0
Mean		5,277.38
Median		625.00
Minimum		4.00
Maximum		100,000.00
Percentiles	25	73.75
	50	625.00
	75	3,400.00

Statistics

Q8_EacSp

N	Valid	56
	Missing	0
Mean		253.82
Median		35.00
Minimum		8.00
Maximum		2400.000
Percentiles	25	18.00
	50	35.00
	75	120.00

Figure 10: Response statistics to survey questions #5 and #8

Typical customer spending (Q8, Figure 10) provided more consistent responses. Unlike the previous question these responses could be codified into categories, simplifying the survey for respondents. These categories reflect products ranging from keychains to full-service hunting expeditions. The grouped responses were $1-5 (1), $5-10 (7), $10-25 (16), $25-50 (8), and $50-150 (12). Responses in the "Other" category were as high as $2,400, but median expenditures were approximately $35. As with Q5, this question does not mean as much individually as it does in association with other responses. To wit, there are likely profiles of offering types that attract ranges of customers at a certain price. The response to this study was not robust enough to provide an adequate context to determine much more at this juncture.

Other questions addressed the secondary hypothesis and explanatory variables. These questions provided alternate insights into the non-business character of agritourism. These questions fell into rough groupings: *business history* – working farms (Q1), length of business

operation (Q2), and primary business season (Q4); *business characteristics* – of customers (Q6) and operations (Q7); *income streams* – internet-related (Q9) and agritourism-related (Q10); and *agritourism opinions* – why start it (Q3), current conditions (Q11) and future support (Q12). Some of these questions may contain internal correlations or contribute incidentally to the regression model, while others may simply be interesting. An analysis of each grouping follows.

Working farms (Q1) display a marked degree of authenticity and pride. A working farm is one that is still active in cropping or ranching, and often has been for generations. For many owners, such longevity is a point of pride; for visitors, it provides a degree of authenticity that an amusement park cannot match. Nearly all operations (49) reported "yes" in this category. Based on typical survey behavior, this may mean that these are the more optimistic among respondents, happy to share a history of which they are proud. Alternately, the figure could indicate that most agritourism operations are working farms.

Length of business tenure (Q2) reflects a combination of success variables. Good products, location, and timing give a business a foothold and how long the business will persist. Among responding businesses, 10 had been around for 1-5 years, 17 for 5-10 years, 16 for 10-20 years, and 13 for 20-35 years. Given that most businesses fail within a few years (Brownlee 2014), I expected to see most respondents in the 1-5 years category, but the majority reported long-term success. This may have to do with pride, as in the previous question: a failing business owner is less likely to talk about their failures than a successful one.

Seasonality (Q4) trended towards single-season, fall offerings. No significant correlations were observed with this variable, but clear trends emerged. Comparing the trends among the four subset variables (dummy variables), spring and summer had the strongest positive trend (.17) while winter had the only negative trends, most negatively with summer and winter (-.24, -.09).

Half (27) of responders were open only one season, while a quarter (13) were open three or more seasons (TotalSeason). Offerings were most common in the fall (39), with spring and summer nearly tied (24, 26, respectively) and winter attractions being the least common (13). Operation owners seem to schedule attractions when they are done with harvest, effectively milking visitors to add to the holiday "bonus" fund. A larger number of open hours seems to be more a convenience for the customer than a business necessity.

Certain demographic groupings (Q6) were observed more than others. These groups often correspond to demographic groups associated with local, slower-paced tourism in the literature. Youth, including teens and young adults (1, 8, respectively), are only infrequently seen as compared to the middle-aged couples, couples with children, the elderly, and elders with grandchildren (32, 20, 22, 19, and 13). Tourist groups tended to be composed of more men than women (13 vs. 4) and those of modest means over more wealthy ones (26 vs. 16). Finally, businesses were more likely to see distant travelers than local faces (26 vs. 19). These observations tell the story of agritourism as an activity primarily oriented to mature to young families, and as a secondary ("drive-by") tourist destination. This finding seems to support the idea that distance matters, but not the way I anticipated.

Observations of business offerings (Q7) were relatively confused. Determining the business offerings tendered different results depending on whether the website or business owner was consulted. Event hosting, farm tours, guided expeditions, and lodging (21, 20, 17, and 16, respectively) were the most popular reported activities, with farm animal experiences, horseback riding, seasonal, and you-pick attractions bringing up the rear (11, 3, 13, and 10). These observations did not match the notes I detailed in the initial web search. For example, I expected you-pick and seasonal attractions to be much more popular. It may also be indicative of outdated

websites.

Customers (Q6) appear to fall under two major groupings. Statistically significant correlations describe two groupings, roughly conceptualized as the RV traveler and the day tripper. The RV traveler is likely to be middle-aged or older, have more income, be male, and travel farther for entertainment or visits. In contrast, the day tripper is likely to be middle-aged or younger, have less income, be female, and choose closer destinations. Only the second group is commonly observed in the literature (Oppermann 1996; Kim *et al.* 2007; Carpio *et al.* 2008). It is possible that these two groups could form distinct demographics for businesses to target, given sufficient marketing. It is also likely that these groups correspond to the activity clusters noted below.

Agritourism offerings (Q7) fall under parallel groupings. Just as customers tend to fall into profiles, certain types of farm activities tend to cluster. Unlike demographics, activity clusters are likely more based on convenience and the PITR[38] standard. The low-risk cluster involves farm tours, you-pick crops, and seasonal attractions. These require relatively little effort and often charge low fees. The higher-risk cluster involves a looser grouping of farm experience, hunting, horseback riding, lodging. These activities involve more extensive customer liability or costly animal maintenance, and cost a correspondingly larger amount. While the higher-risk activity cluster has few positive correlations within itself, it has negative correlations to the low-risk cluster to suggest it exists, especially when examining the website listing of offerings.

Correlations exist between the three questions (Q4, Q6, Q7). These correlations suggest larger meta-groupings of characteristics. Businesses with winter offerings show a demographic

[38] PITR: Pain in the Rear. Farms, like all businesses, are an endless series of minor and major chores whose sum hopefully ends up in profit. Some chores are more profitable or necessary than others. When the right balance of annoyance and income meet, a final set of activities and products defines the business (*Credited to an unknown discussion or interview*).

grouping of higher-income, older, non-local patrons who often patronize hunting and lodging offerings. Summer attractions (e.g., u-pick, seasonal, tours) frequently attract younger, female visitors with average income and local residences. Middle-aged patrons and business with fall offerings fall into both groups. These two major meta-groupings seem to highlight seasonally-appropriate activities and typical customer bases alike. As such, they can form the basis of future advertising efforts and agritourism development.

Web presence (Q9, Figure 11) is increasingly important to attract customers. While well-established businesses can rely on customer loyalty and word of mouth, business that cannot be easily found on a smartphone and GPS unit cannot be easily patronized today. Half of respondents (27) indicated that they received only 0 – 20% of their business from internet contacts or sales. Others indicated internet incomes ranging from 20 - 40% (10), 40 - 60% (9), 60 - 80% (4), and 80 – 100% (6). According to the literature, operators rely heavily on word-of-mouth and newspaper ads, but tourists rely on hotel brochures and webpages (Ryan *et al.* 2006). Most respondents (businesses) acted according to the literature, with only a few using web bookings (e.g., weekend-long hunting or wedding bookings). The divide may arise from type of offering and length of business tenure; new businesses have to fight to gain ground, while establishes ones do not. It may also have to do with difficulties in gaining a Web presence, let alone an accurate one given the inconsistent nature of Google or Yelp business reviews.

Gross income from agritourism (Q10, Figure 11) follows similar patterns. Most studies report that agritourism income is typically supplemental at best, with the exception of big operations like wineries. Using a similar scale to the previous question, half (29) of respondents indicated that 0 – 20% of their gross income came from agritourism. Others indicated 20 – 40% (14), 40 – 60% (6), 60 – 80% (2), and 80-100% (5) of their revenue flow. These results beg the

question: what will it take to make agritourism beyond a less-than-subsistence income? The only solutions found so far have been becoming bigger or becoming a tourist trap. Neither is ideal for existing small operations that want to maintain their heritage or way of life.

Statistics

Q9_InInc

	Missing	0
Mean		32.86
Median		30.00
Minimum		10.00
Maximum		90.00
Percentiles	25	10.00
	50	30.00
	75	50.00

Statistics

Q10_AInc

N	Valid	56
	Missing	0
Mean		28.57
Median		10.00
Minimum		10.00
Maximum		90.00
Percentiles	25	10.00
	50	10.00
	75	30.00

Figure 11: Response Statistics to survey questions #9 and #10

Most operations were started for financial reasons (Q3). Across most agritourism studies, more income was the most-often cited reason for looking into tourism. For my study, half (30) of owners took the leap to gain more revenue. Less common were the three alternate responses: something to keep them busy during retirement (11), a career change (6), and because it seemed interesting (5). Like all choices, the last three were drawn from a combination of the literature and my interviews. While multiple responses were allowed by the survey, very few respondents selected more than one option. This thinking may reflect a very pragmatic way of living.

The final opinion questions queried the business atmosphere surrounding agritourism. Kansas has done more than many states to enable agritourism (see Chapter 2), but could always do more. Most (39) respondents were optimistic about current business conditions (Q11) and a quarter (18) had a mixed opinion; few (2) were pessimistic. Asked about future expansion

options[39] (Q12), most (37) were for additional state support while the rest were split between a mixed opinion (7) and contentment with current opportunities (8). These responses seem to indicate that Kansas is doing a good job of extending what state support it can.

Interview Analysis

The five interviews conducted for this study broadened my understanding of the literature. They suggested new threads of inquiry and confirmed patterns in the analysis. Future studies would benefit from interviews with other business owners, city planners, politicians and promotors.

Bismark Gardens[40] is located near Lawrence, KS and operates as a farm-side market operation, giving tours on rare occasions. Its owner Mary Ross entered into agritourism in 1982 to supplement poor crop prices, gradually increasing, then scaling back operations. Her variety has expanded beyond her initial strawberry patch (now discontinued) and presently includes common summer crops like corn and peppers (Ross 2012).

The Circle-S Ranch[41] is located near Lawrence, KS. Once a cattle ranch, owner Mary Kronimer converted it into a B&B in 1998. From there it quickly transitioned into a site hosting weddings and conferences, and has won well-deserved awards for its quality. In addition to its main business it offers horseback riding, spa services, a walking trail, and a gift shop. It retains its herds of livestock (buffalo, cattle, and horses), as sources of income and as a viewing pleasure

[39] Expansion options could include a better-built and maintained agritourism website, custom maps of regional attractions placed in the pamphlet bins of hotels and rest-stop restaurants, and quality road signs pointing lost drivers to rural attractions. See Comen (2006) for additional information.
[40] http://bismarckgardens.com/. The street address is 616 N 1700 Road; Lawrence, KS 66044 and the phone number is (785) 727-5512. To arrive go north on Hwy 59, then east on Lyon Street, following it to E 1600 road. Head north on that road to N 1700 road, and turn right.
[41] http://www.circlesranch.com/ . The street address is 3325 Circle S Lane; Lawrence, KS, and the phone number is (785) 843-4124. To arrive go north on Hwy 59 and follow Hwy 24 north. Go north on County Route 1045 (Wellman Road). Take a right on 35th Street, then another right onto Circle S Lane.

for guests (Kronimer 2012).

Pendleton's Kaw Valley Country Market[42] is located near Lawrence, KS and is open year round. One of the five local farms that started the Lawrence Farmer's Market in 1981, owner Karen Pendleton's first product was locally-grown asparagus and other "alternative crops" (i.e., those not usually grown locally). Over the years she has expanded to sell popular crops (e.g., sweet corn), flowers, and bedding plants and additionally features a native butterfly garden, gift shop, and entertainment for kids. It operates as a u-pick and farm stand operation that give tours. It is also active in the educational and farm community, such as through sponsoring materials and field trips for local 4th grade students (Pendleton 2012).

Strawberry Hill Tree Farm[43] is located near Lawrence, KS. Purchased in 1972 by Eric Walther as a career change and place to retire, it first started selling Christmas trees in 1984 and has operated continually, in large part because of consumer demand and generational memories. Agritourism in name only (to avoid liability), it offers trees, hot cider and cookies, and a small gift shop throughout the winter season (Walther 2012).

Victorian Veranda Country Inn[44] is near Lawrence, KS. Established in 1999 by owner Roy Phillips, its initial ambitions were much greater before curtailing to a few core activities. Today it offers a year-round B&B and hosts a few dozen weddings annually (Phillips 2012).

Tourism works best when the entrepreneur is socially inclined. This includes starting an operation and managing day-to-day business. Ross started out optimistic, but eventually soured

[42] http://www.pendletons.com/. The street address is 1446 E 1850 Road; Lawrence, KS 66046 and the phone number is (785) 843-1409. To arrive, take 23rd Street (K-10) east of town and turn north on County Route 1057. Go west on N 1400, then north on E1850. Alternately, take 15th Street (N 1500) out of town then turn south onto E1850.
[43] http://www.strawberryhillchristmas.com/. The street address is 794 Hwy 40; Lawrence, KS 66049 and the phone number (785) 331-4422. To arrive go west on 6th Street (Hwy 40) west of town. It is just past the K-10 interchange.
[44] http://www.vcountryinn.com/. The street address is 1431 N 1900 Road; Lawrence, KS 66044 and the phone number is (785) 841-1265. To arrive go north on Hwy 59, follow Hwy 24 north, and go west on N 1900 road.

after enough customer interactions. Phillips started because he thought it would be fun, and still enjoys it. Kronimer commented that people tired her out as much as cattle, but in a different way that suited her personality.

Agritourism operations have different commitments to tourism and ways of attracting customers. Walther and Phillips have transitioned from mostly full-time work to full-time tourism. Pendleton splits her time roughly equally between farming and tourism, with an unclear dividing line. Kronimer spends nearly all her time on tourism, while Ross does the same for her farming. For advertising the u-pick and market stand farms mostly relied on word of mouth, while the wedding hosts booked the bulk of their business online. Ultimately, the goal is to provide a satisfying and satisfactory experience, one just good enough to attract and please people. For those owners who can manage this feat, the likelihood of success increases.

Income is not always evenly spread through the year. Ross and Kronimer get steady income all throughout the summer and fall while Pendleton's customers come most frequently in the spring and fall, with a dead time over the summer. For Pendleton, a longer season is primarily a customer convenience; her income could well be the same as a popular site with a 5-week season. Phillip's and Kronimer's income, largely derived from weddings, have the advantage of being scheduled (and only rarely cancelled). If tourism income can complement and stabilize unstable farm income, it seems to be doing its job.

Support for individual agritourism activities depends on foot traffic and popularity. Many businesses (especially farms) have a few primary products that make most of their money, with other products breaking even or losing money. Not every product may fit each customer, but variety acts as a source of attraction. Phillips indicated that he had to cut away non-essential activities when their level of use did not support their cost. Pendleton and Kronimer have been

moving in the opposite direction, gradually expanding their offerings. That said, both Walther and Pendleton would like to trim back certain activities, but customer expectations hinder this. Finally, farmers markets and sales to restaurants can be worthwhile for farms with long growing seasons and sufficient low input costs (especially finicky "alternative" crops).

Community outreach is one venue for attracting attention to agritourism. Groups like the North American Farmer's Direct Marketing Association (NAFDMA) can offer business support, while Slice of Ag informs people of all ages about the origin of food. Farm Family Trip, essentially paid lecture tours for farm families, is a long-distance type of outreach.[45]. Outreach can also cause unintentional harm. Ross and Pendleton both indicated that the local fresh produce market is a victim of its own success. Every grant to a first-time farmer and new community garden adds more cheap produce to the local supply. Career farmers have problems making a profit in such a context, similar to the effect that recent Uber ride sharing has on taxi drivers (Henwood 2015; Liss 2015). Thus, the type of outreach should be carefully researched before implementation in order for it to have its intended effect.

Finally, politics and communication can greatly influence economic outcomes. Phillips and Walther noted that for Kansas legislators, agritourism is a buzzword that they can talk to their constituents without making a real financial commitment. People need to talk with each other for the system to work because everyone has their own goals: customers want great deals and an experience, at convenient hours; owners want assistance but not interference, especially disliking higher taxes; politicians want ideas to promulgate, but often underfund in-depth research; and researchers love to study, but few non-academics read their work. Agritourism

[45] Surprisingly, Pendleton reports that inner-city kids knew much more about farming than country kids did. Questions like "does chocolate milk come from brown cows" were more likely to come from more-rural Midwest kids than those in a large eastern city. In contrast, Midwest kids learned about things like rainforests.

businesses could also do with talking to, and referring customers between, each other. Such communications would build the trust required to grow a community and improve policies.

Chapter VI:

"Ratum et Consummatum" (*Confirmed and Completed*)

This study was premised on the idea that distance could be tested as a quantitative predictor of economic outcomes. The geographic literature indicated this was likely to be true. Using rural tourism (agritourism) businesses in the state of Kansas, I found distance to have some effect, but its influence was less important than the characteristics of the business in question. However, hidden within this unexpected result there were interesting patterns. What follows is a review and discussion of the literature, methods, and findings of this study.

Background and Methods (Chapters II–IV)

Agritourism is a type of business organization that commercializes the rural setting, simultaneously sustaining traditions while developing new ones. Agritourism is defined as "visits to farms, ranches, and other agricultural locations for the purposes of recreation", and can include anything from u-pick patches to hunting expeditions to rural bed and breakfasts. Often located on small farms or as small parts of larger farms, these small-scale family operations typically provide supplementary income to support inconsistent sales of agricultural products. (Carpio *et al.* 2008).

Popular agritourism is the legacy of the large-scale career shifts, mechanization of agriculture, rural land consolidation, and urbanization. Higher urban incomes have led to greater demand for entertainment, and people primarily raised in urban settings began looking to the countryside for amusement. Mostly out of necessity, some farmers chose to provide this entertainment. By making themselves into salesmen these farmers started to commercialize the rural atmosphere as much as their traditional way of life. In the oft-tempestuous face of nature

and efficiency-oriented crop markets, the ability to sell sweet corn as an experience or at a higher price can be a godsend.

Rural tourism development is hindered by spatial isolation. Cities generate more investment than farmland because they host more people, higher incomes, lower transportation costs, and greater concentrations of high-skilled workers (i.e., higher profits). Income generated by rural territories and smaller cities mostly flow toward larger urban centers. Greater isolation has measurably negative effects on job growth, an effect enhanced by inferior infrastructure. For less-developed regions to grow some form of local profit capture is often required.

Quantitative models have guided this study's understanding of space. Spatial interaction models use population, purchasing, production, and transportation to explain geographic patterns. The models explored include: input-output models, which measure total use and production over regions; central place theory, which explains business location and urban sprawl; and gravity models, which this study employs heavily. Each of these models contributed conceptually to the variables used in later regression models.

Gravity models are economic models derived from Isaac Newton's equation of gravitational force. They commonly predict the flow of population or income over space, using measures such as cost-of-living and transportation costs. My study employed a simplified version of these models in order to quantify the summed effects of distance on foot traffic and the overall income of agritourism operations in Kansas.

The demand for tourism decreases with distance from the tourist's origin. Widely known as distance decay, this observation makes some locales are more attractive others – a combination of regional rarity or uniqueness, accessibility difficulties, and the feeling of being away from home. These ideas are echoed by central place theory and the concept of market

access. Similarly, a fusion of impeding terrain and uneven development can create tourism exclusion zones. A given business's market share, agritourism or otherwise, depends on the delicate balance of enabling traits (within a population) and business offerings. Total travel distance controls the balance of these traits.

The effects of distance were the focus of this study. Using existing web resources, an updated database of approximately 500 providers in Kansas were sent a custom-built survey. 61 completed responses were returned, and 56 responses were processed for response frequency and linear regression. These were modified and expanded using ArcGIS and SPSS, software for geographic and statistical processing respectively. These modifications primarily collected and summed the survey data. Additionally, 2010 data from the Census Bureau were utilized for each county and transformed using a dynamic measure of distance. Many resulting variables were transformed to meet the parametric assumptions of linear regression.

Results (Chapter V)

Data analysis indicated that business and consumer characteristics were the best predictors. The dependent variables from one model were often among the strongest variables predicting other dependent variables, with prices (Question 8) and expected income (Q10) predicting foot traffic (Q5), and foot traffic (Q5) predicting income (Q10, AnnTourInc). Other survey questions such as the length of business tenure (Q2), open business seasons (Q4), total season length (TotalSeason), and internet presence (Q9) were much weaker variables. These results reinforce the idea that researchers have been right to rely first on traditional economic "heavyweights" (money, people, and prices) as model variables. All of the variables, whether derived from the survey or ArcGIS models, reveal interesting patterns in the data.

Q5 ← 0.412 (Q8) + 0.395 (Q10) + 0.286 (NrBis16 / NrBis32)	$\mathbf{R^2}$ = 0.545
Q10 ← 0.517 (Q5) - 0.230 (NrBis32)	$\mathbf{R^2}$ = 0.226
AnnTourInc ← 0.370 (Q10) + 0.244 (Q2) - 0.222 (Inc50 / Inc100)	$\mathbf{R^2}$ = 0.272

Table 12: Final model equations

Distance variables were only moderately good model predictors. Despite clear anecdotal and research evidence to the contrary, distance was never a primary variable. The analyses included accessibility to major roads (RoadDist), the number of nearby agritourism businesses (NrBis[*xx*]), and distance-modified census values (e.g., Xy050). Using a circular search radius of 16 and 32 km, NrBis was typically the strongest distance predictor. RoadDist and NrBis64 were runner-ups. Sum variables were either highly correlated or not at all. In general, income (e.g., Inc50) best predicted income (Q10, AnnTourInc) and population (e.g., most Sum variables) best predicted foot traffic (Q5). Of all these only NrBis was consistently entered into most models, both as a negative and positive variable. This proves that while travel distance is never a primary model variable, it always mattered enough to tangibly affect economic outcomes.

Most businesses were of modest means. Typical respondents were working farms (Q1) that had been in business from 5-20 years (Q2), had relatively few customers (Q5), and did not make much money from tourism. At least half started into agritourism for the money (Q3), were open only one season (Q4), and got 0-20% of their customers from web contacts and income from tourism (Q9, Q10). Most were optimistic about current agritourism conditions in the state, but would like to see more state support through advertising, funding, or outreach (Q11, Q12). These results paint the picture of a nascent industry, ready to step up should the public become sufficiently interested, but not one that is ready to stand on its own yet.

The regression patterns predict interesting trends. In most cases, more foot traffic is associated with increased business income, and vice versa. Nearly every variable caused an increase in foot traffic (Q5) with no one demographic group carrying greater weight. In the

second and third models, tourism income rose with business tenure (Q2) but fell with web bookings (Q9). Being near areas with higher median income seems to be a hindrance, likely because rising available income enables consumers to include more non-agritourism entertainment choices into their life . This pattern groups agritourism businesses into two classes: mature (larger, well-known) and nascent (smaller, less-known). Initially advertising and clustering near similar operations are important, but gradually word-of-mouth and reputation take over. To achieve the best economic outcomes, a business is effectively required to scale back farming and replace it with retail tourism. What is a boon in the short-term is a bane in the long-term, as one seeks to distinguish one's business from others.

Survey correlations confirm the groupings of characteristics. Clusters of traits were associated with farm season (Q4), customer traits (Q6), and offering types (Q7). Business offerings typically fell into high-risk (e.g., horseback riding, hunting, lodging) activities in the winter and low-risk (e.g., farm tours, seasonal, you-pick) activities in the summer; fall attractions, the most popular, bridged both groups. Customers were often the RV Traveler (male, older, better-off, non-local) and the Day Tripper (female, younger, average means, local), with middle-aged tourists joining either group. While an interesting set of patterns, my ability to do more than hint at their existence is limited by observation-based nature answers and questions that were poorly understood by respondents.

Looking Back, Looking Forward

During the analysis, the selection of Sum variables could have been improved. While the variables made a strong showing, the types of things they examined should have been broadened. Sum variables explored income (median household) and population (age, ethnicity, gender, and total) characteristics. Common to most models was a trend wherein the *Field*100 distance cohort

was the best population variable and Inc050 was the best income variable. In retrospect, the analysis could have been improved by including categories of variables (e.g., education). Nonetheless, distance looks to have a lesser effect on income (spending) than it does on foot traffic (customers), most likely from different geographic distributions. Compared to income, population distribution is much more weighted towards the eastern third of Kansas.

The gravity variables introduced a relative anomaly with interesting implications. Most of the gravity variables were coded as a total value divided by distance. Xx025 was mistakenly coded as a percentage value (i.e., subgroup / total / distance) instead, causing it to display a spatial pattern similar to that of Inc050. From an analysis perspective this error likely made little difference, as the *Field*025 variables only rarely impacted the models. The spatial pattern for mean, median, or percentage values may be markedly different, however. Subtle variations in local populations may reveal significant contributions to model results in future studies.

Many options were uncovered for future research in the area of agritourism. While few if any of these are likely to have an immediate impact on the financial futures of existing businesses, it may be easier to get a fix on what exists and how to change the situation incrementally. First, study areas could be scaled up or down, allowing for more information from a wider area (e.g., the Great Plains) and from smaller ones (e.g., KDOT territories). From past experience, re-scaling can sometimes realize better results. Second, it could help to get a clearer idea of land ownership (e.g., corporate, family, private) and parcel size, and how this relates to business fortunes. The main limitation with this approach is existing parcel mapping, whose spatial coverage is highly variable in Kansas. It would be beneficial to add to the regional and international understanding of a largely understudied industry.

Looking forward, the agritourism industry has growth potential. In Kansas and beyond,

customer awareness and patronage of the industry is growing. While agritourism consultant Jane Eckert anticipates a robust growth rate (30% from 2008 – 2018), cities and states will need to get involved if this is going to happen (Eckert 2008). In particular, it would be wise to resolve the problem wherein businesses rely on word-of-mouth and newspaper ads, while consumers rely on web presence and motel brochures instead (Ryan *et al.* 2006). Greater stakeholder communication would also aid in the cause (Phillips 2012; Walther 2012). If the work of agritourism researchers and free thinkers is anything to go on, in 20 years we will all have been bitten by the farm bug.

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Appendices

Appendix 1: Accessory Figures

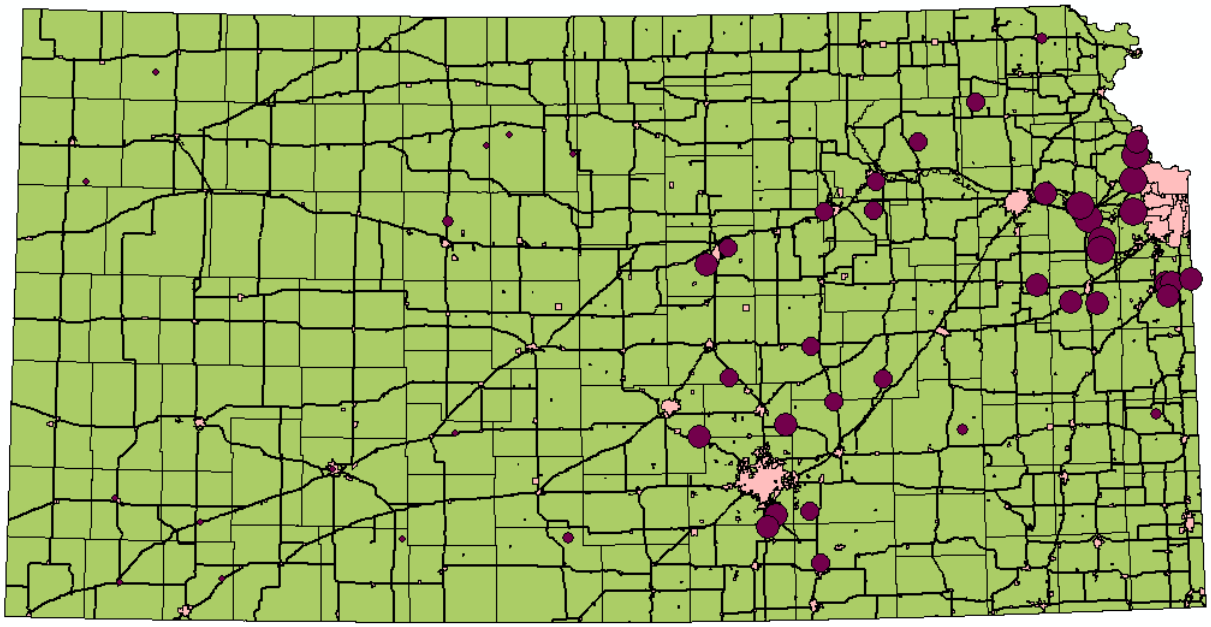

Figure 12: Pop100, similar to nearly every other gravity variable measuring population

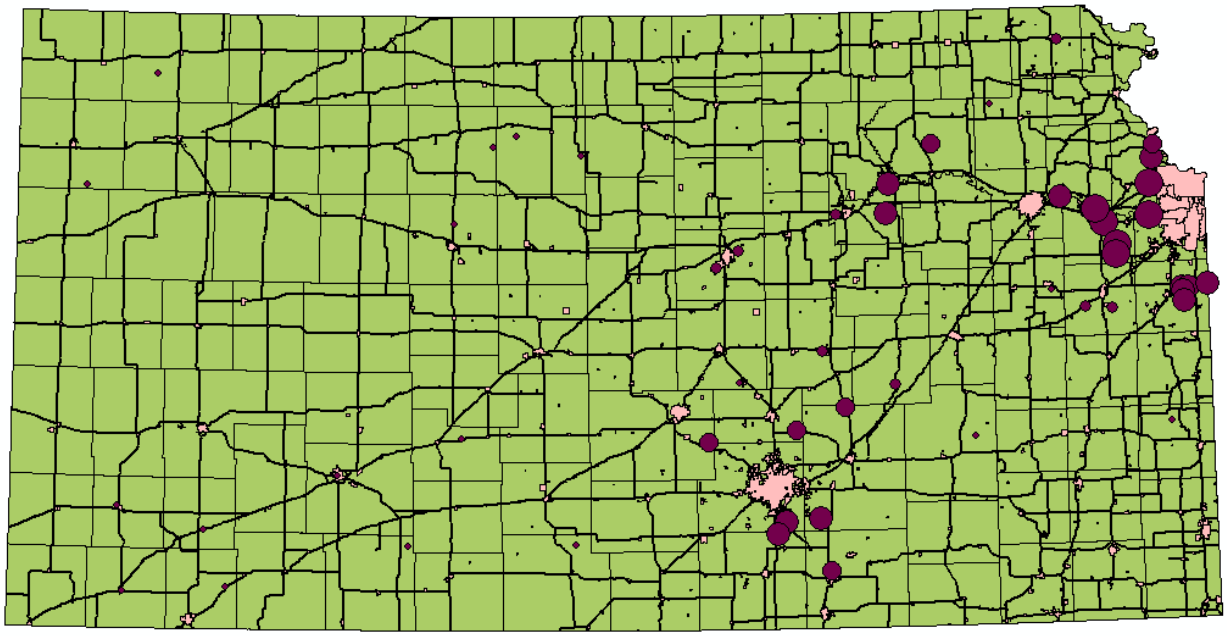

Figure 13: NrBis32, similar to NrBis16

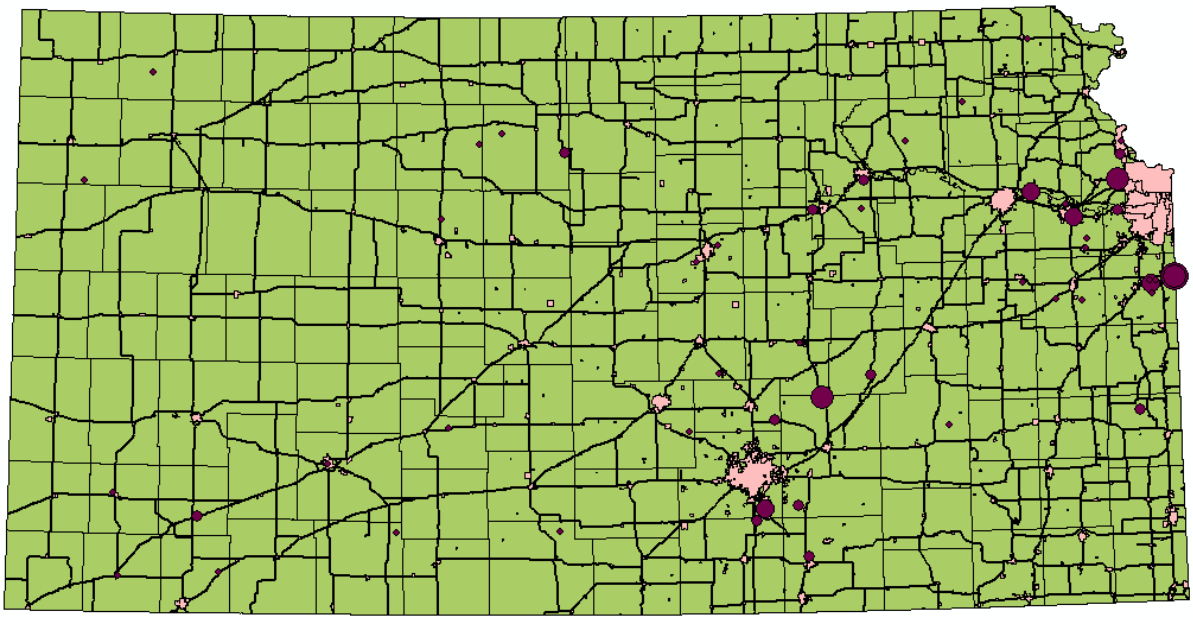

Figure 14: Estimated number of tourists that patronized each business (Question 5)

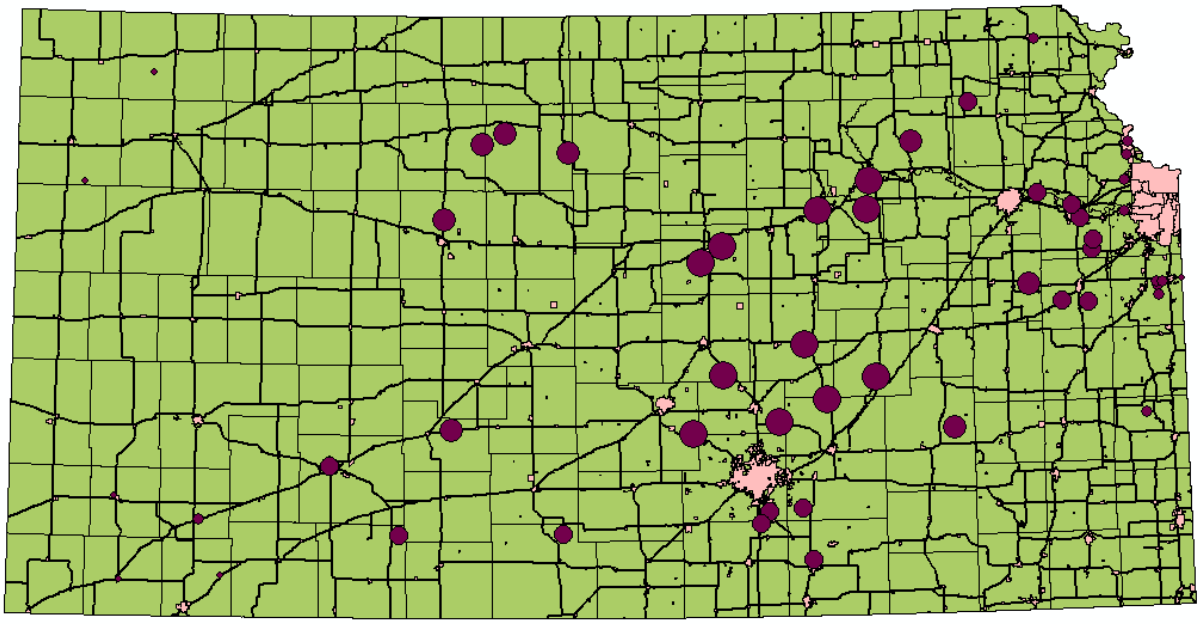

Figure 15: Xx025, the least distance-sensitive variable of female population

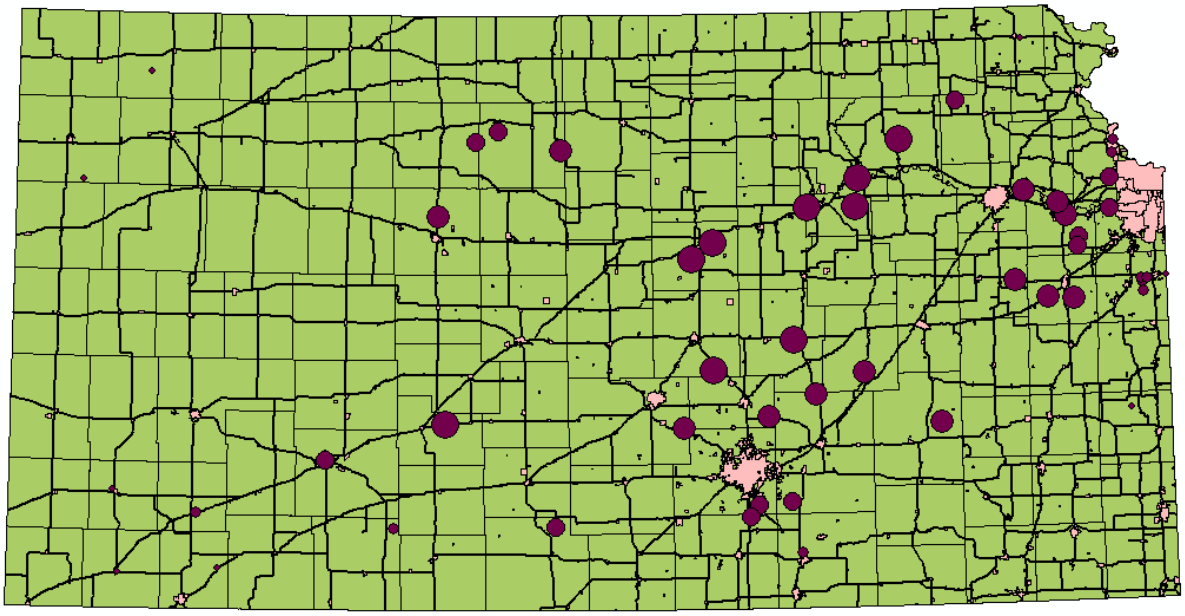

Figure 16: Inc050, the most significant income variable in the models

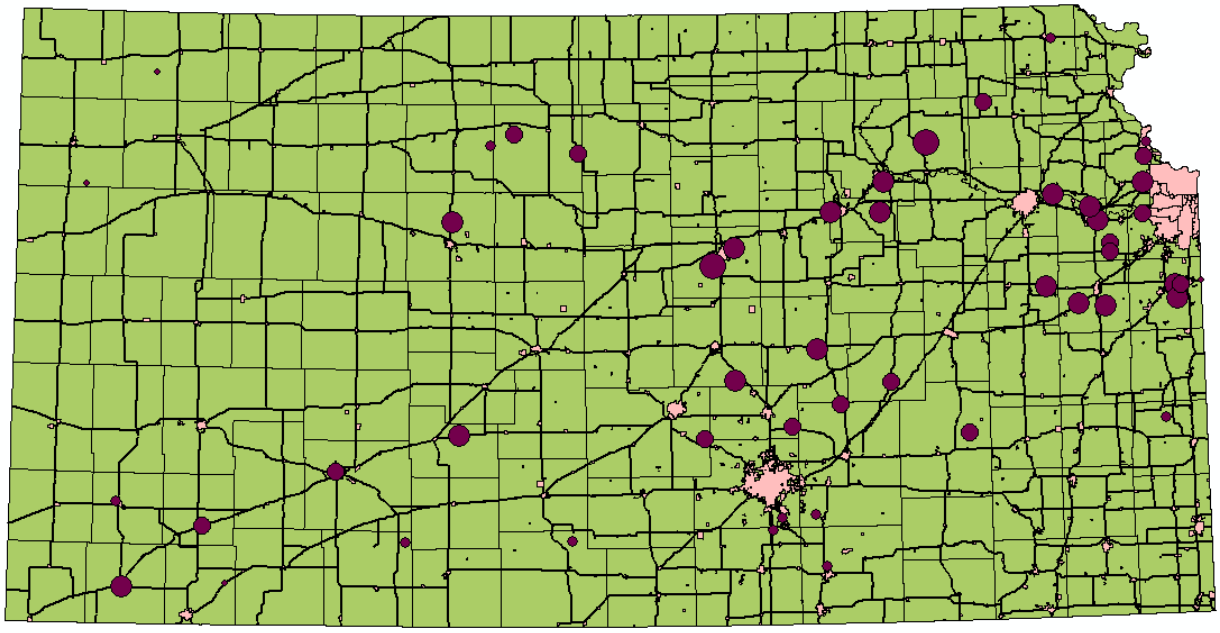

Figure 17: Inc100, largely corresponding to urban centers across the state

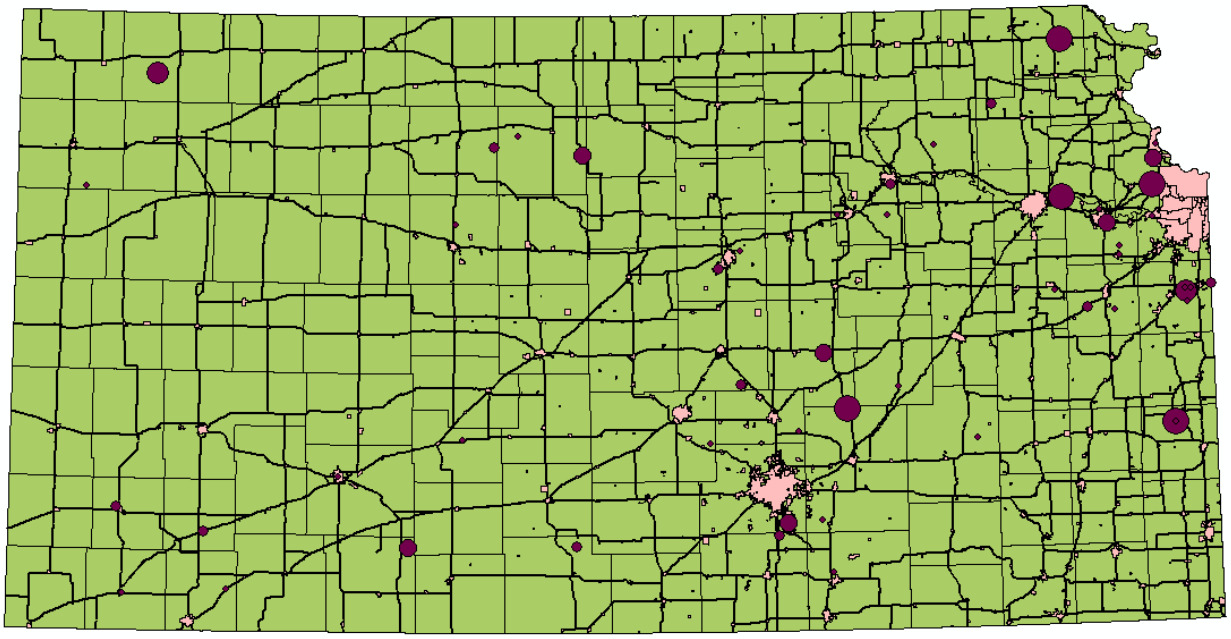

Figure 18: Estimated percentage of gross income derived from tourism (Question 10)

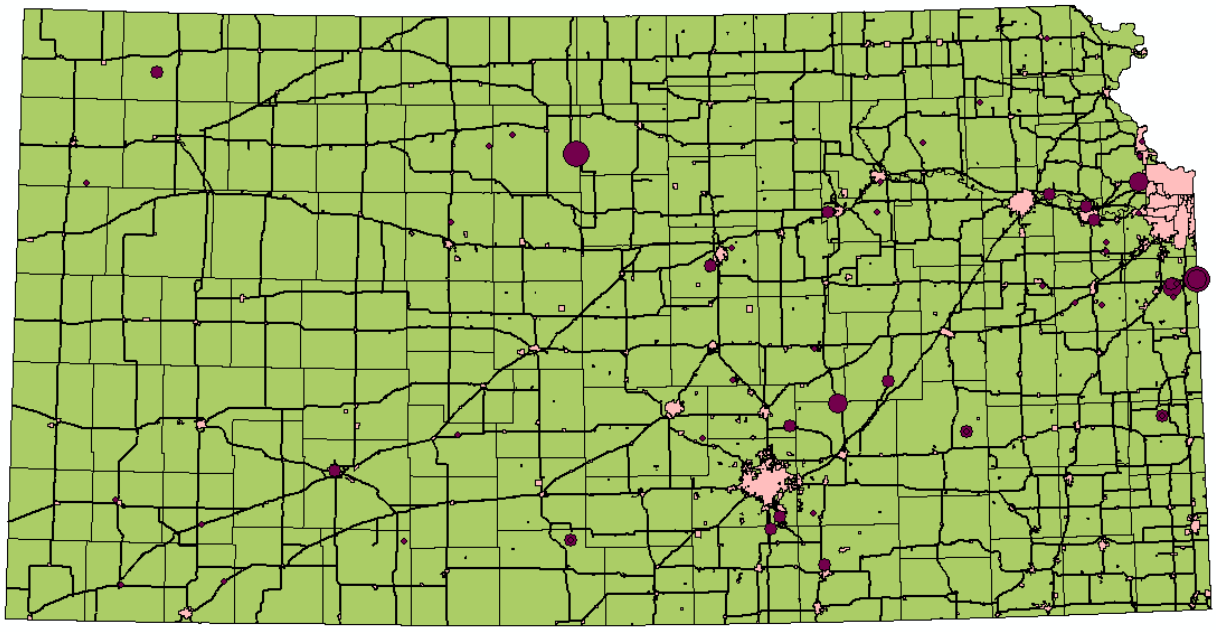

Figure 19: Estimated total gross tourism income (Questions 5 x 8)

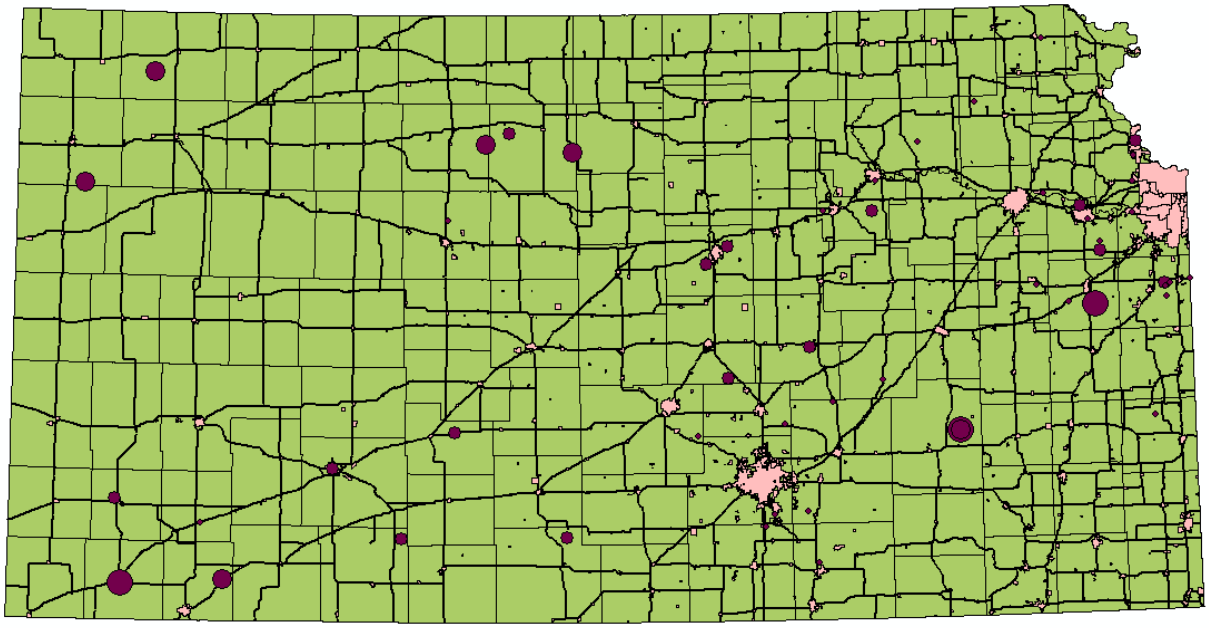

Figure 20: Estimated income spent per tourist (Question 8)

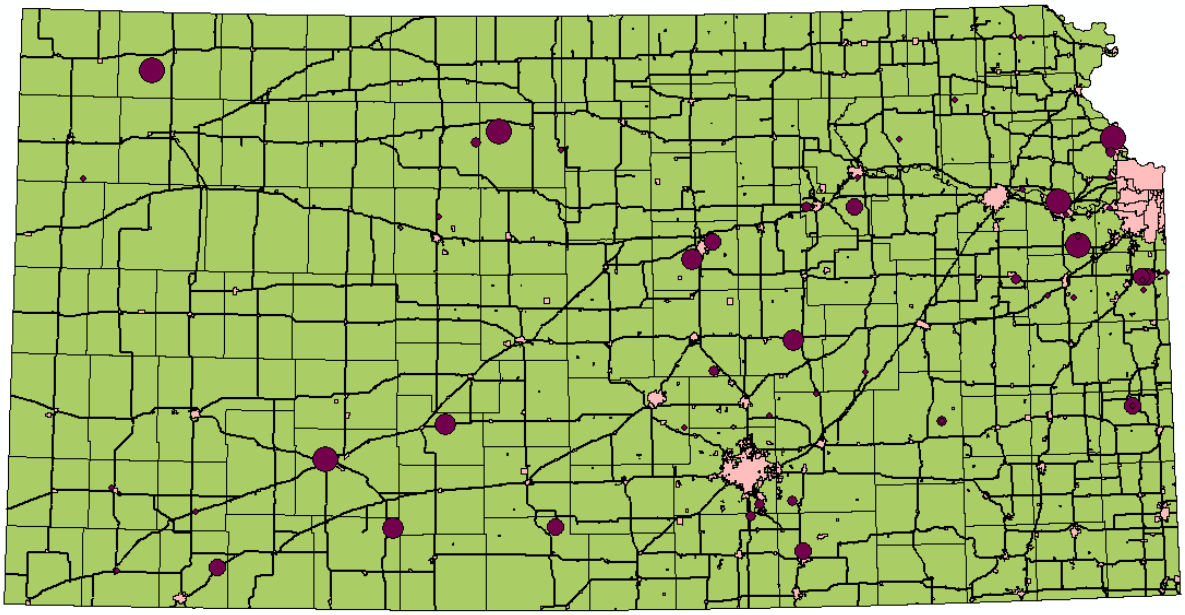

Figure 21: Estimated gross income derived from internet advertising (Question 9)

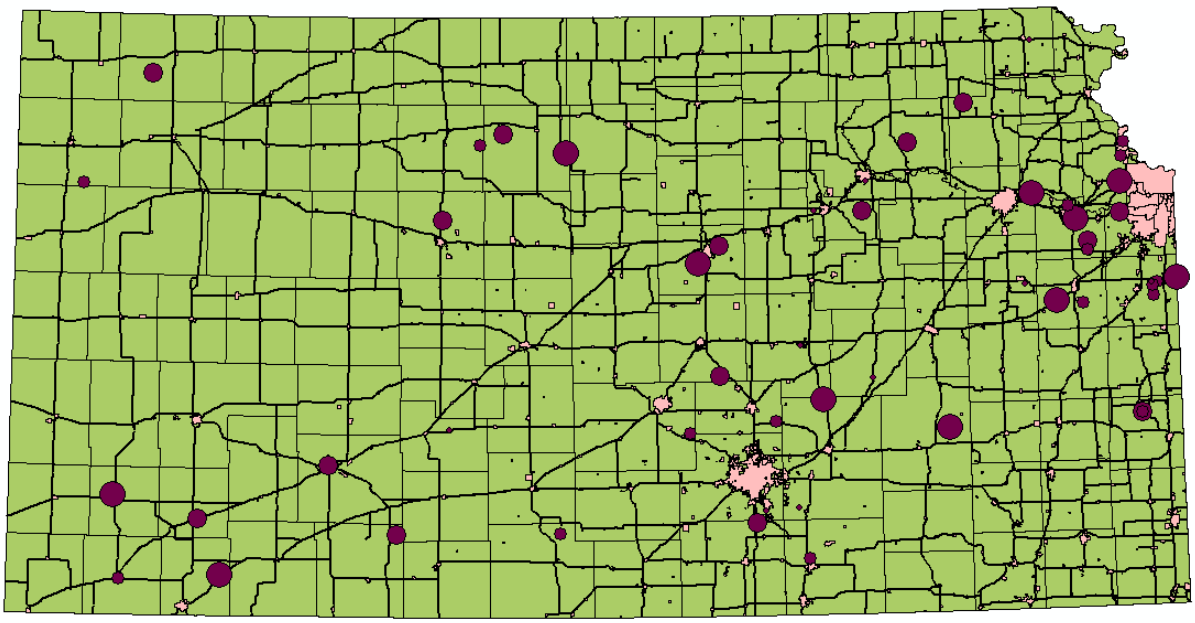

Figure 22: Length of business operation (survey question #2)

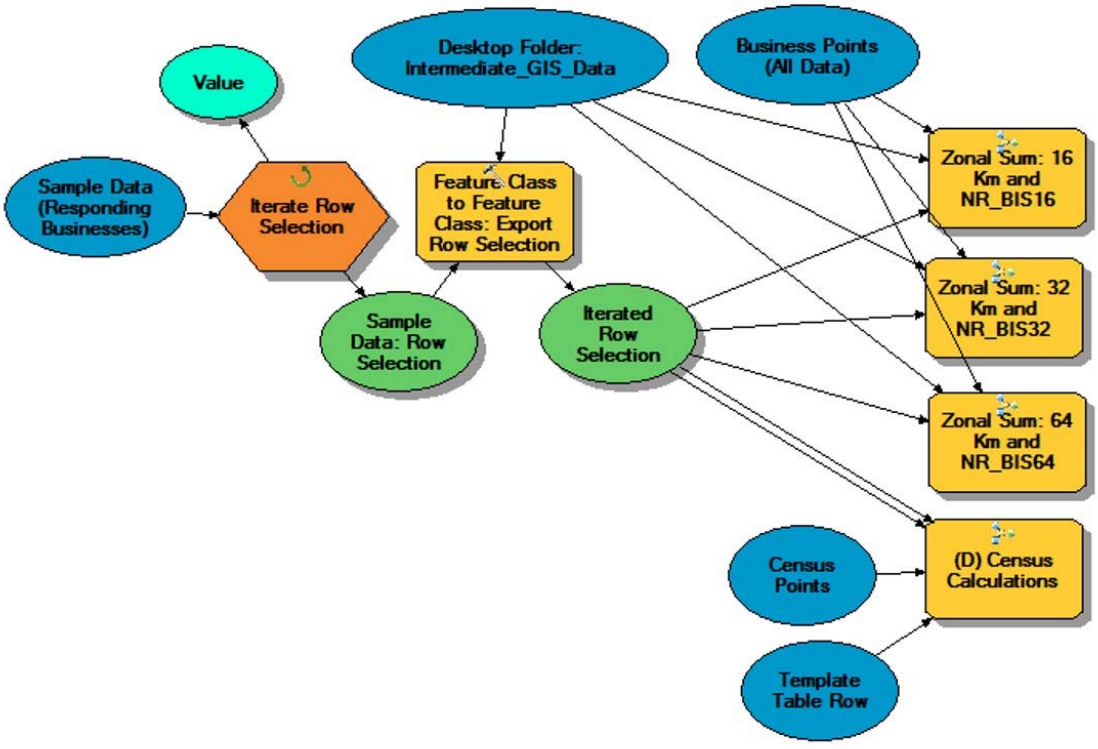

Figure 23: Model 2

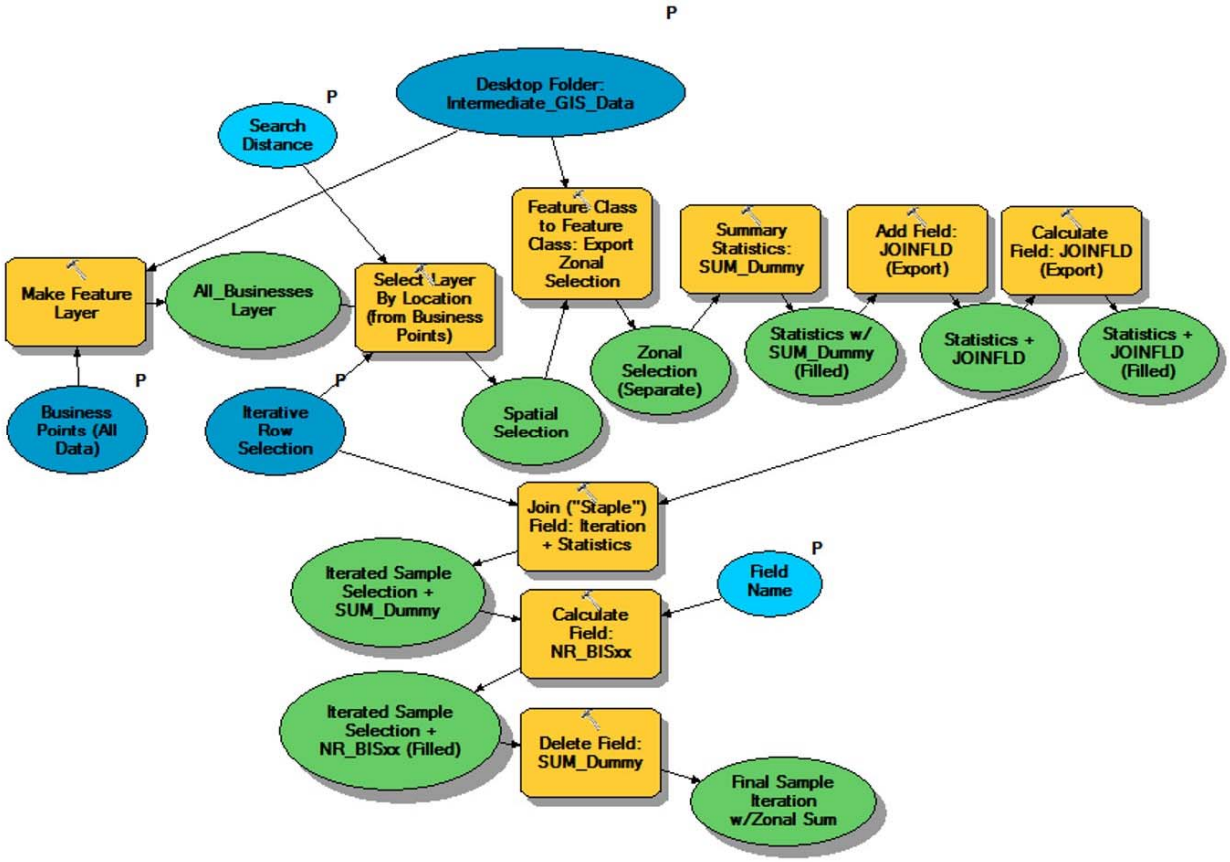

Figure 24: Model 3

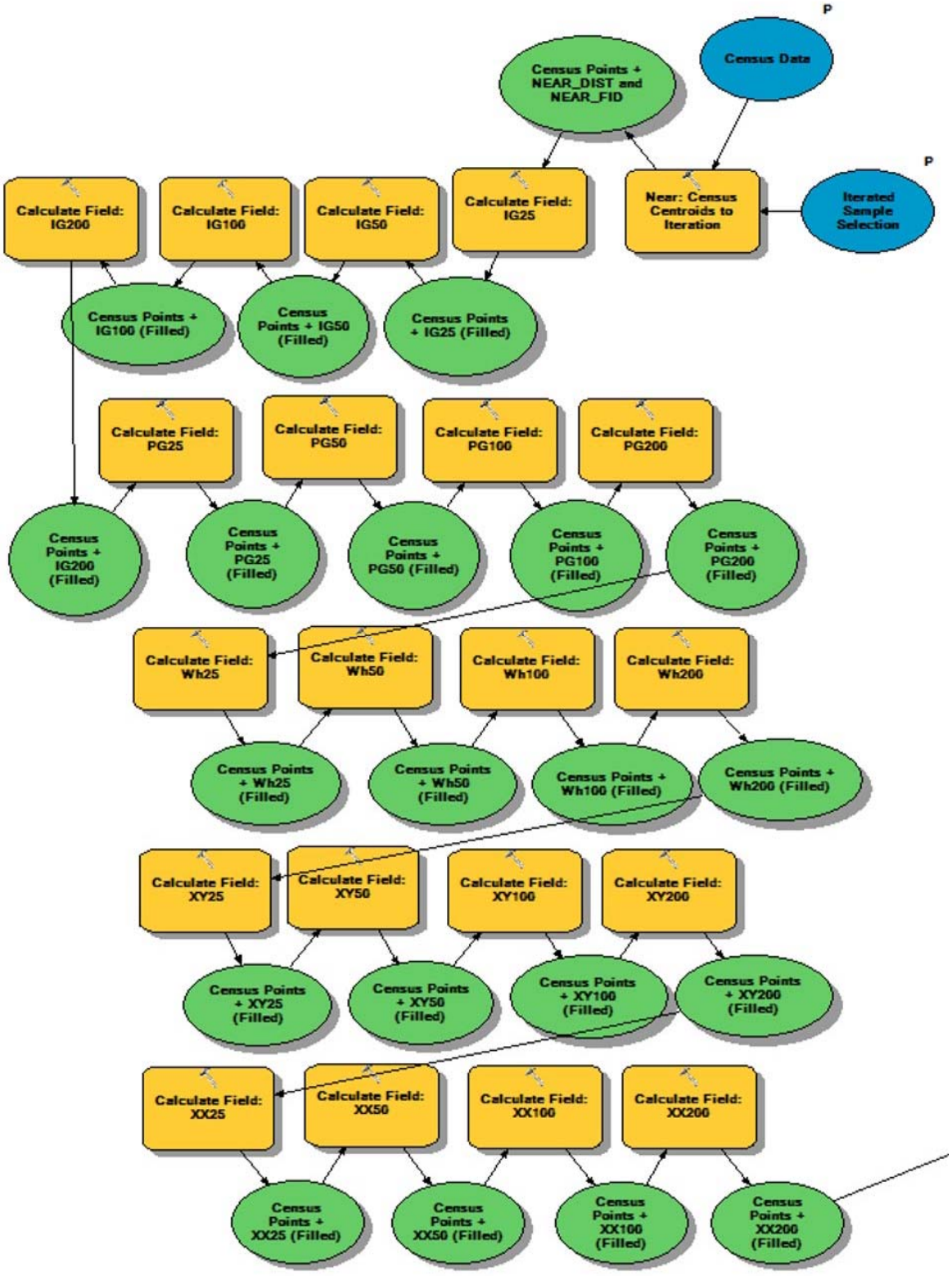

Figure 25: Model 4 (left side). Note that variable names were modified slightly during analysis (e.g., *Field*25 and 50 -> *Field*025 and 050; Pg[*xx*] and Ig -> Pop[*xx*] and Inc)

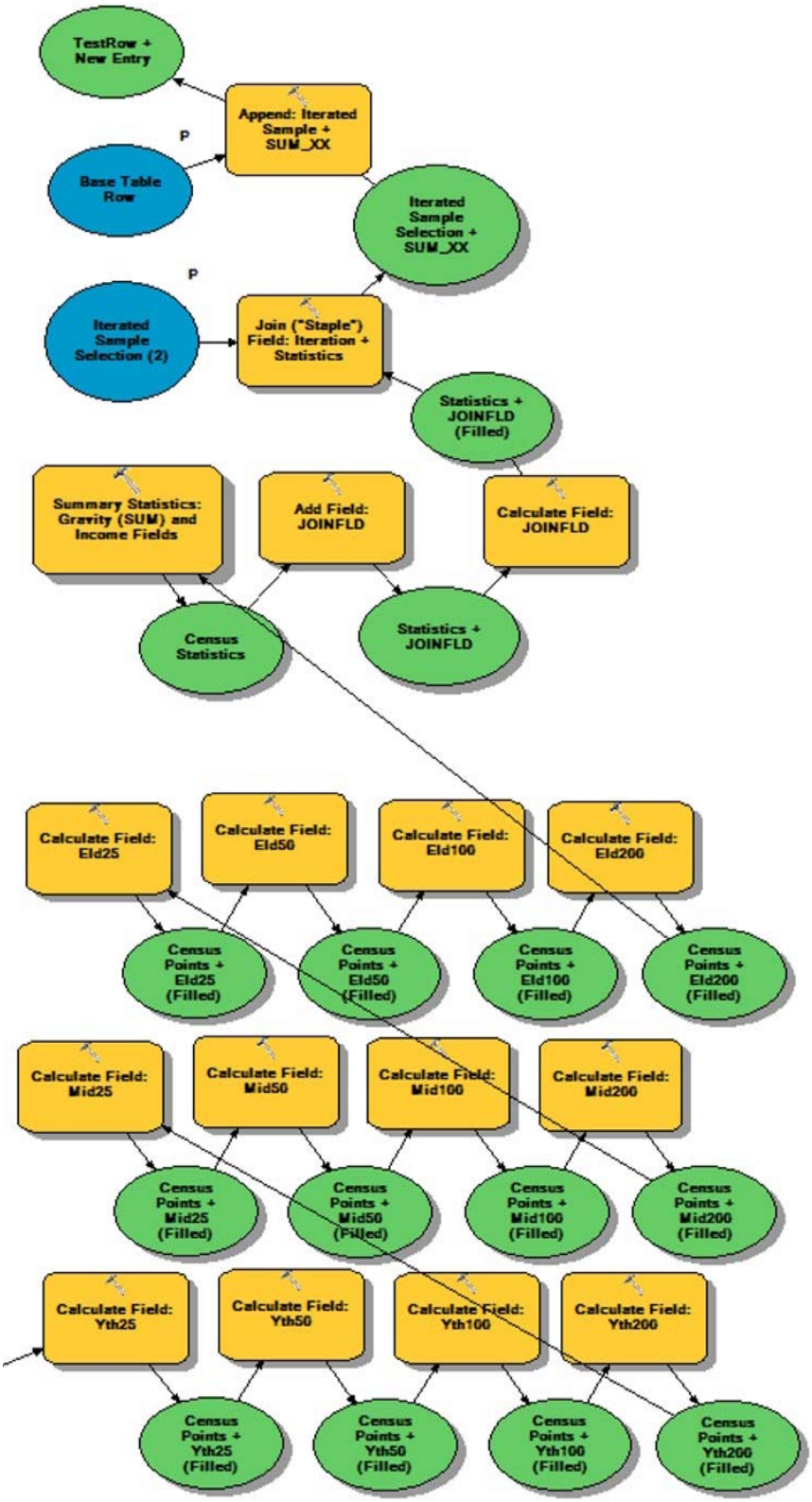

Figure 26: Model 5 (right side)

Appendix 2: ArcGIS Model Builder Tools, Additional Notes

- Append: Each instance of this tool adds a new field (column) if the original table doesn't have it. This means a cascading series of one-cell columns if the table isn't set up right. Set up your table beforehand if you want to avoid these issues.
- Calculate Field: Each instance of this tool overwrites previous executions. No error message will be returned if the input data for the equation is in error. If only one entry (row) is selected, only one cell will be updated.
- Feature Class to Feature Class: Make sure that saved file locations are correct to make this function work correctly. As with the *Buffer* tool, the sub-files can be saved for the purpose of error checking. Note that some tools require layers (the *Create Layer* tool) to work correctly instead.
- Field Join, Table Join: These tools allow users to copy-and-paste data from one table to another. If there is a mismatch of the number of entries (rows), system errors results.
- Iterator: These are not strictly tools. One can be added per model, with multiples used via sub-models within models. Use the Insert menu to include one.
- Near: The fields this adds are named the same each time (Near_Dis, Near_Fid). If an entry (row) is selected, the tool will always reference the correct file.
- Remove Join: This removes a *Table or Field Join*. It functions perfectly in the ArcMap console, but not within a model. The work-around is to create a separate model with just that in it, then embed that model within the larger model.
- Summary Statistics: The results are placed in a separate table. More to the point, they also allow for "column" calculations, not just "row" calculations.
- Spatial Selection: The same results can be done using the *Buffer* tool. This is often suggested in testing as it allows for the visualization of errors.

Appendix 3: Useful Tourism and Agritourism Links

- Kansas:
  - Tourism: http://www.travelks.com/
  - Agritourism: http://www.travelks.com/industry/agritourism/
  - Agritourism Contact: Sue Stringer
    1020 S. Kansas Ave, Suite 200
    Topeka, KS 66612
    (785) 296-1847
    Sue.Stringer@TravelKS.com
- Nebraska:
  - Tourism: http://visitnebraska.com/
  - Agritourism:
    http://visitnebraska.com/destinations/search/see_and_do?by_interest=Agritourism
  - Tourism Contact (Director): Kathy McKillip
    (402) 471-1558
    kathy.mckillip@nebraska.gov
- Iowa:
  - Tourism: http://www.traveliowa.com/
  - Agritourism: http://www.traveliowa.com/attractions/AgriTourism

    - Tourism Contact: Shawna Lode
      (515) 725-3090 or (888) 472-6035
      shawna.lode@iowa.gov
- Missouri:
    - Tourism: http://www.visitmo.com/
    - Agritourism: https://www.visitmo.com/agritourism.aspx
    - Missouri Division of Tourism
      (573) 751-4133
      tourism@ded.mo.gov
- Oklahoma:
    - Tourism: http://www.travelok.com/
    - Agritourism: http://www.travelok.com/Agritourism
    - Oklahoma Division of Tourism:
      (800) 652-6552
      information@TravelOK.com
- Arkansas:
    - Tourism: http://www.arkansas.com
    - Agritourism: http://www.arkansas.com/agritourism/
    - Arkansas Department of Tourism:
      (501) 682-7777
      Email Inquiry Form at: http://www.arkansas.com/travel-tools/contact/
- Texas:
    - Tourism: http://traveltex.com
    - Texas Department of Tourism:
      (512) 463-1782
- The United States Department of Agriculture (USDA) has two main divisions dealing with research, the Economic Research Service (ERS) and the National Agriculture Statistics Services (NASS, http://www.nass.usda.gov/). These research both agriculture and rural development, and contain a great deal of useful information. A few choice inclusions are noted here:
    - Rural Economic Development Metrics: http://www.ers.usda.gov/topics/rural-economy-population.aspx
    - Map of Natural Amenities: http://www.ers.usda.gov/Data/NaturalAmenities/
    - Map of U.S. Farmer's Markets: http://blogs.usda.gov/2011/10/27/data-lovers-rejoice-more-farmers-market-geocodes-available/
- Agritourism Business Guides:
    - The Kansas Center for Sustainable Agriculture and Alternative Crops:
      http://kansassustainableag.org/
    - The Agricultural Marketing Resource Center:
      http://www.agmrc.org/commodities__products/agritourism/agritourism_profile.cfm
- Kansas State Resources Include:
    - Kansas Sampler, an Agricultural News Website: http://kansassampler.org
    - The Kansas Bed and Breakfast Organization: http://www.kbba.com/
    - The Kansas Sheep Organization (including links to sheep shearing events):
      http://www.kansassheep.com/events.html
    - Kansas Hunting Outfitters:
      http://www.kansasoutfittersassociation.com/kansas_hunting_guides.html
    - Tourism in the Flint Hills: http://kansasflinthills.travel/destinations/agri-tourism