ABSTRACT

XU, SHUANGYU. Spatial Understanding of Themed Touring Routes through Wine Trails: Characterization, Residents' Attitudes, and Social Capital. (Under the direction of Carla E. Barbieri and Yu-Fai Leung.)

Themed Touring Routes (TTRs), defined as roads or road segments that link nearby tourism attractions under an overarching theme or product, have been widely developed surrounding different themes worldwide as a strategy to expedite local economy. As the most common types of TTRs, wine trails have received limited research attention including the geospatial characteristics and their associations with residents' attitudes and community social capital along trails. All three aspects (wine trails' geospatial characterization, attitudes of residents living along wine trails, and community's social capital) are critical for sustainable tourism development but are to be explored.

This study examined selected wine trails (nine for the first manuscript, two for the second and third manuscript) in the Piedmont region of North Carolina to address three purposes: (1) developing a geospatial and tourism characterization of wine trails; (2) investigating the geospatial influence of selected wine trails on residents' attitudes toward wine tourism; and (3) examining residents' perceptions of social capital related to winery development along wine trails and its association with the geospatial and tourism characterization. Social exchange and social capital theory were used to guide this study. Geospatial procedure was used to characterize the nine wine trails by synthesizing measures of their geospatial and tourism attributes. Survey procedures were used to address the second and third purposes.

Results reveal three (*Superior, Marginal, Poor*) characterizations of Piedmont wine trails in terms of their geospatial (*Spatial Pattern, Connectivity, Accessibility*) and tourism

(*Comprehensiveness*, *Dominance*, *Complementariness*) characteristics. Residents were neutral in their attitudes toward Piedmont wine trails, but slightly positive about the *Socio-cultural* benefits on their community. Residents' socio-demographic characteristics, levels of wine enthusiasm, and geospatial attributes are associated with their overall attitudes toward wine trails. They also noted an overall moderate level of social capital associated with Piedmont wineries, with the *Collective Action* dimension being rated most highly. Residents' socio-demographic characteristics, relationship with the Piedmont region and wine trails, and geospatial attributes were associated with social capital overall, and *Bonding, Bridging, Collective Action,* and *Information Sharing* dimensions. Besides enhancing the spatial understanding of wine trails, this study lays the contextual foundation for future TTRs studies and provides practical implications for the wine tourism industry, especially on route design, planning and management, and future policy-making.

Spatial Understanding of Themed Touring Routes through Wine Trails: Characterization, Residents' Attitudes, and Social Capital

by
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DEDICATION

This dissertation is dedicated to my dear parents, Mr. Yiling Xu and Ms. Guizhen Zhang for their infinite love and support, and unwavering belief in me.

BIOGRAPHY

Shuangyu Xu was born and raised in Shangrao, Jiangxi, China. She started her undergraduate study at Dalian University of Foreign Languages in 2004. During her four years' study, she was awarded yearly with student excellence scholarship. She graduated with a Bachelor of Arts in English with a specialization in tourism management in June, 2008. Two months after graduation, she moved to United States for her Master's study at University of Missouri, Columbia. While working on her thesis on recreational storm chasing, she was also involved in various research projects. From them, she got to know the broad spectrum of the recreation and tourism field, and found her interests in rural tourism. Following such passion, after two years' Master's study, she moved to North Carolina State University in August 2010 for the doctoral study at the Department of Parks, Recreation and Tourism Management. During her doctoral study, she found it fascinating to learn and use the Geographic Information System (GIS) to assist rural tourism research. Therefore, she pursued a full minor and the graduate certificate in GIS. She is interested in developing spatial understanding of themed touring routes, with a focus on routes' characterization, residents' attitudes regarding local tourism development and community's tourism related social capital.

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The two months from October to December 2013 was the longest two months so far in my life. I am beyond grateful to all my dear friends and colleagues that come to the data collection trip with me, even multiple times: Dr. Chantell LaPan, Dr. Guofang Miao, Hantang Qin, Jing Li, Karly Meszaros, KC Birendra, Dr. Shen Ma, Dr. Shiming Fang, Tian Guo, Tingting Liu, Wei Wang, Xiaolei Shi, Xiaopeng Duan, Yinglei Zhang, and Dr. Yuchen Mao. Without your devotion of time and help, this project can never get done within the desired time frame.

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INTRODUCTION

Themed Touring Routes (TTRs), referring to roads or road segments or even walking trails that link nearby tourism attractions under an overarching theme or product, have been developed worldwide. Examples of TTRs include those associated with natural resources (e.g., the Great Texas Coastal Birding Trail, the Geiranger-Trollstigen national scenic by-way in Norway), heritage (e.g., the New Jersey Coastal Heritage Trail, Queensland Heritage Trail Network in Australia), culinary arts (e.g., the Vermont Cheese Trail, the Olive Oil Greenway in Spain), and religious practices (e.g., the Camino de Santiago in Spain, the Buddha's Footprint Pilgrimage in Thailand). By gathering and offering services and products together, TTRs have the capacity to attract a larger number of visitors to the region, thus boosting local economic development (Briedenhann & Wickens, 2004; Lourens, 2007; Rogerson, 2007). Additionally, TTRs can create an identity for the region and facilitate a community bond through a cooperation network among businesses and services (Meyer, 2004; Meyer-Cech, 2005; Rogerson, 2007).

Although TTRs are developed around a wide variety of themes (e.g., arts, heritage, food, religion), wine trails are the most common type in the U.S. There are wine trails 277 wine trails in 48 states nationwide (America's Wine Trail, 2012). In contrast, Civil War trails are only in 31 states (Civil War Discovery Trail, 2012) and 63 birding trails exist across the country (American Birding Association, 2012). Wine trails, as one component of the wine tourism industry (Hall, Johnson, & Mitchell, 2000), have rapidly grown around the world during the past decade (Scherrer, Alonso, & Sheridan, 2009). Despite such growth, research

on wine tourism is scant (Carlsen, 2004), having predominantly focused on entire wine regions rather than specific wine routes. The limited number of studies on wine routes have focused on marketing issues, such as identifying current and potential visitors and exploring marketing strategies for further development (Hashimoto & Telfer, 2008; Jaffe & Pasternk, 2004), and on performance evaluation such as level of satisfaction and constraints from winery managers' perspectives (Correia, Passos Ascenção, & Charters, 2004).

In spite of TTRs' suggested capacity to revitalize local economies, they have been under-researched. Information is especially lacking regarding residents' perceptions of the impacts TTRs deliver to their communities. An enhanced understanding of residents' attitudes toward tourism development can help other stakeholders (e.g., tourism businesses, government) to better serve local community members, strengthen partnerships among related sectors and businesses, and assist policy makers in gaining residents' support for future development efforts (Oviedo-Garcia, Castellanos-Verdugo, & Martin-Ruiz, 2008); therefore, such an understanding can facilitate sustainable tourism development (Gursoy & Rutherford, 2004; Lankford, 1994).

There is also a limited understanding on the levels of interaction and aggregation of resources within communities along routes. Given that TTRs are networks of actors (e.g., municipalities, associations, and institutions) trying to cooperate effectively (Meyer-Cech, 2005), and that cooperation networks are vital for successful route development (Meyer, 2004), it is also necessary to examine TTRs' social capital, defined as the aggregate of resources that are linked to possession of a durable network (Bourdieu, 1986). Such examination will enhance the literature on social capital associated with tourism development,

which is still at the exploratory stage (McGehee, Lee, O'Bannon, & Perdue, 2010; Moscardo, 2012).

Examination of TTRs' tourism (e.g., comprehensiveness, variety) and geospatial (e.g., distance, connectivity) characteristics is another missing piece in the current tourism literature. Limited studies taking geospatial factors into consideration mainly focused on one variable (i.e., distance) in nodal areas or towns (Harrill & Potts, 2003). Understanding TTRs' geospatial characteristics is important as they influence the accessibility for both tourists and residents (Bowman, 2009; Papatheodorou, 2004), tourists' destinations and itinerary (Lue, Crompton, & Fesenmaier, 1993; McKercher, 1998), residents' perceived benefits (Harrill, 2004; Harrill & Potts, 2003; Jurowski & Gursoy, 2004a; Raymond & Brown, 2007), and social capital (Camagni, 1995; Inkpen & Tsang, 2005; Westlund, Rutten, & Boekema, 2010). Likewise, the bundles of tourism amenities, infrastructure, and services provided along TTRs also influence residents' perceptions and satisfaction toward the touring route (Denstadli & Jacobsen, 2011).

Taking into consideration the role of geospatial and tourism characteristics in residents' perceptions and behaviors, developing a geospatial and tourism understanding of TTRs on residents' perceived benefits and social capital will contribute to an enhanced holistic understanding of TTRs. Such understanding is critical to lay out the theoretical foundation of future TTRs studies and provide insights for route design, planning and management based on community satisfaction and the quality of life of their resident.

Problem Statement and Study Objectives

The overall capacity of TTRs in revitalizing local economies (Briedenhann & Wickens, 2004; Russo & Romagosa, 2010), the preponderance of wine trails among TTRs and its increasing popularity associated with the wine industry growth (Hardy, 2006), the scarce literature available on TTRs overall, and the aforementioned significance of geospatial and tourism characteristics all call for a closer examination of the geospatial and tourism characteristics of wine trails and their association with residents' attitudes toward wine trails and the perceptions of social capital along wine trails.

Table 1. Study objectives by manuscript

	Study Objectives by Manuscript
Manuscript 1 (Geospatial and tourism characterization of wine trails)	
1-1	Identify and quantify geospatial attributes of the wine trails.
1-2	Identify and quantify tourism-related attributes of the wineries and wine trails.
1-3	Characterize wine trails based on geospatial and tourism characteristics.
Manuscript 2 (Residents' attitudes toward wine trails and wine tourism development)	
2-1	Explore residents' attitudes toward wine trails.
2-2	Examine socio-demographic, level of wine enthusiasm, and geospatial factors associated with residents' perceived personal benefits and attitudes toward wine trails.
2-3	Examine the mediating effect of personal benefits on attitudes toward wine trails.
Manuscript 3 (Perspectives of community social capital along wine trails)	
3-1	Identify residents' perceptions of social capital in communities along wine trails.
3-2	Evaluate the association between socio-demographic, relationship with the Piedmont region, geospatial factors, and communities' social capital.

Therefore, this study was conducted to enhance the spatial and tourism understanding of wine trails as a type of TTRs, driven by three interconnected purposes: (1) develop a geospatial and tourism characterization of wine trails; (2) investigate the geospatial influence

in residents' attitudes toward wine trails; and (3) examine the geospatial influence in the level of social capital among communities along wine trails. Each purpose is addressed in a separate manuscript, which in turn is defined by specific objectives (Table 1). Details on the theoretical background, scope and specific objectives, and analysis of each manuscript are provided in individual manuscripts.

Research Design

Study Setting

This study was conducted in the Piedmont Triad of North Carolina (NC) given its fast-growing wine industry and wine trails. NC, home to more than 100 wineries, 23 wine trails and three American Viticultural Areas – AVAs (Yadkin Valley, Swan Creek, and Haw River), is one of the top destinations for wine and culinary tourism, and wine production nationwide (NC Department of Commerce, 2012). The Piedmont Triad, located in the north central North Carolina (Figure 1), has 646,333 households spread in 12 counties of 5,875.2 square miles (U.S. Census Bureau, 2010). This region has an average median household income of $41,873, with 17% of its population below poverty level; 79.3% has at least a high school degrees and 17.9% at least a Bachelor degree (U.S. Census Bureau, 2010).

There are altogether 11 wine trails in the general Piedmont region, of which nine trails (Haw River, Lexington Loop, Midlands, Piedmont Heritage, Scenic 421 Corridor, Surry County, Swan Creek, Upper Yadkin, Yadkin River) are completely within the Piedmont Triad and thus included in this study. These wine trails range from 15.2 to 53.5 miles in

length, and have between three and five wineries each trail. Besides its growing wine industry, the Piedmont Triad is also known for the textile, tobacco and furniture industries.

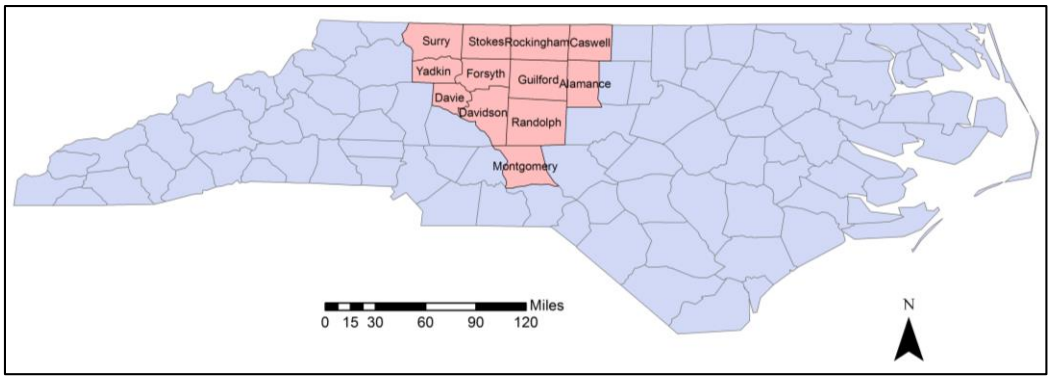

Figure 1. Map of Piedmont Triad in NC

Geographic and Survey Procedures

Geographic and survey procedures were used to address the research purposes. Geographic procedures were used in the first manuscript to develop the geospatial and tourism characterization of wine trails by applying spatial measures (*Spatial Pattern*, *Connectivity*, *Accessibility*), and developing tourism indices to secondary data (e.g., wine trail coordinates and tourism data from NC Department of Commerce, winery websites, and roads data from NC Department of Transportation). Results from geographic procedures were used to select two wine trails (Surry County and Haw River) that became the setting for the second and third manuscripts. Survey procedures were then used in the second and third manuscripts to address their specific objectives.

The survey questionnaire was designed to query residents around a 10-mile buffer zone of Surry County and Haw River wine trails about their attitudes toward wine trails, the perceptions of social capital, enthusiasm for wine and wine trails, and their demographic information. Institutional Research Board's approval was obtained under the exempt category on September 18, 2013 (Appendix A). Descriptive statistics, reliability tests, and multivariate regression analyses were performed to address study objectives; detailed explanation on the specific research methods (e.g., variables, measurements, analyses) are presented in individual manuscripts.

Definitions of Terms

Americana Viticultural Areas (AVAs): Specific geographic regions federally designated as suitable for growing grapes with distinct characteristics (Thode & Maskulka, 1998).

Community: "Area in which individuals and groups regularly interact to integrate various attributes, opportunities, and services for the fulfillment of subsistence needs and the establishment of a scene of sense of community" (Allen, 1991, p. 32).

Cumulative Opportunity Measure: "A count of the number of potential opportunities that can be reached within a predetermined travel time or distance" (El-Geneidy & Levinson, 2006, p. 6).

Link or Edge: A segment of linear feature. Specifically, an edge is defined by the two vertices or nodes at both ends of the edge in a network (Lee & Wong, 2001).

Route and Trail: Trails are of "a smaller spatial scale and often to indicate the ability of visitors/tourists to engage in attractions on foot, by bicycle or on horseback" (Rogerson,

2007, p. 50) than routes which are usually associated with drive tourism and longer distances. Given the standard use of the term wine trails in the practice and scholarship of tourism, it will be used throughout this study.

Themed Touring Route (TTRs): Roads or road segments or even walking trails that link nearby tourism attractions under an overarching theme or product which have been developed surrounding different themes or products worldwide.

Wine Tourism: "Visitation to vineyards, wineries, wine festivals and wine shows for which grape wine tasting and/or experiencing the attributes of a grape wine region are the prime motivating factors for visitors" (Hall & Macionis, 1998, p.267).

Wine Trail: Partnership of wineries and vineyards work together to attract tourists and promote their products (Plummer, Telfer, Hashimoto, & Summers, 2005).

Dissertation Organization

This dissertation is organized following the three-manuscript format. Although each manuscript has its own purpose and specific objectives as aforementioned, altogether they contribute to the overarching theme of enhancing the spatial understanding of TTRs (Figure 2). The geospatial and tourism characterization developed in the first manuscript helps route planners and winery owners optimize route design and management, as well as tourism service offerings. Results from the first manuscript serves to set up the examination of geospatial influence in residents' attitudes toward wine trails (manuscript two) and social capital (manuscript three) in neighboring communities. The examination of such a characterization with residents' attitudes and perceptions of social capital help gain

community support and forge community bond. Together, the three manuscripts provide the big picture for sustainable tourism development in linear tourism settings.

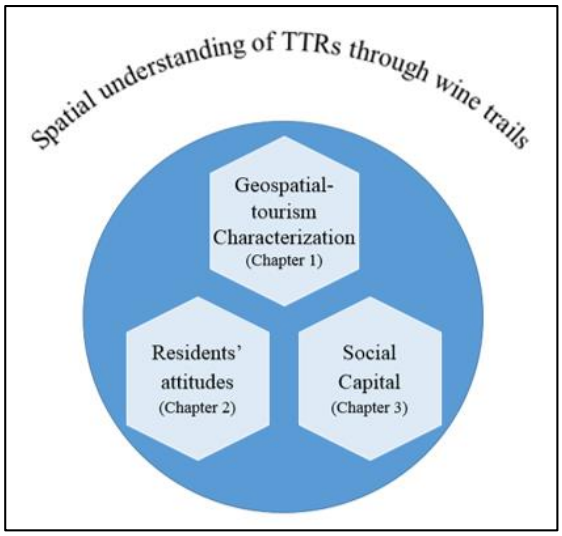

Figure 2. Organization of dissertation in three manuscripts

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Characterizing Themed Touring Routes:

A Geospatial and Tourism Evaluation of Wine Trails [1]

Abstract

Themed Touring Routes, have been developed rapidly around the world over the last few decades. Wine trails are one of the most commonly types of TTRs developed globally. Limited studies have examined the geospatial attributes or tourism resources of TTRs and wine trails in particular, which challenges their marketing and managerial efficacy and resource allocation optimization. To address these gaps, this study characterizes TTRs by measuring geospatial and tourism attributes of nine wine trails in the Piedmont region of North Carolina (U.S.). *Spatial Pattern*, *Connectivity* and *Accessibility* measurements were used for the geospatial characterization, while *Comprehensiveness*, *Dominance*, and *Complementariness* measurements for the tourism characterization. The geospatial and tourism characterization developed in this study yields three types of wine trails, those with Superior, Marginal, and Poor geospatial and tourism attributes. Besides enhancing our understanding of TTRs, this study sheds light on planning and managerial issues (e.g., route design, obtaining residents' support) critical for TTRs performance and development.

Keywords: Geospatial attributes; GIS; Themed touring routes; Tourism attributes; Wine tourism; Wine trails

[1] This manuscript will be submitted to a tourism geography journal; thus it was formatted to follow their journal guidelines (maximum word count: 8000; APA citation style). Word Count = 7,910 (including text, footnotes, and references); Figures = 2; Tables = 4.

Introduction

Recent years see a mushrooming development of touring routes (e.g., the Great Texas Coastal Birding Trail, the New Jersey Coastal Heritage Trail, the Vermont Cheese Trail, the Niagara wine route). These touring routes all fall under the umbrella of Themed Touring Routes (TTRs), which refers to roads or road segments that link nearby tourism attractions under an overarching theme or product (e.g., natural resources, heritage, culinary arts). Among different themes of TTRs, wine trails have become one of the most common ones developed throughout the traditional wine regions in Europe and the emerging wine regions of the "New World" (Hall & Macionis, 1998). The United States (U.S.), for example, has at least one wine trail in 48 states with a total number of 277 wine trails nationwide (America's Wine Trail, 2012). In contrast, only 31 states accommodate Civil War trails (Civil War Discovery Trail, 2012) and there are only 63 birding trails in the nation (American Birding Association, 2012).

Despite the growth in number and popularity, wine trails are under-represented within the wine tourism literature (Carmichael & Senese, 2012). Past wine tourism studies have predominantly focused on entire wine regions examining motivations and preferences of tourists (Charters & Fountain, 2006), regional development (Carmichael & Senese, 2012), festivals and events (Carlsen, 2000; Getz, 2000), synergies between wine culture and heritage (Frochot, 2000), and wine tourism marketing (Barber, Donovan, & Dodd, 2008).

The gap in the wine trails literature is even more conspicuous related to their comprising tourism and geospatial attributes. As a tourism phenomenon, the success of TTRs is dependent on the services and amenities offered along the route as they influence the

attractiveness of the entire route. Likewise, their uniqueness is also molded by the route length, number of comprising wineries, and spatial pattern. Thus, the tourism and geospatial variability of wine trails can influence their capacity to attract and satisfy different types of tourists. In this sense, developing a geospatial and tourism characterization of wine trails can provide critical implications on the planning, management, and marketing (e.g., better targeting visitors by obtaining trails' uniqueness) of wine trails (Gursoy & Rutherford, 2004).

The rapid increase in popularity of wine trails in recent years, the overall limited understanding of the geospatial and tourism attributes of TTRs, and the need to fill this gap to enhance the planning, managerial, and marketing intelligences related to wine trails, call for a closer examination of wine trails. Thus, this study was conducted with the purpose of developing a geospatial and tourism characterization of TTRs by examining nine wine trails in the Piedmont region of North Carolina (NC). Specifically, this study addressed three objectives: (1) identify and quantify geospatial attributes of wine trails; (2) identify and quantify tourism-related attributes of wineries and wine trails; and (3) characterize wine tourism routes based on geospatial and tourism characteristics. Although this study focused on wine trails, the resulting characterization can also be applied to other types of TTRs.

Past Studies on TTRs

TTRs encompass a variety of names and concepts including "scenic byway" (Besculides, Lee, & McCormick, 2002), "tourism or touring route" (Briedenhann & Wickens, 2004), "route tourism" (Lourens, 2007), "heritage trail" (Cheung, 1999), and "cultural heritage corridor" ("Gullah/Geechee Cultural Heritage Corridor", 2011). Although routes and

trails are oftentimes used interchangeably, literature distinguishes between these two terms. Trails refer to "a smaller spatial scale and often indicate the ability of visitors/tourists to engage in attractions on foot, by bicycle or on horseback" (Rogerson, 2007, p. 50), while routes denote distant comprising nodal attractions (e.g., wineries) and a longer driving distance (Rogerson, 2007). In this sense, many wine trails in the U.S., like the ones where this study was conducted, are technically routes as required driving when visiting between comprising wineries.

Three topics have emerged from studies focusing on an array of TTRs. The first topic focused on visitors' behaviors and experiences including visitation frequency, levels of satisfaction and loyalty, and preferences toward the settings (e.g., scenic by-ways, Denstadli & Jacobsen, 2011; birding trails, Scott & Thigpen, 2003). A second set of studies examined the impact of TTRs on local economic development (e.g., rural tourism route, Briedenhann & Wickens, 2004). The third group aimed at developing management plans for specific TTRs (e.g., wine routes, Correia et al., 2004).

Geographic Perspective on Tourism and Wine-Tourism

Tourism is considered essentially a geographic phenomenon (Farsari & Prastacos, 2004; McKercher & Lau, 2008) and therefore has been examined from the geographic perspective. Geographic Information System (GIS) has been used to document tourism resource inventories, identify suitable areas for tourism development (Boyd, Butler, Haider, & Perera, 1994), assess land-use changes in destinations (Allen, Lu, & Potts, 1999), and analyze visitor flows in relationship with resource use (Bahaire & Elliott-White, 1999). Most recent studies

have used GIS for more complex analysis. Deng and Dyre (2009) for example, used GIS to map natural and cultural tourism resources and travel spending in West Virginia to evaluate the economic benefits derived from tourism. Lee, Choi, Yoo, and Oh (2013) combined GIS with network analysis in South Korea to classify 43 villages based on spatial centralities for integrated tourism management.

GIS have also been used to examine the wine industry and wine tourism, especially among cultural geographers, mainly to assess the viticultural potential of emerging grape regions by modeling climate and landscape features (Dougherty, 2012) or to evaluate viticulture performance in terms of site conditions, management practice and vineyard performance (Bowen et al., 2005). The use of GIS in wine tourism studies is more limited in terms of number and scope, being mostly used to perform simple calculations. Yuan and Cai (2005) for example, performed a GIS analysis of wine festival attendees' zip codes to identify their home origins and travel distance. Similarly, Henehan and White (1990) used GIS among six wine trails in New York (US), to calculate trail's total length and distance between wineries along the trail.

Characterizations are commonly used in the tourism field to typify emerging phenomena to enhance the systematic understanding of how attributes of those phenomena vary to or conform to existing structures (Selin, 1999). Considering the capacity of GIS to analyze tourism phenomena, the importance of characterization, and the limited studies on the geospatial attributes of wine tourism and wine trails in particular, it is postulated that a characterization of TTRs (as a relatively new and under-researched tourism phenomenon) using GIS could bring similar benefits.

Components for Geospatial and Tourism Characterization

The linear connection among comprising attractions of TTRs and the tourism nature of their nodal points (i.e., main attractions) suggest both geospatial and tourism attributes be incorporated in the characterization of wine trails. From a review of the literature, six attributes are deemed important to develop such characterization: (1) *Spatial Pattern* (2) *Connectivity* and (3) *Accessibility* as geospatial attributes, and (4) *Comprehensiveness* (5) *Dominance* and (6) *Complementariness* as tourism attributes (Figure 3).

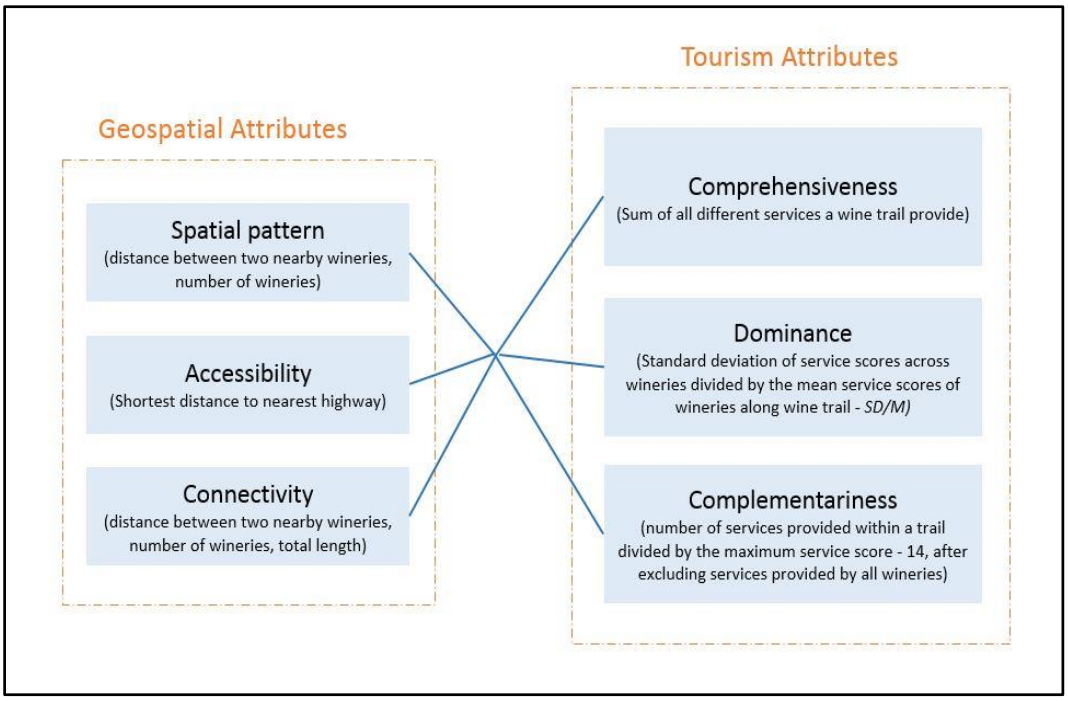

Figure 3. Conceptual geospatial and tourism characterization of TTRs

Geospatial Attributes

TTRs vary in spatial patterns with regards to their total trail length, the number of comprising nodal tourism attractions, and the relative distance between two nearby attractions along the routes. Thus *Spatial Pattern*, mainly indicated by relative distance between nearby wineries, should be taking into consideration of the geospatial characterization. *Connectivity* and *Accessibility* are also important geospatial attributes of TTRs for their direct influence on the access of tourists and residents to main attractions (Bowman, 2009; Papatheodorou, 2004).

Connectivity describes the spatial or functional continuity of a network (Zipperer et al., 2000). Road network connectivity shapes tourists' decision-making in terms of destination choices and travel transportation modes (Page & Lumedon, 2004), and thus is a catalyst for successful tourism (Olawale & Adesina, 2013). Among various measures of connectivity (e.g., Alpha index, link-node ratio, connected node ratio), Gamma index (Υ), $\Upsilon = \frac{\#\text{links per unit of area}}{3*(\#\text{nodes}-2)}$ is most useful for tourism for its ability to compare different networks regarding levels of connectivity (Lee & Wong, 2001).

Accessibility, referring to "the ability of people to reach destinations at which they can carry out a given activity" (Mitchell & Town, 1977, p. 3), is widely used in studies related to transportation, and urban and regional planning (O'Kelly & Horner, 2003). Good accessibility (e.g., airports, good road network connectivity) is critical for tourism planning as it significantly increases the attractiveness of the destination and thus the number of tourists (Papatheodorou, 2004). Proximity between nodal points, as an indicator of accessibility, has been postulated to be the most important attribute for people visiting a trail

(Bowman, 2009). Various measures have been developed to assess accessibility. For example, cumulative opportunity measure counts potential opportunities that can be reached within a certain travel time or distance (El-Geneidy & Levinson, 2006; Vickerman, 1974); gravity-based measure is most applicable for urban areas (Taylor, Sekhar, & D'Este, 2006); and shortest distance measures the geographic accessibility of facilities (e.g., health-care) and resources (Gesler, Jordan, Dragonir, Luta, & Fryer, 1999).

Tourism Attributes

As a service industry, the success of tourism is closely related to the variety and quality of services/amenities that the destination provides (Kandampully, 2000; Barbieri, Mahoney, & Butler, 2008). Although abundant literature exists on the quality of tourism services and products with the majority concentrating on visitors' satisfaction, measurement of the variety of tourism services/amenities is relatively scarce. Such lacuna is critical to fill because clusters of products and services within TTRs increase their capacity to expedite economic development and community bonding in a given region (Briedenhann & Wickens, 2004). Taking into consideration that TTRs market themselves as a one tourism product, evaluating the *Comprehensiveness, Dominance* and *Complementariness* of the services provided by wineries (nodal points) is important to characterize wine trails.

Comprehensiveness refers to the number of different services available at a winery that helps to roundup the overall service provision within a trail (Warfield, Hauser-Cram, Krauss, Shonkoff, & Upshur, 2000). Thus, this measure is broadly used to assess the overall provision of services and amenities in a number of service industries, including the health

service (Nader, 1990). *Dominance* refers to the strength of a brand, product, service or firm, relative to its competition in a specific geographical area (Aaker, 1996). A strong *Dominance* within a market, oftentimes suggests the presence of a monopoly (Chen, Doraszelski, & Harrington, 2009). Although there are several ways of calculating the dominance of a product, market share calculated as a percentage of the total market achieved by a firm or brand, is the most direct way. *Complementariness* refers to those goods or services meant to be offered separately, but are dependent on each other for their sales (Kumarage, Bandara, & Munasinghe, 2010). In the case of wine trails for example, *Complementariness* refer to different wineries along same wine trail complement each other in service provision so that the trail could provide a variety of different services for tourists.

In sum, past studies have mostly focused on the spatial characteristics of single nodal attractions or destinations, and have used GIS to merely depict characteristics in tourism (and especially wine tourism) research. Thus, applying GIS on TTRs settings with more sophisticated analysis incorporating geospatial and tourism attributes (Deng & Dyre, 2009) and developing a resulting characterization is imperative, given the imbalance between limited understanding of the geospatial and tourism characteristics of TTRs and wine trails in particular, and the rapid development of TTRs worldwide.

Research Methods

Study Site Background

This study was conducted in NC because of its prosperous wine tourism industry. Home to more than 100 wineries and 23 wine trails, NC ranks fourth nationwide as a wine

and culinary tourism destination, and ninth for wine production ("Wine Industry Facts", 2012). The majority of NC wine trails lie within three American Viticultural Areas - specific geographic regions federally designated as suitable for growing grapes with distinct characteristics (Thode & Maskulka, 1998).

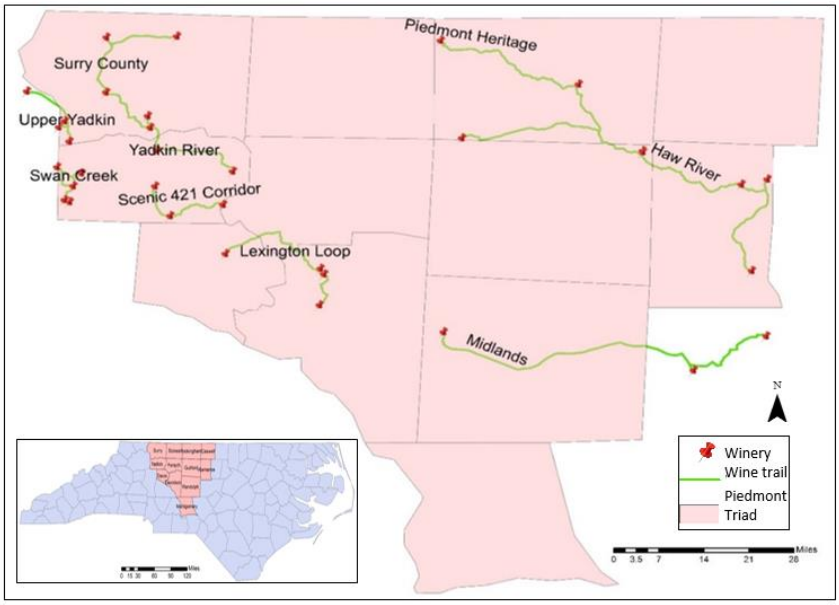

Figure 4. Map of study wine trails and wineries in the Piedmont Triad (NC)

The Piedmont Triad was selected as the study region because of the rapid growth of wineries and wine trails in this area. Located in the north-central NC, The Piedmont Triad covers 12 counties with a total area of 5,875 square miles (U.S. Census Bureau, 2010). Three main cities (Greensboro, Winston-Salem, High Point) within this area form the Triad geographically. Besides the growing wine industry, the Piedmont Triad is also known for its textile, tobacco and furniture industries. The region has an estimated population of 1,640,357

residing in 646,333 households, with an average median household income of $41,873 (U.S. Census Bureau, 2010). Low formal education, thus poverty levels, are relatively high in this region; only 18% have at least a bachelor's degree and 17% is below poverty level (U.S. Census Bureau, 2010).

Nine trails fell within the Piedmont Triad comprising a total of 34 wineries (Figure 4)[2]. The study wine trails are concentrated in three main areas: (1) western Piedmont Triad (Surry County, Upper Yadkin, Swan Creek, Yadkin River, Scenic 421 Corridor); (2) eastern side of Piedmont Triad (Piedmont Heritage, Haw River); and (3) southern part of the Triad (Lexington Loop, Midlands). Most wine trails are composed by three or four wineries (M = 4), except for Swan Creek which has five wineries (Table 2). The nine wine trails range from 15.2 to 68.0 miles in length (M = 32.2 miles). They range from 2.5 to 38.7 miles in the relative distance between two neighboring wineries along the same trail. Most study wine trails span two counties, with the exception of Surry County (1 county) and Lexington Loop (3 counties).

[2] The Piedmont Crossroads and Uwharrie Mountains wine trails were excluded from this study because only a small proportion of their routes fell within the Piedmont Triad.

Table 2. General information of study wine trails and their comprising wineries

Trail and Comprising Wineries	Length	Counties Encompassed	Wineries' coordinates
Haw River	***42.8 miles***	***2 counties***	
Benjamin Vineyards & Winery			35.927251, -79.308354
Grove Winery			36.221028, -79.555460
Glen Marie Vineyards			36.138914, -79.331743
The Winery at Iron Gate Farm			36.151356, -79.272884
Lexington Loop	***26.8 miles***	***3 counties***	
Childress Vineyards			35.843039, -80.286008
Junius Lindsay Vineyard			35.932423, -80.283958
Raylen Vineyards and Winery			35.968872, -80.498289
Weathervane Winery			35.918771, -80.275730
Midlands	***53.5 miles***	***2 counties***	
Horizon Cellars			35.682756, -79.440143
Silhope Winery			35.767042, -79.275842
Zimmerman Vineyards			35.776618, -80.005403
Piedmont Heritage	***68.0 miles***	***2 counties***	
Autumn Creek Vineyards			36.491853, -80.012076
Chinqua Penn Vineyards			36.384272, -79.699996
Grove Winery			36.218345, -79.555092
Stonefield Cellars			36.252458, -79.963796
Scenic 421 Corridor	***15.2 miles***	***2 counties***	
Alison Oaks Vineyards			36.134534, -80.657748
Hangover Park Vineyard			36.061572, -80.623512
Westbend Vineyards			36.089251, -80.504014
Surry County	***31.6 miles***	***1 county***	
Hutton Vineyards			36.278262, -80.668772
Old North State Winery			36.501841, -80.608391
Round Peak Vineyards			36.499874, -80.768162
Shelton Vineyards			36.364904, -80.768634
Swan Creek	***15.5 miles***	***2 counties***	
Buck Shoals Winery & Vineyard			36.100769, -80.862877
Dobbins Creek Vineyards			36.167017, -80.824682
Laurel Gray Vineyard			36.134946, -80.842835
Raffaldini Vineyards			36.181723, -80.879420
Shadow Springs Vineyard			36.096083, -80.851375
Upper Yadkin	***15.8 miles***	***2 counties***	
Brushy Mountain Winery			36.244135, -80.851783
Elkin Creek Vineyard			36.279499, -80.875407
Grassy Creek Vineyards			36.294444, -80.862147
McRitchie Winery			36.367202, -80.947827
Yadkin River	***20.8 miles***	***2 counties***	
Flint Hill Vineyards			36.170854, -80.482074
Ragapple Lassie Vineyards			36.221954, -80.654604
Stony Knoll Vineyards			36.306877, -80.674453

Data, Measurements and Geospatial Procedures

Wine trails' *Spatial Pattern*, *Connectivity* and *Accessibility* were employed as geospatial attributes. *Spatial Pattern* was calculated by the standard deviation (*SD*) of the distance (in miles) between contiguous wineries comprised in each wine trail. Gamma index (Υ) was employed to measure *Connectivity* of the road system (including interstate highways, state routes and local roads) in this study for its suitability for tourism research (Smith, 1997). *Accessibility* was measured by the distance (in miles) from a winery to the nearest highway (paved roads with controlled access and highest speed limits, Federal Highway Administration, 2014). Data for geospatial attributes were retrieved from the Environmental Systems Research Institute (ESRI, 2013) website and the road system data (layers) was downloaded from the NC Department of Transportation ("Road data", 2013).

Tourism attributes were captured through simple counts of services/amenities provided by wineries and wine trails. Data regarding services/amenities provision were retrieved from the NC Department of Commerce website ("Wine", 2013) and individual wineries' website. The number of services/amenities provided by each winery was counted in a dichotomous way (1 = available; 0 = not available). A total of 14 services/amenities were identified (range 0 - 14) related to four domains: (1) *landscape* referring to those linked to natural and agricultural settings such as on-site vineyard and grape pick-up (range 0 - 3); (2) *wine tourism* described those services/amenities inherent to this industry, such as wine tastings and winery tours (range 0 - 5); (3) *hospitality* encompassed the provision of food and beverages, private events and lodging services (range 0 - 3); and (4) *other* captured a variety of services/amenities catering to visitors that didn't fall within the previous categories, such as

art galleries and outdoor recreation (range 0 - 3). Services/amenities provided within each domain were first counted for each winery; then these counts were added to calculate the total number of services/amenities per domain provided by the wine trail.

Scores of wineries on their overall service provision were used to calculate three indices (*Comprehensiveness*, *Dominance*, and *Complementariness*) at the wine trail level. *Comprehensiveness* was computed by the sum of all different services that wine trails provide. For example, if a wine trail offered altogether 12 services/amenities (out of 14) to their visitors, their *Comprehensiveness* would be 0.86 (12/14). *Dominance* was calculated through the standard deviation of services/amenities scores across wineries divided by the mean scores among wineries within the wine trail (*SD/M)*. For example, if a given wine trail is composed by four wineries which altogether provide 26 services/amenities (M = 6.5; SD = 2.7), their *Dominance* would be 0.42 (2.7/6.5). *Complementariness* was calculated by the number of services/amenities provided within a trail divided by the maximum services/amenities index score (14), after excluding services/amenities provided by all wineries. For example, if a trail offered 12 services/amenities but one service was offered throughout its comprising wineries, the *Complementariness* would be 0.79 ([12-1]/14). Scores of each tourism measures range from zero to one, representing three levels: Low (0 – 0.4), Moderate (0.4 – 0.8) and High (0.8 – 1.0).

Geospatial and tourism indices were imported into GIS for geospatial analysis. Coordinates of each winery were imported to ArcGIS to generate a map where each wine trail was located and push-pinned. Network analysis was then performed to visualize the nine mapped wine trails. The total length of each wine trail and the relative distance between two

nearby wineries along trails were recorded and compared with data retrieved earlier from NC Department of Commerce to ensure accuracy. An ArcGIS extension for vector data spatial analysis (XTools) was utilized to compute and capture the points where wine trails intersect with road systems. The number of intersections and road segments that subdivided by intersections (edges) was used to compute the Gamma index. The near tool in ArcGIS was used to calculate the distance from each winery to the nearest highway in miles. Then table join and spatial join functions (ArcGIS) were performed on the spatial measures (e.g., *Connectivity*) and tourism indices (e.g., *Complementariness*) obtained from earlier analysis to integrate all data for each wine trail into one map. Such integration was used to summarize wine trails' characteristics and develop the geospatial and tourism characterization.

Results

Geospatial Characterization

The nine wine trails vary greatly relating to the relative distance between adjacent wineries (Table 3). Midlands showed the largest relative distance variation (*SD* = 11.9) between its three comprising wineries (38.7 and 14.9 miles). In contrast, Surry County showed the lowest variation (*SD* = 0.5) closely followed by Swan Creek (*SD* = 0.6). Wine trails with similar distance variation between their neighboring wineries also showed different *Spatial Patterns* based on the overall dispersion of their wineries. For example, Haw River (*SD* = 6.1) and Lexington Loop (*SD* = 5.7) have similar distance variations throughout the trail. However, Haw River has two wineries in the middle of the trail very close to each other (5.6 miles) but farther away from the wineries at each end (18.4 and 18.8

miles); Lexington Loop has three wineries clustered at one trailhead (6.7 and 6.7 miles) and much farther away from their fourth winery at the other end of the trail (18.8 miles). Variations in relative distance and dispersion of wineries along wine trails suggest three types of *Spatial pattern*s of wine trails: (1) *Center Clustered* where wineries tend to be gathered in the middle of the wine trail (Haw River); (2) *Trailhead Clustered* referring to those trails in which most of their wineries are concentrated in either of the trail end (Lexington Loop, Midlands, Swan Creek, Upper Yadkin, Yadkin River); and (3) *Evenly Spread* in which the distance among wineries are similarly spread along the trail (Piedmont Heritage, Scenic 421 Corridor, Surry County).

Table 3. Summary of geospatial attributes of the study wine trails

Trail Name	Spatial Pattern[1]					Connectivity[2]			Accessibility[3] (in miles)
	1	2	3	4	*SD*	Intersect	Edge	Gamma (*Y*)	
Haw River	18.4	5.6	18.8	-	6.1	89	158	0.31	0.08
Lexington Loop	18.8	6.7	6.7	-	5.7	70	132	0.31	0.02
Midlands	38.7	14.9	-	-	11.9	145	283	0.32	1.71
Piedmont Heritage	22.9	17.4	27.5	-	4.1	148	290	0.32	1.34
Scenic 421 Corridor	6.1	9.1	-	-	1.5	40	80	0.33	0.64
Surry County	10.1	10.3	11.2	-	0.5	68	130	0.31	0.02
Swan Creek	4.9	4.3	3.5	2.5	0.6	25	49	0.31	0.03
Upper Yadkin	8.9	2.6	4.3	-	2.7	29	56	0.31	0.01
Yadkin River	7.9	12.9	-	-	2.5	34	69	0.33	0.57

[1] Measured by distance between two nearby wineries on wine trail in miles. Relative distance is arranged in the direction from north toward south between two contiguous wineries. Vacant cases mean the wine trail don't have that number of wineries.

[2] Intersections and edges are measured by simple counts.

[3] High accessibility < 0.5 miles to nearest highway; moderate accessibility = 0.5 – 1.0 miles to nearest highway; low accessibility > 1.0 mile to nearest highway.

The number of intersections and edges are related to the total length of wine trails. For example, Piedmont Heritage (68.0 miles), the longest one among the nine study trails has most intersections (148) and edges (290), while Swan Creek, the shortest trail, has least intersections (25) and edges (49). Despite such variations in trail length, and number of intersections and edges, results indicate very similar levels of *Connectivity* among the nine wine trails (Y = 0.31 - Y = 0.33; M_Y = 0.32) representing low levels of *Connectivity* (Olawale & Adesina, 2013).

Overall, wine trails have a good level of *Accessibility* (M = 0.4 miles); 77.8% of the studied wine trails are within one mile from a highway and 55.6% less than 0.5 miles; 66.7% has at least one section of the trail on highway (Lexington Loop, Midlands, Piedmont Heritage, Scenic 421 Corridor, Surry County, Upper Yadkin). Two trails, Midlands (1.71 miles) and Piedmont Heritage (1.34 miles), are located more than one mile away from a highway. Variations on *Accessibility* suggest wine trails be characterized in three groups: (1) *High Accessibility* representing wine trails located less than 0.5 miles away from highway (Haw River, Lexington Loop, Surry County, Swan Creek, Upper Yadkin); (2) *Moderate Accessibility*, referring to wine trails that are between 0.5 – 1.0 miles away from a highway (Scenic 421 Corridor, Yadkin River); and (3) *Low Accessibility* comprising wine trails located more than one mile away from a highway (Midlands, Piedmont Heritage).

Tourism Characterization

As expected, given the nature of the studied trails, *Wine tourism* is the most popular service domain (M = 10) provided by wine trails, followed by *Landscape* (M = 5) and

Hospitality (*M* = 5); *Other* types of services are the least provided (*M* = 2; Table 4). With regards to the quantity of services provided, the Piedmont Heritage wine trail (28 services) is leading its counterparts, even surpassing the number of services provided by Swan Creek trail (23 services) formed of five wineries. Midlands is the wine trail providing the least number of services (12 services) probably due to the fact that it consists of only three wineries.

Table 4. Summary of tourism attributes of the study wine trails

Trail Name	**Service Attributes[1]**					**Comprehensiveness[2]**	**Dominance[2]**	**Complementariness[2]**
	LS	**WT**	**HS**	**OT**	***Σ***			
Haw River	5	14	4	3	26	0.86	0.48	0.79
Lexington Loop	3	11	4	0	18	0.57	0.22	0.50
Midlands	5	6	1	0	12	0.50	0.25	0.36
Piedmont Hrtg.	6	14	5	3	28	0.93	0.20	0.71
Scenic 421 Corr.	4	11	4	2	21	0.64	0.00	0.40
Surry County	5	11	5	2	23	0.71	0.48	0.57
Swan Creek	6	13	6	0	25	0.71	0.58	0.57
Upper Yadkin	6	5	6	4	21	0.71	0.52	0.71
Yadkin River	5	9	6	4	24	0.86	0.33	0.64
Mean	5	10	5	2	22	0.72	0.34	0.58

[1] Measured by simple counts; LS = Landscape, WT = Wine tourism, HP = Hospitality, and OT = Other.
[2] Three levels for tourism measures: low (0.0 – 0.4), moderate (0.4 – 0.8) and high (0.8 – 1.0).

Comprehensiveness of the wine trails ranges from 0.50 to 0.93 (*M* = 0.72) suggesting a relative broad variety of services provided by each wine trail. Six of the nine wine trails scored very high (*Comprehensiveness* = +0.7) by offering at least 10 services to their tourists. Results indicate that Piedmont Heritage is the most comprehensive wine trail providing 13

different types of services (*Comprehensiveness* = 0.93). Midlands (*Comprehensiveness* = 0.50) and Lexington (*Comprehensiveness* = 0.57) are least comprehensive, providing only seven different types of services. Two levels of *Comprehensiveness* were identified: (1) *High Comprehensiveness* composed by three trails (Haw River, Piedmont Heritage, Yadkin River) and (2) *Moderate Comprehensiveness* composed by six wine trails (Lexington Loop, Midlands, Scenic 421 Corridor, Surry County, Swan Creek, Upper Yadkin).

The nine wine trails differ greatly with each other on *Dominance* (range = 0.00 - 0.58). Swan Creek (*Dominance* = 0.58) shows a clear sign of having one dominant winery in the trail, while Scenic 421 Corridor (*Dominance* = 0.00) reveals no such indication. Overall low *Dominance* scores imply wine trails do not have an obvious dominant winery (*M* = 0.34), which is positive considering that wine trail is marketed as a whole rather than by individual comprising wineries. Dispersions on *Dominance* suggest wine trails are of: (1) *Moderate Dominance* (Haw River, Surry County, Swan Creek, Upper Yadkin), or (2) *Low Dominance* (Lexington Loop, Midlands, Piedmont Heritage, Scenic 421 Corridor, Yadkin River).

The tourism services provided by wineries within each wine trail tend to complement each other as denoted by their overall good level of *Complementariness* (*M* = 0.58), implying that some services provided by wineries along each trail are not overlapping with each other but quite unique. However, *Complementariness* varies greatly across wine trails (range = 0.36 - 0.79), suggesting that wine trails in the Piedmont triad are of: (1) *Moderate Complementariness* (Haw River, Lexington Loop, Piedmont Heritage, Surry County, Swan Creek, Yadkin River, Upper Yadkin) or (2) *Low Complementariness* (Midlands, Scenic 421 Corridor).

Table 5. Summary of geospatial and tourism characterization of wine trails

Trail Name	Geospatial Indicators			Tourism Indicators[2]		
	Spatial Pattern	Connect.	Access.[1]	Comprehen.	Domin.	Complement.
Superior Geospatial and Tourism Characterization						
Haw River	Center cluster	Low	High*	High*	Moderate	Moderate*
Lexington Loop	Trailhead cluster	Low	High*	Moderate	Low*	Moderate*
Piedmont Hrtg.	Evenly spread	Low	Low	High*	Low*	Moderate*
Yadkin River	Trailhead cluster	Low	Moderate	High*	Low*	Moderate*
Marginal Geospatial and Tourism Characterization						
Surry County	Evenly spread	Low	High*	Moderate	Moderate	Moderate*
Swan Creek	Trailhead cluster	Low	High*	Moderate	Moderate	Moderate*
Upper Yadkin	Trailhead cluster	Low	High*	Moderate	Moderate	Moderate*
Poor Geospatial and Tourism Characterization						
Midlands	Trailhead cluster	Low	Low	Moderate	Low*	Low
Scenic 421 Cor.	Evenly spread	Low	Moderate	Moderate	Low*	Low

[*] Indicates higher scores
[1] High accessibility < 0.5 miles to nearest highway; moderate accessibility = 0.5 – 1.0 miles to nearest highway; low accessibility > 1.0 mile to nearest highway.
[2] Three levels for tourism measures: low (0.0 – 0.4), moderate (0.4 – 0.8) and high (0.8 – 1.0).

Geospatial and Tourism Characterization Summary

In summary, results indicate geospatial and tourism variations across the nine wine trails in terms of *Spatial Patterns, Accessibility, Comprehensiveness, Dominance*, and *Complementariness*; all were consistent on their low level of *Connectivity* (Table 5). Most wine trails are clustered in their trailhead, and have high *Accessibility*, moderate *Comprehensiveness,* low *Dominance* and moderate *Complementariness*. Haw River, Lexington Loop, Piedmont Heritage, and Yadkin River showed a superior geospatial and tourism characterization given their overall good standing in three out of four indicators

(high *Accessibility*, high *Comprehensiveness*, low *Dominance*, or moderate *Complementariness*). On the other hand, Midlands and Scenic 421 Corridor appeared to have a poor geospatial and tourism characterization only exceling on their low *Dominance* level. Surry County, Swan Creek, and Upper Yadkin had a marginal geospatial and tourism characterization having high scores in two attributes (high *Accessibility*, moderate *Complementariness).*

Discussion and Implications

The identification and quantification of geospatial and tourism measures used in this study appear suitable to characterize and further classify wine trails. Given that different *Spatial Patterns* were found across levels of *Accessibility, Comprehensiveness, Dominance,* and *Complementariness*, it is postulated that these measures also suitable to characterize other types of theme routes, such as culinary or religious routes where nodal points (restaurants, churches) are readily identified and serve as major routes destinations. Although *Connectivity* was unsuitable to characterize the study wine trails, these results should not be taken as conclusive considering its potential association with the overall remoteness of all wine trails in rural areas.

Low levels of *Connectivity* attained across all nine wine trails indicate that the road network systems in the study area is far from ideal, probably also due to their remote locations. These results call for an enhancement in wine trails' connectivity and the road network systems to boost wine tourism development in Piedmont Triad, considering that a high level of *Connectivity* is a determinant of successful tourism and shapes tourists' travel

destination choices (Olawale & Adesina, 2013). Good *Accessibility* across the study wine trails is a great asset, given its capacity to increase regional attractiveness and the number of tourists (Papatheodorou, 2004).

As per the tourism attributes, results suggest that Piedmont wine trails are providing a variety of *wine tourism* services to their visitors. Still much room exists for expanding their amenities on the *landscape* features of their vineyards and on *hospitality* services inherent to the wine tourism (e.g., private events, food services), especially on the *other* category (e.g., art-related components, outdoor recreation options). The low-to-moderate *Dominance* within the Piedmont wine trails may imply good communication among the comprising wineries at their inception development stage, results deserving further exploration. Worth noting is that wine trails with a moderate dominant winery represent the recent-to-longstanding established continuum, suggesting that *Dominance* may not only be attained through years of accumulating tourism experience, marketing intelligence, or resources.

The geospatial and tourism characterization of this study suggests important practical implications for wineries in the Piedmont Triad as well as regional tourism planners. It is advisable that when enhancing wine trails' connectivity, planners concentrate on the number and density of connections in road networks regardless the wine trails' length, as this study found that longer trails do not warrant better levels of connectivity. Such strength should be better promoted in wineries' websites and other promotional media to firmly seize interested potential visitors; similarly, managers should consider highlighting their easy access through signage along the highway and nearby exit to capture wine enthusiasts driving-by.

Considering the relative proximity among wine trails, the one trail providing higher number of services and amenities will better position itself as compared to their counterparts. However, when considering increasing new offerings, wineries' managers should keep in mind that they are part of one theme route. Therefore, wineries are suggested identify their niche services to complement the service provision of other wineries along the trail to strengthen the attractiveness of the entire route (*Comprehensiveness*) while decreasing the competition (*Dominance)* among them.

Efforts should also be made to outbalance comprising wineries to reduce *Dominance* within the entire route. The low *Complementariness* found within the two wine trails having the least number of comprising wineries (Midlands, Scenic 421 Corridor) suggests that wine trails developers should carefully consider the "magic number" of comprising wineries and the composition of their neighboring competitors when tracing their routes, as lower *Complementariness* may decrease their overall tourism appeal. Wine trails with smaller number of nodal wineries than their neighboring routes should pay special attention to developing unique services and amenities to strengthen their distinctive tourism appeal.

Limitations and Future Research

Implications outlined from this study should be interpreted with caution when extrapolated to other contexts because of three main limitations. First, although the Piedmont Triad was chosen as suitable for this study, it is by no means representative of other wine regions in the state or elsewhere. Regions with different levels of tourism development, regional wine branding, agricultural characteristics (e.g., soil, water), or political structures

(e.g., local support, subsidies) may result in a different characterization. Second, the nine wine trails examined were justified and appropriate for developing a primary characterization of the wine trails in the Piedmont. However, they only represent a small proportion of the 277 wine trails dispersed in 48 states in the U.S. with distinct geographies and contexts. Such small sample size also limited the capacity to conduct statistical analysis to further validate differences across wine trails. A third limitation refers to the spatial scale - local level, used in this study. Although this scale was appropriate to portray Piedmont's geographic data and spatial attributes, using a different scale (e.g., regional level) may produce different spatial patterns (Lam & Quattrochi, 1992). Given these limitations, any generalizations or interpretations of the results beyond the scope of this study should be done with caution.

Despite the limitations, this study leads the way for future geospatial and tourism characterization of TTRs as well as carries the aforementioned planning and managerial implications. To move forward in validating the developed geospatial and tourism characterization, this study should be replicated in other geographic regions to capture a broader spectrum of wine trails with different geospatial characteristics (e.g., spatial patterns, number of comprising wineries), at different tourism development stages, and within various agro-ecological systems which determines the types and quality of grapes grown and wines produced. It is advisable that different spatial scales, besides county-level, be considered when exploring the geospatial and tourism characterization in other regions.

The geospatial and tourism characterization was measured using three geospatial indicators that have been previously used and validated in previous studies (e.g., Olawale & Adesina, 2013). Although the concept of tourism attributes examined were adapted from the

economics and marketing fields, their actual measures were entirely created for this characterization based on the services/amenities wineries usually provide. Therefore, such tourism measures need to be validated among other wine tourism settings and its utility further examined pertaining to other types of tourism services beyond TTRs.

The outlined planning and management implications of this study can be expanded if this developed geospatial and tourism characterization is further explored in association with other determinants of successful tourism developments. For example, it is yet to investigate whether and to what extent wine trails' geospatial and tourism characteristics influence residents' attitudes towards wine tourism; also if those attributes foster different levels of social capital among communities along the trails. The resulting geospatial and tourism characterization can also be tested on other types of TTRs especially those required driving distance between their nodal attractions (e.g., culinary routes, craft trails) to expand its planning and management implications and consolidate its theoretical contributions.

Conclusions

This study examined nine wine trails in the Piedmont Triad of NC aiming to enhance the geospatial and tourism understanding of wine trails through their characterization. The identification and quantification of three geospatial (*Spatial Pattern, Connectivity, Accessibility*) and three tourism-related (*Comprehensiveness, Dominance, Complementariness*) attributes was suitable to characterize the study wine trails and to further classify them as superior, marginal, and poor geospatial and tourism wine trails. With minor adjustments, such geospatial and tourism attributes can be applied to other TTRs. By

proposing this characterization of TTRs, this study made significant contributions to the scholarship and practice of tourism and wine tourism in particular.

From the scholarship perspective, the identification and synthesis of geospatial and tourism attributes of wine trails smooth the path for future TTRs studies, an area that is under-represented in the literature. The use of GIS to frame wine trails' characterization in this study provides new directions in the tourism field in three ways. First, this study pioneers the simultaneous examination of different geospatial and tourism attributes besides the simple trail length and wineries count in the literature. Second, this study shows that GIS can be used to synthesize several attributes, including tourism indicators, by homogenizing their measures through a more sophisticated analysis. Lastly, the creation of three tourism service measures sets the baseline for future tourism studies assessing different types of services/amenities.

Results of this study also shed light on issues to consider in the planning and design of the rapidly growing wine tourism industry, which relies on wine routes to attract a larger number of visitors. On this regards, the study characterization provides management intelligence as to indicate what and how to improve the geospatial and tourism performance on wine trails based on six attributes. Despite that TTRs greatly differ on their themes, the geospatial and tourism characterization developed in this study can be applied not only to other wine trail contexts but also other types of TTRs and tourism phenomena, especially located in rural areas.

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Residents' Attitudes toward Wine Trails and Wine Tourism Development [3]

Abstract

Wine trails, as a linear tourism setting, have been studied insufficiently despite their recent rapid development around the world. In response, this study examines the attitudes of residents living along wine trails toward wine tourism development and explore the influence of geospatial factors, demographics and levels of wine enthusiasm, on their attitudes. Residents living along two wine trails in North Carolina (U.S.) were surveyed using a drop-off/pick-up method. Results indicate residents had neutral attitudes toward local wine trails overall, but were slightly positive about wine trails increasing the economy, socio-cultural quality, and environmental conditions of their communities. Residents' age and frequency of visits to wine trails were significantly associated with their attitudes toward wine trails; no significant associations were found between geospatial attributes and residents' attitudes. This study sheds light on issues related to wine trail planning, design, management, and policy making at all levels.

Keywords: Geospatial measures; Personal benefits; Residents' attitudes; Wine trails; Wine tourism

[3] This manuscript will be submitted to a tourism journal. Thus, it follows tourism journal guidelines: Abstract maximum length 150 words; manuscript maximum length 10,000 (including abstract, text, tables and references); and Chicago reference style. Word Count = 9,811; Figures = 3; Tables = 8

Introduction

Wine trails has grown considerably in the last decade globally (America's Wine Trail 2012; Hardy 2003). Despite such popularity and their relevance to economic development (Bruwer 2003), the literature on wine trails is scant as the main body of wine tourism focuses predominantly on entire wine regions. The limited number of studies on wine trails have primarily examined marketing issues, such as identifying current and potential visitors and exploring marketing strategies for further development (Hashimoto and Telfer 2003; Jaffe and Pasternak 2004), or performance evaluation in terms of satisfaction and managerial constraints (Correia et al. 2004). The extant wine tourism literature reveals a scarcity of studies assessing local residents' attitudes toward wine trails, which is incongruent with residents being a key stakeholder in regional tourism development (Jamal and Getz 1995; Sautter and Leisen 1999).

Limited understanding of local residents' attitudes toward wine trails challenges their planning and management optimization. For example, the lack of genuine community participation resulting from residents' distrust and uncertainty about tourism developments is a significant constraint encountered during tourism routes' development (Briedenhann and Wickens 2004). This is not surprising, considering residents' attitudes toward tourism development are a key determinant for successful tourism (Gursoy and Rutherford 2004) and residents' involvement is directly related with their support for tourism development endeavors (Gursoy and Rutherford 2004; Heffernon, Andereck, and Vogt 2000; Teye, Sirakaya, and Sönmez 2002).

Different approaches have been used to examine residents' attitudes toward tourism development and their perceptions of tourism impacts. Several studies have assessed residents' perceived impacts at the personal level (McGehee and Andereck 2004); perceived economic, socio-cultural, and environmental impacts (Byrd, Bosley, and Dronberger 2009; Gursoy and Rutherford 2004); and overall community satisfaction (Nunkoo and Ramkissoon 2009). Some attributes have been found to influence residents' attitudes toward tourism endeavors, including demographic characteristics (McGehee and Andereck 2004), level of economic dependency on tourism sector activities (Liu and Var 1986), and length of residence in the local community (Lankford and Howard 1994). However, results are inconclusive and additional data are needed to comprehensively understand factors that influence residents' attitudes.

Although geospatial attributes (e.g., residents' locations, distance) have caught researchers' attention for shaping residents' attitudes toward regional tourism development, efforts were placed merely on the distance to the center of the study area (Harrill 2004; Harrill and Potts 2003; Jurowski and Gursoy 2004; Raymond and Brown 2007). Information is scarce related to linear tourism settings –particularly wine trails– given that previous studies have mainly focused on tourism nodes such as specific attractions (Harrill and Potts 2003) or towns (Gursoy et al. 2002, McGeehee et al. 2010). Besculides, Lee, and McCormick (2002) did conduct a study on a linear tourism setting (Los Caminos Antiguos Scenic and Historic byway, Colorado, U.S.) assessing residents' perceived cultural benefits; however the influence of geospatial characteristics (e.g., connectivity, accessibility, distance) on residents' attitudes along touring routes were not explored.

The burgeoning of wine trails around the world, the scarce tourism literature on wine trails in general and on their neighboring residents' perceptions in particular, and the overall lacuna on the role of geospatial characteristics on residents' attitudes toward tourism development along linear tourism settings, call for the need to understand residents' attitudes toward tourism development along wine trails. Filling such a gap is critical to planning, managing and marketing wine trails. Thus, residents surrounding two wine trails in the Piedmont region of North Carolina (NC, U.S.) were surveyed to examine their attitudes toward local wine trails while incorporating geospatial characteristics into such examination. Specifically, this study's objectives were to: (1) explore residents' attitudes toward local wine trails; (2) examine socio-demographic, wine-related, and geospatial factors associated with residents' perceived personal benefits and attitudes toward local wine trails; and (3) examine the mediating effect of personal benefits on attitudes toward local wine trails.

Literature Review

Residents' Attitudes toward Tourism

Studies on residents' attitudes and perceptions in tourism communities date back to the early 1960s, when the main focus was to examine the perceived positive impacts derived from tourism development (Jafari 1986). Both terms (attitudes, perceptions) were used interchangeably in many studies as they used similar measurement items and scales (McGehee and Andereck 2004; Andereck and Nyaupane 2011). Evidence of the deterioration of natural and cultural resources associated with tourism development expanded the benefits-related research foci to assess negative impacts during the 1970s (Pizam 1978). Those studies

evolved to be more integrated in the 1980s by investigating positive and negative impacts in parallel (Belisle and Hoy 1980) and by moving from one-dimensional (mainly economic) to multi-dimensional studies (Milman and Pizam 1988). At that time, studies were also driven by the need to garner more comprehensive residents' assessments to support further tourism development (Murphy 1985).

Perdue et al. (1990) established a threshold in research on residents' attitudes toward tourism by moving beyond inventorying impacts to linking impacts with residents' support for additional development. Several studies further extended the linkages between tourism impact and resident's support while examining residents' attitudes (e.g., Lankford and Howard 1994) and perceptions (e.g., Ross 1992). Research on resident's perceptions also moved from macro (e.g., statewide) to micro approaches by exploring specific variables predicting residents' perceptions of tourism within communities (McGehee and Andereck 2004; Perdue et al. 1990). Although research on residents' attitudes toward tourism developments has been conducted for more than four decades, the quest for sustainability in the new millennium has triggered a renewed interest in residents' perceptions of tourism impacts on the environment and society (Gursoy, Chi, and Dyer 2009; Northcote and Macbeth 2006).

Theoretical Frameworks behind Residents' Attitudes: The Social Exchange Theory

Several theories have framed residents' attitudes studies throughout the years, including: the *Growth Machine* theory, focusing on tourism as an economic engine (Harrill, Uysal, Cardon, Vong, and Dioko 2011); the *Tourism Use History* theory, emphasizing residents'

specific responsibilities toward tourism development within the community (Draper, Woosnam, and Norman 2011); the *Power* theory, focusing on individual's power (Kayat 2002); and *Community Attachment*, prioritizing residents' levels of social bonds and community participation (Gursoy and Rutherford 2004). More recently, the *Identity* theory proposes that resource-based occupational identity, environmental identity, and gender identity of residents influence their attitudes toward tourism impacts and support (Nunkoo and Gursoy 2012).

The Social Exchange theory (SET) has been predominantly employed to assess residents' attitudes toward tourism development (Andriotis 2005; McGehee and Andereck 2004; Wang and Pfister 2008). Originating from earlier philosophical and psychological orientations in utilitarianism and behaviorism, SET has been one of the major theoretical perspectives in social psychology (Cook and Rice 2003) since the early works of Homans (1961), Blau (1964) and Emerson (1962). Social exchange refers to the exchange "of activity, tangible or intangible, and more or less rewarding or costly, between at least two persons" (Homans 1961, p. 3); that is, the benefits a person provides to another person is contingent on rewards from the other (Nunkoo and Ramkissoon 2011). Such exchange of activities and resources is a basic form of human interaction and people tend to maximize the value of the exchange outcomes (Choi and Murray 2010).

Evaluations of the value of an exchange is complex and dynamic (Blau 1964; Jurowski et al. 1997). SET postulates that people make decisions regarding engaging in exchanges based on their evaluations of both costs and benefits occurring during the process (Andereck, Valentine, Knopf, and Vogt 2005; Jurowski and Gursoy 2004; Skidmore 1975). Individuals

are likely to evaluate an exchange positively and engage in the exchange if they perceive benefits outweigh costs, whereas individuals evaluate the exchange negatively if costs outweigh benefits. As a theory concerned with the exchange of resources between individuals and groups (Ap 1992), SET has been utilized in many social science fields, including anthropology (Levi-Strauss 1969), psychology (Kelley and Thibaut 1978), marketing (Bagozzi 1978), and communication (West and Turner 2000).

Ap (1990) first applied SET in the tourism field in the early 1990s (Choi and Murray 2010). Tourism development requires some exchanges within a community because local residents are more likely to positively engage in tourism development if perceived benefits from tourism outweigh the costs (Andereck et al. 2005; Chen and Chen 2010; McGehee and Andereck 2004; Perdue et al. 1990). Some common perceived benefits associated with tourism are increasing employment opportunities, improving quality of life, and cultural exchange between tourists and residents. Perceived costs include the increase in the prices of goods and services, increase in traffic congestion, and damage to natural environment and landscape (Gursoy and Rutherford 2004; Ko and Stewart 2002).

Measurements and Influencers of Residents' Attitudes

Based on SET, various models have been designed to assess residents' attitudes associated with tourism development in terms of perceived positive and negative impacts. Although early studies commonly distinguished between these two dimensions (Perdue et al. 1990), more recent researchers have argued that perceptions of tourism impacts stretch beyond positive and negative impacts. Jurowski et al. (1997) introduced the evaluation of

perceived tourism impacts within three dimensions (economic, social, and environmental), and their model was later challenged for the aggregation of costs and benefits into each dimension (Gursoy et al. 2002; Gursoy and Rutherford 2004). Thus, six dimensions — positive/negative economic, socio-cultural , and environmental impacts— are more prevalent within the literature (Chen and Chen 2010; Ko and Stewart 2002; Kuvan and Akan 2005; Vargas-Sanchez, Plaza-Mejia, and Porras-Bueno 2009; Yoon, Gursoy, and Chen 2001).

Although traditional tourism attitudes studies concentrate on residents' perceptions about tourism impacts on the community and environment (Andereck and Nyaupane 2011), perceived tourism impacts at the individual level –personal benefits– have also been examined. For example, McGehee and Andereck (2004) probed residents' personal benefits associated with tourism development with a two-item construct (i.e., "I would personally benefit from more tourism development in my community", "the amount I feel I benefit personally from tourism in my community"). Wang and Pfister (2008) further developed an eight-item scale to measure personal benefits along eight aspects: contributions to the economy, downtown revitalization, special events and programs, arts and cultural features, shopping and dining choices, recreation opportunity, historic homes, and community services. Although these studies verified the influence of personal benefits –especially indirect social values– in residents' perceptions, they failed to validate the scale developed to measure personal benefits. A more recent study of residents' perceptions of tourism impacts on quality of life, which integrated and tested residents' perceptions of personal benefit as a mediator, confirmed the need to include a measure of personal benefit when examining residents' perceptions of tourism development (Andereck and Nyaupane 2011).

Attributes influencing residents' attitudes have also been examined, especially in terms of demographic characteristics. Younger (McGehee and Andereck 2004) or more educated (Korça 1998) individuals tend to have more positive attitudes toward tourism than others. However, such associations are inconclusive, as other studies have found opposite results related to age (Tomljenovic 1999) and education (Ahmed 1986). Thus, it has been suggested that socio-demographic attributes do not influence attitudes toward tourism directly, but are mediated by perceived personal benefits (McGehee and Andereck 2004; Purdue et al. 1990).

Residents who are business owners (Lankford 1994) or financially dependent on the tourism industry (Deccio and Baloglu 2002; Haralambopoulos and Pizam 1996; Jurowski et al. 1997; Lankford and Howard 1994) also tend to positively welcome tourism developments as they perceive greater economic benefits derived from this industry. Community satisfaction is also related to residents' attitudes toward tourism development (Ko and Stuart (2002), although this relationship is not well understood (Nunkoo and Ramkissoon 2011). Similarly, community attachment, often measured by length of residence, is also related to resident's attitudes toward tourism development although the direction and strength of the relationship varies (Jurowski et al. 1997; Lankford and Howard 1994; McGehee and Andereck 2004).

Geospatial factors have been suggested to influence residents' attitudes toward tourism development (Belisle and Hoy 1980; Keogh 1990; Mansfield 1992; Harrill 2004; Jurowski and Gursoy 2004; Raymond and Brown 2007). However, past studies have only focused on nodal areas, in terms of specific attractions (e.g., Mount Rogers National Recreation Area in Virginia, Gursoy et al. 2002) or entire towns (e.g., Charleston in South Carolina, the coastal

town of Manteo, NC, Harrill and Potts 2003). Yet results from these studies are inconclusive; while some found that residence proximity to a tourism area increases the awareness of the benefits of tourism development, thus develops more favorable attitudes (Belisle and Hoy 1980; Mansfeld 1992; Sheldon and Var 1984), others found distant residents were more favorable to the impacts and development of tourism (Harrill and Potts 2002; Jurowski and Gursoy 2004; Raymond and Brown 2007). However, research has yet to examine residents' attitudes toward tourism development along linear tourism routes. Understanding residents' attitudes toward tourism and tourism routes is important as it helps informing community stakeholders and policy makers, enhances community satisfaction and improves quality of life for residents.

Research Methods

Study Wine Trails

This study examines two wine trails (Haw River, Surry County) from the Piedmont region of NC where almost one-half (11) of all 23 wine trails in this state are located. The Piedmont covers 5,875 square miles in 12 counties and is home to 646,333 households with an average median household income of $41,873 (U.S. Census Bureau 2010). Only 17.9% of the residents have at least a Bachelor's degree, and 17% of households live below poverty level (U.S. Census Bureau 2010). Besides the growing wine industry, the Piedmont is also known for textile, tobacco and furniture industries.

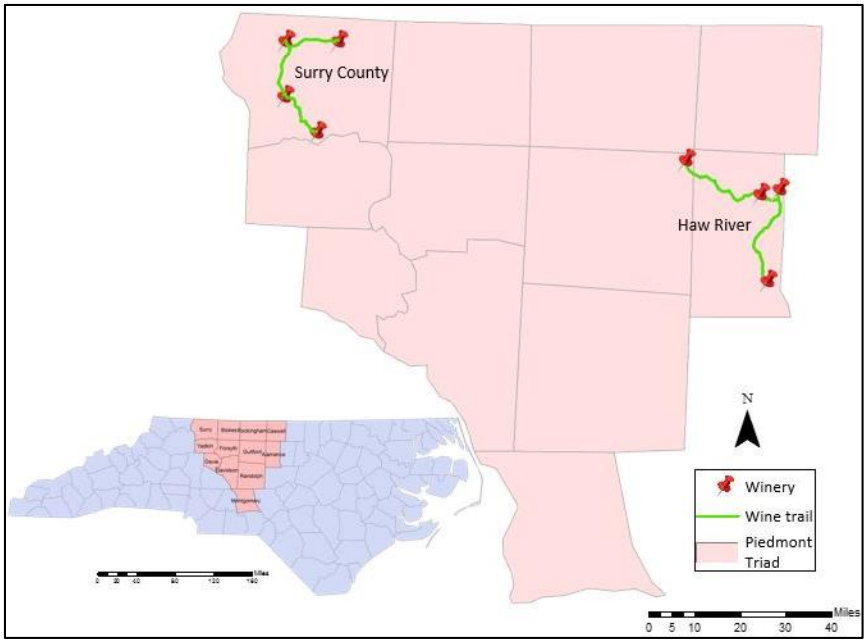

Figure 5. Study wine trails and their locations in the Piedmont Region (NC)

Haw River and Surry County were considered for this study because their unique characteristics can facilitate the identification of geospatial and tourism factors associated with residents' attitudes (Figure 5). Haw River Wine Trail (Haw River) and Surry County Wine Trail (Surry County) share several characteristics including same number of composing wineries (4), medium in trail length (Haw River = 43 miles; Surry County = 32 miles), and high accessibility with close proximity to a highway (Haw River = .08 miles; Surry County = .02 miles). Additionally, none of these wine trails show signs of having a dominant winery in terms of tourism amenities provided; furthermore, the tourism amenities their wineries provide complement each other. Despite those similarities, the Haw River and Surry County are very distinctive in terms of their relative locations in the Piedmont region (Haw River, central east; Surry County, northwest), spatial pattern (Haw River, wineries clustered in the

center of the trail; Surry County, wineries evenly spread), and the comprehensiveness of tourism services (Haw River, high comprehensiveness; Surry County, moderate comprehensiveness) [4].

Geospatial Data and Survey Instrument

Data were collected through a combination of Geographic Information System (GIS) applications and a survey instrument. GIS was used to calculate the distance from respondents' residence to the closest winery (in miles) as in indicator for residents' location immovability. A survey questionnaire was developed to collect information on residents' attitudes and perceived personal benefits associated with local wine trails, their socio-demographic characteristics, and their level of wine enthusiasm (e.g., visits to wine trails, wine club memberships)[5].

Given the lack of consistent methods and standardized instrumentation to measure resident's attitudes toward tourism (Lankford and Howard 1994), modified scales were used to assess their overall attitudes (Ko and Stewart 2002; Smith, Anderson, Davenport, and Leahy 2013) and perceived personal benefits (Andereck and Nyaupane 2011; McGehee and Andereck 2004; Wang and Pfister 2008) associated with local wine trails. The modified attitudes scale included in the instrument was comprised of 24 items representing three dimensions of perceived positive and negative impacts: *Economic Impacts* (8 items; e.g., "Economic stability of the community"; "Prices of goods and services"), *Socio-cultural*

[4] Refer to Manuscript 1 of this dissertation for specific details on the methodology behind the geospatial and tourism characterization of Haw River and Surry County.
[5] The survey instrument is included in Appendix B.

Impacts (8 items; e.g., "crime in the community", "small town feeling of the community"), and *Environmental Impacts* (8 items; e.g., "quality of public infrastructure and facilities", "traffic congestion and parking problems"). Items were measured using a five-point Likert scale (1 = significantly decreased; 5 = significantly increased). The modified personal benefits scale comprised seven items representing two dimensions: *Personal Enhancement* (4 items; e.g., "My property value has increased"; "I have more opportunities to participate in recreational activities"); and *Community Sentience* (3 items; e.g., "I feel my community a better place to live", "I care more about community's natural resources"), also measured in a five-point Likert scale (1 = strongly disagree; 5 = strongly agree).

The survey instrument also collected information on residents' level of wine enthusiasm including involvement with the wine industry (e.g., whether a household member work in a local winery), wine tourism (e.g., frequency of visits to the Piedmont wine trails), and length of residence in their current neighborhood (in years). Socio-demographic data queried were age (in years), level of education (5 categories ranging from high-school degree or less to advanced degree), and annual household income before taxes (6 categories ranging from less than $25,000 to $150,000 or more).

Sampling and Survey Procedures

A stratified random sample of 663 households residing in communities within a 10-mile buffer spread around each wine trail was selected for this study. The sample was stratified to include all zip codes within the study site and to capture households of varying distance from the wine trails. To examine the distance effect of wine trails on residents'

attitudes, one-half of the sample from each wine trail was randomly drawn within a 5-mile buffer and the other half within a 5-10 mile buffer. Only zip codes with at least five percent of their areas falling within the 10-mile buffer were included.

The drop-off/pick-up method for household survey research was used in this study by hand-delivering questionnaires in residences within study communities. This method was chosen as it reduces non-coverage error and increases response rate (Steele et al. 2001) and, thus, is suitable for surveying small rural communities such as the study sites. Data collection spanned two and half months (October-December, 2013) and involved a two-day procedure. Surveys were dropped off on weekends (Saturday and/or Sunday); the field researcher knocked on the door of sampled households, introduced herself to a present adult, and explained the study purposes. After obtaining the adult's consent, the researcher left a bag containing the survey instrument and a cover letter; she also instructed residents to hang the completed survey (in the supplied bag) on the doorknob on a designated date. The pick-up was scheduled during weekdays (2-3 days after drop-off). If no package was hung on the doorknob, the researcher knocked on the door and left a stamped envelope along with a brief note asking residents to mail their completed surveys back. This procedure was implemented after an attempt to drop-off the surveys with no personal contact resulted in a very low response rate during the first week of data collection along Haw River.

A total of 344 surveys were collected (294 picked-up; 50 mailed back) representing an overall response rate of 51.9%. Specifically, 401 surveys were dropped along the Haw River wine trail and 164 were returned (144 picked-up; 20 mailed back), representing 40.9% response rate. From the 262 surveys dropped along the Surry County Wine Trail, 155 were

returned (140 picked-up; 15 mailed-back) representing 59.2% response rate. The lower response rate along the Haw River wine trail was because of the method employed during the first week of data collection as aforementioned. A total of 300 complete surveys were included for analysis after excluding incomplete surveys.

Data Analysis

Data were coded and entered in the Statistical Packages for the Social Sciences (SPSS) 21.0 software for running analysis including descriptive statistics, Cronbach's alphas, and multivariate regressions ($p < .05$). Descriptive statistics were used to outline respondents' characteristics (e.g., demographic composition, level of wine enthusiasm), their attitudes and perceived personal benefits toward local wineries and wine trails. Cronbach's alphas were computed to test the internal reliability of items comprising each impact dimension (*Economic, Socio-cultural, Environmental*) and personal benefit (*Personal Enhancement, Community Sentience)* dimension; 0.33 corrected item score was used as the criterion to retain an item within a dimension (Ho, 2006). Then, the grand means for each impact dimension and personal benefit dimension were calculated; overall mean scores of attitudes and personal benefits were also calculated. To standardize measurement, item statements stating that Piedmont wineries increased "real estate and property tax", "prices of goods and services", "economic inequality among residents", "crime in the community", and "overcrowding in public area" were reverse coded for calculating dimension and overall means.

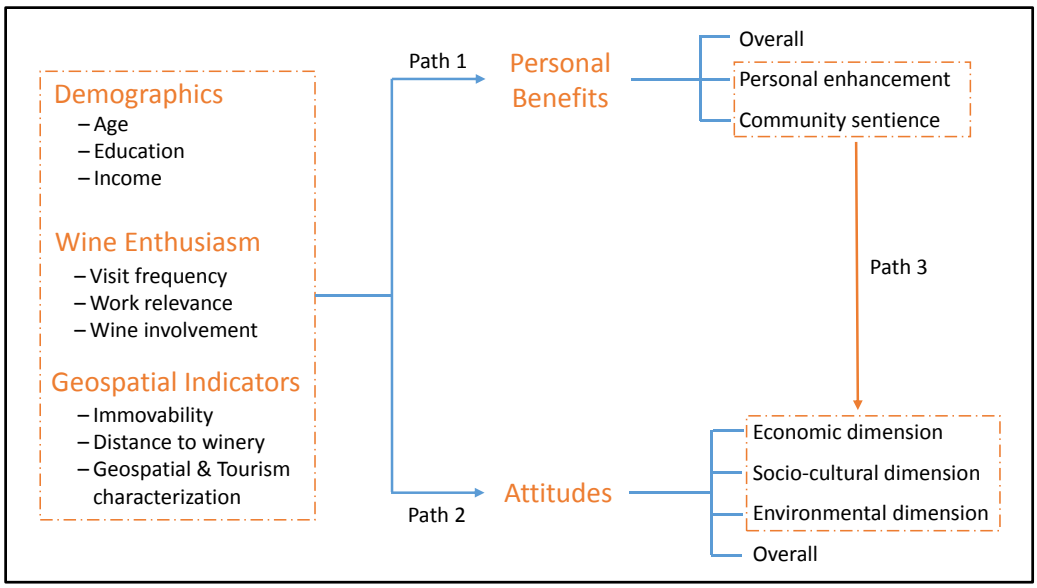

Figure 6. Model paths to examine resident's attitudes toward wine trails

Multivariate regressions were used to examine the influence of residents' demographics, their level of wine enthusiasm, and geospatial indicators on residents' perceived personal benefits and attitudes toward wine trails[6]. Specifically, three consecutive regression paths were followed (Figure 6). First, residents' demographics (age, education level, household income), level of wine enthusiasm (visit frequency to Piedmont wine trails, whether work is wine-related, level of wine involvement), and geospatial indicators (residents' location immovability, residence distance to closes wine trail, geospatial-tourism characterization) were regressed to residents' perceived personal benefits toward local wineries (personal enhancement, community sentience, overall personal benefits). Given the categorical nature of the geospatial-tourism characterization (Haw River = Superior; Surry County = Moderate),

[6] Structural equation modeling (SEM) was also attempted. However, the small sample size of this study prevented a good model fit. A SEM output is included in the Appendix C.

it was entered into the model in a dichotomous formed (Surry County, otherwise). In the second path, the nine independent variables were regressed to four indicators of residents' attitudes toward local wineries (economic, socio-cultural, environmental, overall). In the third path, residents' perceived personal benefits were regressed to residents' economic, socio-cultural and environmental attitudes toward local wineries, to confirm the mediating role of perceived personal benefits.

Preliminary statistical tests were conducted to examine whether demographic composition of residents neighboring the wine trails were comparable. Results showed no significant differences in key demographic characteristics (age, t = -.833, p = .405; level of formal education, χ^2 = 2.15; p = .708; pre-tax household income, χ^2 = 1.51, p = .912) between both groups, thus supporting treating them as one sample.

Results

Respondents Profile

Most respondents were female (58.4%) and 46.6% were middle-aged between 46 and 65 years old (M = 52.3); they had different levels of formal education, ranging from a high-school degree or less (23.5%) to at least a four-year college degree (28.2%; Table 6). Almost half (49.1%) of the respondents were full-time employees. Notably, 31.5% were retired, which is consistent with the senior age composition of respondents. Nearly one-half (48.6%) of respondents reported a pre-tax annual household income less than $50,000, also consistent with the overall relatively low incomes in the region; 29.0% earned at least $75,000 annually.

Table 6. Socio-demographic profile of respondents

Socio-Demographic Indicators	Number of Respondents	Percent of Respondents
Gender (n = 296)		
Female	173	58.4%
Male	123	41.6%
Age (n = 292)		
18 - 25 years old	19	6.5%
26 - 35 years old	27	9.3%
36 - 45 years old	54	18.5%
46 - 55 years old	61	20.9%
56 - 65 years old	75	25.7%
66 - 75 years old	41	14.0%
76 years or older	15	5.1%
Mean (in years)		*(52.3)*
Standard Deviation		*(15.3)*
Level of education (n = 298)		
High school graduate or less	70	23.5%
Some college	88	28.5%
Two-year college degree	56	18.8%
Four-year college degree	57	19.1%
Advanced degree	27	9.1%
Mean		*(2.6)*[1]
Standard Deviation		*(1.3)*
Employment status*[2] *(n = 289)		
Full time employee	142	49.1%
Part time employee	21	7.3%
Retired	91	31.5%
Students	13	4.5%
Unemployed	19	6.6%
Other[3]	12	4.2%
Pre-tax household income (n = 237)		
Less than $25,000	48	20.3%
$25,000 - $49,999	67	28.3%
$50,000 - $74,999	54	22.8%
$75,000 - $99,999	39	16.4%
$100,000 or more	29	12.2%
Mean		*(2.8)*[4]
Standard Deviation		*(1.4)*

[1] This reports the average respondents agreement or disagreement on a 5 point scale from "1 = High school graduate or less" to "5 = Advanced degree".

[2] Percentages sum to more than 100%, as respondents were able to select multiple categories.

[3] Other includes disabled, self-employed, stay at home mom.

[4] This reports the average respondents agreement or disagreement on a 5 point scale from "1 = Less than $25,000" to "6 = $150,000 or more".

Respondents were rooted in their community, having lived 38 years on average in their current neighborhood (*SD* = 18.2; Table 7). Few respondents (10.2%) indicated that at least one member of their household is involved with wine-related activities; following online wine-related social media (4.7%) and being a member or friend of a wine club (4.7) were the most typical ways of being involved. A small proportion of respondents (9.8%) had members involved with the wine or tourism industries, mostly working for the restaurant sector; involvement in a winery or vineyard was minute (1.4%).

Table 7. Attachment with their neighborhood, wine related activities, and wine tourism

Indicators of attachment	**Number of Respondents**	**Percent of Respondents**
Number of years living in the neighborhood (n = 221)		
Less than 3 years	26	9.2%
3 - 5 years	38	13.4%
6 - 10 years	44	15.5%
11 - 20 years	52	18.4%
21 - 34 years	50	17.7%
35 - 50 years	51	18.0%
51 years or more	22	7.8%
Mean (in years)		*(38.0)*
Standard Deviation		*(20.6)*
Household *involvement with wine-related activities*[1] *(n = 295)*		
Subscriber to a wine-related magazine	6	2.0%
Member or friend of a wine club	14	4.7%
Member of a wine-related organization	2	0.7%
Follower of online wine-related social media	14	4.7%
Respondent of any informal wine social groups	11	3.7%
No connection with any wine-related activity	265	89.8%
Household* members *currently involved with the wine or tourism industries*[1] *(n = 305)		
Winery or vineyard	4	1.4%
Restaurants	21	7.1%
Lodging industry	4	1.4%
Other tourism business	9	3.0%
No involvement	267	90.2%

[1] Percentages sum to more than 100%, as respondents were able to select multiple categories.

Results suggest that study respondents are somewhat frequent wine-trail visitors. In the past three years, 22.1% have visited at least once a winery located in the Piedmont region and 29.1% one outside the Piedmont (Table 8). Within the same time-frame, 23.2% had visited either Haw River (20.4%) or Surry Country (26.0%) wine trails; Yadkin River (15.7%) and Lexington Loop (11%) were other Piedmont wine trails respondents visited.

Table 8. Visit frequency to wine trails in and outside the Piedmont in the past three years

Wine Trails	**Never**	**Rarely**	**Occasionally**	**Sometimes**	**Frequently**	**Mean[1]**
Overall *wine trails visitation*						
Piedmont wine trails	87.9%	4.9%	4.8%	1.2%	1.2%	(1.23)
Outside the Piedmont	70.9%	17.1%	6.7%	5.0%	0.3%	(1.47)
Study wine trails (n = 300)						
Haw River	79.6%	11.0%	6.7%	1.7%	1.0%	(1.33)
Surry County	74.0%	8.3%	11.7%	3.3%	2.7%	(1.52)
Haw River and Surry County	76.8%	9.7%	9.2%	2.5%	1.8%	(1.43)
Other* Piedmont *wine trails (n = 300)						
Yadkin River	84.3%	5.3%	7.4%	1.0%	2.0%	(1.31)
Upper Yadkin	90.3%	2.7%	4.4%	1.3%	1.3%	(1.21)
Lexington Loop	89.0%	4.6%	4.7%	0.7%	1.0%	(1.20)
Swan Creek	91.7%	3.0%	3.3%	1.0%	1.0%	(1.17)
Scenic 421	93.3%	2.0%	2.3%	1.4%	1.0%	(1.15)
Piedmont Heritage	92.3%	4.7%	2.0%	0.3%	0.7%	(1.12)
Midlands	96.8%	1.9%	0.7%	0.3%	0.3%	(1.06)

[1] Respondents' average agreement or disagreement on a 5 point scale from "1 = Never" to "5 = Frequently".

Attitudes toward Wine Trails

Cronbach's tests showed high internal reliability among the *Economic* (α = .885), *Socio-cultural* (α = .853), and *Environmental* (α = .847) impacts of Piedmont wineries on local communities (Table 9). Respondents perceived that their communities were not heavily impacted after Piedmont wineries were established (M = 3.21). Examined by dimensions,

Socio-cultural impacts were most positively rated (M = 3.24) followed by *Economic* (M = 3.22) and *Environmental* (M = 3.17) impacts. Within the *Economic* dimension, most respondents reported that Piedmont wineries increased tourists' spending (67.5%; M = 3.69) and the variety of local businesses (57.0%; M = 3.60). Increase in the variety of cultural activities (M = 3.54) and the beautification of local landscapes (M = 3.54) were perceived as the most positive impacts under the *Socio-cultural* and *Environmental* dimensions, respectively. Although respondents did not perceive negative impacts derived from the establishment of wineries in their communities, they reported a slight increase in their real estate and property taxes (M = 3.28) and the prices of goods and services in their local communities (M = 3.20).

Cronbach's tests also showed high internal reliability among the *Personal Enhancement* (α = .817) and *Community Sentience* (α = .859) dimensions of perceived personal benefits obtained from wineries (Table 10). Overall, respondents perceived limited personal benefits (M = 3.14) associated with winery development in the Piedmont. Such benefits were slightly more pronounced regarding the sentience toward their community (M = 3.26) than to individual enhancement (M = 3.05). Respondents agreed that the winery and wine tourism development in the Piedmont has influenced them to care more about their community's cultural (M = 3.31) and natural (M = 3.31) resources, but slightly disagreed that they influence increases in their property value (M = 2.92) or quality of life (M = 2.96).

Table 9. Residents' perceived impacts of Piedmont wineries in local communities

Impacts by Dimensions (n = 284)	Significantly decreased	Decreased	Stayed the same	Increased	Significantly increased	Mean[1]
Economic Impacts (α = .885)						***(3.22)***[2]
Tourists' spending	1.8%	1.5%	29.2%	60.6%	6.9%	(3.69)
Variety of local businesses	1.8%	1.1%	40.1%	49.8%	7.2%	(3.60)
Number of local businesses	2.5%	1.8%	49.3%	42.4%	4.0%	(3.43)
Number of jobs	4.0%	2.2%	46.0%	45.3%	2.5%	(3.40)
Real estate and property tax	2.6%	0.7%	66.3%	27.1%	3.3%	(3.28)
Prices of goods and services	2.5%	1.1%	72.3%	21.5%	2.6%	(3.20)
Community economic stability	2.2%	3.6%	70.4%	22.3%	1.5%	(3.17)
Economic inequality among residents	2.2%	4.1%	80.4%	11.8%	1.5%	(3.06)
Socio-cultural Impacts (α = .853)						***(3.24)***[3]
Variety of cultural activities	2.2%	1.5%	42.3%	47.8%	6.2%	(3.54)
Conservation of local heritage	2.2%	1.1%	63.7%	29.6%	3.3%	(3.31)
Sense of community identity	2.2%	1.8%	66.4%	26.7%	2.9%	(3.26)
Residents' quality of life	2.5%	1.5%	68.0%	26.5%	1.5%	(3.23)
Number of recreational facilities	1.9%	1.1%	75.3%	19.9%	1.8%	(3.19)
Communities' small town feeling	2.2%	5.8%	67.5%	22.7%	1.8%	(3.16)
Quality of public services	2.5%	1.1%	83.6%	11.3%	1.5%	(3.08)
Crime in the community	3.6%	4.0%	83.6%	7.7%	1.1%	(2.99)
Environmental Impacts (α = .847)						***(3.17)***[4]
Beauty of local landscapes	2.5%	1.1%	43.5%	45.3%	7.6%	(3.54)
Environmental consciousness	2.6%	0.3%	67.8%	26.3%	3.0%	(3.27)
Health of local ecosystems	2.6%	1.9%	67.5%	26.2%	1.8%	(3.23)
Tranquility of community	2.6%	4.8%	67.6%	23.2%	1.8%	(3.17)
Quality of public infrastructure	1.8%	1.1%	80.5%	15.1%	1.5%	(3.13)
Traffic congestion	2.5%	2.5%	81.2%	12.3%	1.5%	(3.08)
Overcrowding in public areas	2.6%	2.5%	81.1%	13.1%	0.7%	(3.07)
Littering	3.6%	6.9%	81.1%	6.9%	1.5%	(2.96)
Overall Attitudes toward Wine Trails						
Attitudes Mean Score						(3. 21)

[1] Respondents' mean agreement level on a 5-pt. scale ("1 = significantly decreased" to "5" significantly increased.

[2] The dimensional mean for *Economic Impact* is calculated after reversing means for "real estate and property tax", "prices of goods and services", and "economic inequality among residents".

[3] The dimensional mean for *Socio-cultural Imp*act is calculated after reversing means for "crime in the community".

[4] The dimensional mean for *Environmental Impact* is calculated after reversing means for "traffic congestion and parking problems", "overcrowding in public areas", and "littering".

Table 10. Residents' perceived impacts of Piedmont wineries at personal level

Personal Benefits (*n* = 291)	**Strongly Disagree**	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Strongly Agree**	**Mean[1]**
Personal Enhancement (α = .817)						***(3.05)***
My understanding of other culture has increased	3.4%	8.3%	57.4%	29.2%	1.7%	(3.18)
I have more opportunities to participate in recreational activities	4.1%	9.3%	56.2%	27.7%	2.7%	(3.16)
The quality of my personal life has improved	6.5%	10.3%	65.7%	16.1%	1.4%	(2.96)
My property value has increased	4.7%	14.0%	67.5%	12.0%	1.7%	(2.92)
Community Sentience (α = .859)						***(3.26)***
I care more about my community's cultural resources	2.4%	6.2%	51.9%	36.8%	2.7%	(3.31)
I care more about my community's natural resources	3.1%	4.5%	52.5%	35.5%	3.4%	(3.31)
I feel my community is a better place to live	5.1%	9.3%	52.4%	30.8%	2.4%	(3.16)
Overall Attitudes toward Wine Trails (mean)						***(3.14)***

[1] This reports the average respondents agreement or disagreement on a 5 point scale from (1) strongly disagree to (5) strongly agree.

Factors Associated with Attitudes toward Wine Trails

Multivariate regressions showed that residents' socio-demographic characteristics, level of wine enthusiasm and geospatial attributes are associated with their overall perceived personal benefits (R^2 = .152, p < .001) and its two dimensions, *Personal Enhancement* (R^2 = .152, p < .001) and *Community Sentience* (R^2 = .125, p = .001; Table 11). When controlling for other variables, respondents' visitation frequency to Piedmont wine trails were positively associated with their overall perceived personal benefits (β = .309, p < .001), *Personal Enhancement* (β = .302, p < .001), and *Community Sentience* (β = .286, p < .001). Additionally, the more involved residents are in wine-related activities (e.g., subscribers to a

wine-related magazine, members of a wine club), the more likely they are to recognize personal benefits obtained from local wine development (β = .141, p = .038) and individual enhancement (β = .156, p = .022).

Table 11. Multiple linear regressions of socio-demographic characteristics, geospatial attributes on residents' personal benefits

Independent *Variables*	**Personal benefits (standardized β and significance)**		
	Overall	**Personal Enhancement**	**Community Sentience**
Demographics			
Age	.006	.003	.014
Education level	.053	.059	.037
Annual household income	.043	.030	.054
Level of wine enthusiasm			
Visit frequency to Piedmont wine trails	.309 **	.302 **	.286 **
Whether work is wine-related	.037	.031	.049
Wine involvement	.141 *	.156 *	.110
Geospatial attributes			
Location immovability	-.019	-.020	-.018
Residence distance to winery	.003	.004	.001
Geospatial-tourism type[1]	-.064	-.062	-.062
Model statistics			
R	.390	.390	.353
R^2	.152	.152	.125
p-value	<.001	<.001	.001

[1] Surry County, otherwise; * $p < .05$ ** $p < .001$

Significant results were also obtained when residents' socio-demographic characteristics, level of wine enthusiasm and geospatial attributes were regressed on the overall attitudes toward wine trails (R^2 = .130, p = .001), as well as their comprising *Economic* (R^2 = .107, p = .005), *Socio-cultural* (R^2 = .184, p < .001), and *Environmental* (R^2

= .136, $p < .001$) dimensions (Table 12). When controlling for other variables, older respondents have a more positive attitude toward wine trails overall ($\beta = .226$, $p = .002$), and on *Socio-cultural* ($\beta = .273$, $p < .001$) and *Environmental* ($\beta = .247$, $p = .001$) impacts. The frequency of visits to Piedmont wine trails was significantly and positively associated with residents' attitudes overall ($\beta = .230$, $p = .001$), and on *Socio-cultural* ($\beta = .282$, $p < .001$) and *Environmental* ($\beta = .191$, $p = .005$) impacts as well. Respondents' or their household members' job relevance to wine tourism was significantly associated only with the *Socio-cultural* ($\beta = .148$, $p = .027$) and *Environmental* ($\beta = .143$, $p = .038$) impacts of wine trails.

Table 12. Multiple linear regressions of socio-demographic characteristics, geospatial attributes on residents' attitudes' toward wine trails

***Independent* Variables**	**Residents' attitudes(standardized β and significance)**			
	Overall	**Economic**	**Socio-cultural**	**Environmental**
Demographics				
Age	.226**	.038	.273**	.247**
Education level	.070	.118	.031	.036
Annual household income	.115	.131	.117	.077
Level of wine enthusiasm				
Visit frequency to Piedmont wine trails	.230**	.108	.282**	.191**
Wine/tourism work relevance	.074	-.062	.148*	.143*
Household wine involvement	-.007	-.050	.019	.012
Geospatial attributes				
Location immovability	-.087	-.126	-.062	-.099
Residence distance to winery	.009	-.068	-.018	.085
Geospatial-tourism type[1]	-.003	.134	-.058	-.054
Model statistics				
R	.361	.326	.428	.369
R^2	.130	.107	.184	.136
p-value	.001	.005	<.001	<.001

[1] Surry County, otherwise
* $p < .05$ ** $p < .001$

However, when controlling for other variables, none of the geospatial attributes showed a significant association with residents' overall attitudes. Results from mapping respondents' overall attitudes on their homes of residence for both wine trails (Figure 7) confirmed these results, as attempts to identify a clear pattern from the spread of residents' attitudes in maps did not succeed.

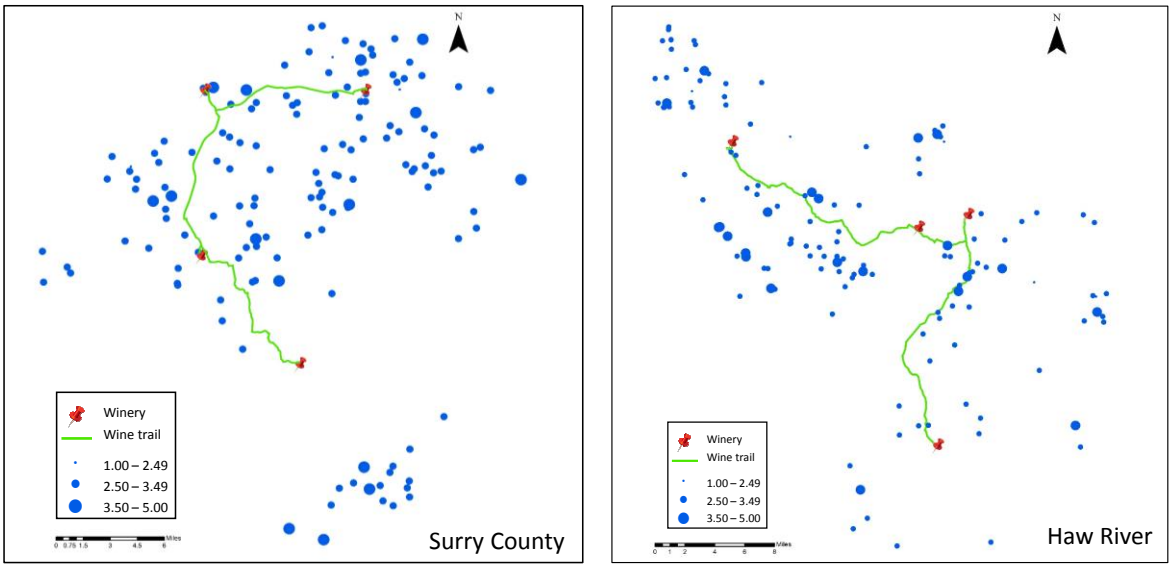

Figure 7. Geographic spread of residents' overall attitudes toward wine trails

To evaluate the mediating effect of personal benefits, residents' personal benefits were regressed with their attitudes toward wine trails. Results showed residents' perceived personal benefits are associated with their perceived *Economic* (R^2 = .121, p < .001), *Socio-cultural* (R^2 = .448, p < .001), and *Environmental* (R^2 = .295, p < .001) impacts derived from local wine tourism development (Table 13). Among personal benefits, perceived

opportunities to participate in recreational activities were positively associated with their attitudes toward the *Economic* (β = .235, p = .015), *Socio-cultural* (β = .298, p < .001) and *Environmental* (β = .280, p = .001) impacts. Respondents' perceived that increase in their property value was significantly associated with the *Socio-cultural* (β = .153, p = .004) and *Environmental* (β = .136, p = .021) attitudes toward wine tourism development. Within the *Community Sentience* dimension, residents who feel their communities became better places to live tend to hold more favorable opinions of the *Socio-cultural* (β = .368, p < .001) and *Environmental* (β = .179, p = .042) impacts of wine trail development.

Table 13. Multiple linear regression of personal benefits on residents' attitudes

Independent Variables	**Residents' attitudes (standardized β and significance)**		
	Economic	**Socio-cultural**	**Environmental**
Personal *Enhancement*			
My understanding of other culture has increased	-.013	-.055	.061
I have more opportunities to participate in recreational activities	.235*	.298**	.280**
The quality of my personal life has improved	.014	-.106	-.061
My property value has increased	-.012	.153**	.136*
Community *Sentience*			
I care more about my community's cultural resources	-.195	-.017	.022
I care more about my community's natural resources	.150	.141	.042
I feel my community is a better place to live	.162	.368**	.179*
***Model* statistics**			
R	.348	.670	.543
R^2	.121	.448	.295
p-value	<.001	<.001	<.001

* p < .05 ** p < .001

Discussion and Implications

This study, which documents local residents holding relatively neutral attitudes toward the Piedmont wine tourism development, challenges the general positive attitudes associated with other types of tourism development (Andereck and Vogt 2000; Gursoy and Rutherfod 2004; McGehee and Andereck 2004). These results may be because of the relatively early stage of wine tourism development in the region, as many previous studies were conducted in well-developed, high-density tourist areas (Harrill and Potts 2003; Sheldon and Var 1984; Williams and Lawson 2001). Also contrary to the extant literature (McGehee and Andereck, 2004; Vargas-Sanchez et al. 2009), study respondents recognized wine trails' socio-cultural benefits to a greater extent than economic ones, which may be associated with the limited cultural activities available in this region, or the higher values of socio-cultural benefits to local residents. The significant characteristics of long residence in the area and the large proportion of retirees may also help explain that diversity of cultural activities is valued higher than economic benefits. Also, given that the Piedmont region is rich in natural resources and cultural beauty, which makes the reason many residents moved to this region after retirement, residents may have a higher value for benefits attributed to these aspects.

Spatial attributes (i.e., location immovability, residence distance to winery, trail geospatial-tourism types) were not significantly associated with residents' attitudes in this study, despite their suggested positive (Belisle and Hoy 1980; Mansfeld 1992; Sheldon and Var 1984) or negative (Jurowski and Gursoy 2004; Tyrell and Spaulding 1984) association with residents' attitudes. This is likely related to the small sample size of this study, the overall disengagement of residents in wine-related activities, and/or the inception wine

tourism stage of the region. For example, residents in regions with a mature wine tourism industry may have a more significant positive view of impacts wineries and wine trails have on the community. Thus, differences in residents' attitudes and view of impacts will be more evident, making it easier to detect and monitor the influence of spatial attributes on residents along well-established wine trails may be more evident. Yet this needs to be confirmed through empirical research.

The significant association between levels of wine enthusiasm and overall residents' attitudes toward wine tourism development and perceived personal benefits suggests that levels of involvement not only affect preferences of those engaged in a certain recreation or leisure activity (Barbieri and Sotomayor 2014; Bryan 1977; Cole and Scott 1999), but also increase their awareness of the benefits this activity produces. Thus, further exploration is needed to better identify what types of wine involvement (e.g., following wine-related social media, membership to wine clubs) increases such awareness, and whether differences exist across levels of wine enthusiasm. Given that wine trail is one type of themed touring routes, this scrutiny could also be expanded to other routes with different themes as related to their level of involvement (e.g., birding).

Besides theoretical implications, this study also provide methodological implications. For example, the modified scale used in the study to measure personal benefits was developed in response to the necessity to more comprehensively capture residents' personal benefits (McGehee and Andereck 2004; Wang and Pfister 2008). High internal reliability of this enriched scale and its two dimensions (*Personal Enhancement; Community Sentience*)

suggests that this scale could serve as a baseline to measure personal benefits in relation to other types of theme touring routes or tourism destinations overall.

Results of this study also provide many practical implications. For example, residents' overall neutral attitudes suggest local winery managers place more efforts on communicating and educating residents about the positive impacts that wineries bring to local communities; it is advisable that such dissemination efforts target young adults given that stronger positive attitudes were found among older respondents, most likely associated with their more extensive residence in the region or they moved to this region after retirement for the natural and cultural resources. Piedmont wineries' managers should capitalize on residents' overall positive perceptions about Piedmont wineries in increasing tourists' spending, diversification of local businesses, variety of cultural activities, and beautification of local landscapes. Doing so might help to bridge the existing gap with local residents. Wineries can use a variety of marketing channels to disseminate their benefits to local communities, such as the traditional marketing (e.g., flyers) or social media (e.g., Facebook, Twitter) and increase local visitation rates.

The general lack of local interest in wine-related activities suggests local wineries increase their efforts to develop such interest among local residents. In this regard, it is critical that Piedmont wineries devote more time to capture local residents given that frequency of visits to local wineries was positively associated with the perceived personal benefits attained from Piedmont wine trails. One way to do so is by promoting popular wine-related activities (e.g., informal wine social groups, on-line wine-related social media) with special incentives for local residents, such as discounts or courtesy wine tastings (Lockshin &

Spawton, 2001). To capture a larger scope of residents as potential visitors, non-wine related events and gatherings should also be expanded and hosted (e.g., weddings, birthday parties, concert, art exhibition) for local residents. All these promotions can generate an initial buzz among locals that may result in positive word-of-mouth referral, and ultimately business loyalty (Lockshin & Spawton, 2001). In the long run, the enhancement of the Piedmont wine industry can boost their positive impacts in the region especially related to wine tourism job opportunities and economic contributions to local economies.

Limitations and Future Research

Interpretation of study results and their implications should be taken with caution, mainly because of two limitations. First, although the two wine trails selected for this study represent different types of wine trails based on their geospatial and tourism characterization (refer to Manuscript 1 for more details), they are not comprehensive of the variety of wines trails that exist in the U.S. and other countries. Compared to wine trails found in well-developed wine tourism regions, choosing wine trails in the Piedmont region at an early stage of their wine tourism development helps minimize the interference of other unrelated factors when examining the influence of geospatial attributes, level of wine enthusiasm, and demographics on residents' attitudes. It could serve as a baseline for future follow-up or longitudinal studies. However, it is acknowledged that the selected wine trails may differ from those in more developed regions, such as the Napa valley in California and in other countries (e.g., Italy, Spain). Second, although the sample size is enough for this exploratory study, it is still relatively small in number as compared to traditional tourism attitude studies.

The small sample size limited the possibility to conduct more sophisticated statistical analysis to examine the role of geospatial attributes on residents' attitudes.

Besides theoretical contributions and providing managerial/planning implications, this study also sheds light for future research. Although geospatial attributes were not found to be significantly associated with the residents' personal benefits and attitudes, the incorporation of residence distance to wineries, specific wine trail geospatial and tourism types, and length of residence illuminates the integration of geospatial considerations into residents' personal benefits. It also be more productive to continue looking at the influence of geospatial attributes on residents' attitudes toward wine trails in areas where the wine industry and wine tourism are more mature such as Napa or Sonoma Valleys in California.

Conclusions

This study examined residents' attitudes toward wine trails in the Piedmont region where wine tourism has been developed recently, and identified the association of the socio-economic, geospatial and level of wine enthusiasm factors with residents' attitudes. In doing so, study results enriched the existing managerial intelligence of wine trails to better bridge with local residents and gain their support for future wine tourism development in hopes of expediting overall economic development by attracting more wine tourists.

Specifically, this study found that wineries' managers should increase their efforts to educate local residents about the positive impacts they produce in the surrounding areas, especially among younger dwellers, and develop residents' interests to visit wineries either for wine-related or non-wine related activities, to attain favorable attitudes from residents, as

suggested by this study results. Such understanding of residents' attitudes along wine trails illuminates the optimization of route design and management in the future with regards to genuinely involving residents and maximizing their benefits. Understanding residents' attitudes toward local wine tourism development is also a step forward toward fostering sustainable tourism development through the boost of economy and enhanced quality of life of residents.

This study also contributed to the scholarship of tourism overall, themed touring routes, and wine tourism in particular, by extending tourism residents' attitudes studies to linear tourism settings. In particular, the personal benefit scale developed for this study appeared not only suitable for fulfilling this study's purposes but also for expanding the personal benefits scale to capture two dimensions – *Individual Enhancement* and *Community Sentience* (McGehee and Andereck 2004; Wang and Pfister 2008).

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Wine Tourism Related Social Capital along Wine Trails[7]

Abstract

Despite a burgeoning body of studies on social capital in sociology and political science, it is still at the exploratory stage to examine social capital in tourism settings generally and its association with tourism development specifically. Wine trails have been growing rapidly during this past decade. Despite the growth, they have received little attention from traditional wine tourism research and even less has focused on changes in social capital in the contexts of wine trails. To address this gap, residents living along two wine trails in the Piedmont region of North Carolina were surveyed in 2013 regarding social capital and its five dimensions (*Bonding, Bridging, Collective Action, Trust* and *Information Sharing*). Results indicate the Piedmont region has not fully developed social capital associated with local wine trails, although residents perceived somewhat strong *Collective Action* derived from this inception industry. Visitation frequency to the Piedmont wine trails was found to be significantly associated with all dimensions of wine tourism social capital except for *Trust*. This study suggests that local wineries and wine trails should invest more efforts to forge community bonding, especially among older residents, and to bridge with other local businesses to foster greater local economic development.

Keywords: Social capital; Wine trails; Wine tourism

[7] This manuscript will be submitted to a tourism journal. Thus, it follows tourism journal guidelines (APA citation style; sub-sections numbered; 600 words per sub-section; abstract 150 words). Word Count = 7,497 (including text, footnotes, and references); Tables = 4.

Introduction

Themed touring routes, such as wine trails and culinary routes, have been acknowledged for its capacity to attract visitors and boost local economies, thus are increasingly being developed surrounding different themes or products worldwide (Briedenhann & Wickens, 2004; Lourens, 2007; Rogerson, 2007). Despite the spur of touring routes and their economic capacity, research on touring routes is limited in number and scope. Existing studies have mainly focused on visitors' behaviors and experiences (e.g., Denstadli & Jacobsen, 2011; Scott & Thigpen, 2003), impacts on local economic development (e.g., Briedenhann & Wickens, 2004; Rogerson, 2007), and management planning (e.g., Correia et al., 2004). Even fewer studies focus on wine trails, primarily examining marketing issues (Hashimoto & Telfer, 2003; Jaffe & Pasternak, 2004). The limited research on wine trails is inconsistent with their popularity as compared to other touring routes (Xu, 2014).

By working together, the various businesses and services along touring routes create a cooperation network (Meyer, 2004; Meyer-Cech, 2005) with the capacity to facilitate community bonding (Rogerson, 2007). Stronger intra-network cooperation and interaction among actors (e.g., neighbors, citizens, government) is not only vital for successful route development (Meyer, 2004) but also is associated with the generation of economic, social and civic benefits for communities, including residents' increased participation and commitment to a community (Falk & Kilpatrick, 2000; Stone, 2001). In this sense, social capital, the cornerstone of social relations, ties and structure (Adler & Kwon, 2002), becomes critical to developing successful touring routes (Meyer, 2004). Despite such importance, lack

of genuine community participation is cited as one of the most significant constraints for their effective planning and management (Briedenhann & Wickens, 2004).

Social capital has also been suggested as having a geospatial dimension (Westlund et al., 2010). Spatial proximity, a key characteristic of local networks in industrial districts (Camagni, 1995), is acknowledged for helping the formation of network ties and facilitating interactions (Inkpen & Tsang, 2005). However, a straightforward connection between social capital and spatial attributes does not emerge in the literature (Westlund et al., 2010), which suggests a need to further understand how social capital and spatial attributes are associated, particularly in linear tourism settings such as touring routes.

In spite of its importance in tourism development and in route management, social capital has received modest attention from the tourism literature, as compared to the plethora of studies in other disciplines, such as family and youth studies, public health, democracy and governance, and economic development. Relatively recent and limited numbers of studies on social capital in the tourism field leave much room for exploration on social capital and regional tourism development (McGehee et al., 2010; Moscardo, 2012; Park, Lee, Choi, & Yoon, 2012). Even more scarce is the literature incorporating spatial characteristics to explore the potential association between social capital and tourism development.

A closer examination of social capital associated with tourism in communities along wine trails is needed for a number of reasons. For example, economic development of touring routes may be greater where social capital is greater and spatial attributes and social networks associated with touring routes may be linked to an area's social capital. Therefore, this study explored the level of social capital of communities along wine trails in the Piedmont region

of North Carolina, USA. Specifically, this study addressed two objectives: (1) identify the level of social capital in communities along wine trails; and (2) evaluate: the association between communities' social capital and residents' demographics; the relationship with the Piedmont region and wine trails; and, the geospatial-tourism characterization of the trail.

Literature Review

Theoretical Considerations of Social Capital

Many definitions of social capital exist and vary according to the specific problems to be addressed within different disciplines (Adler & Kwon, 2002; Moscardo, 2012; Pawar, 2006). Among those, Woolcock's (1998) definition: "the information, trust, and norms of reciprocity inhering in one's social networks" (p. 153) is one of the most widely cited. Roughly described in the early 1910s by Hanifan as the good will and social intercourse among individuals and families (McGehee et al., 2010), social capital has been recognized for its importance to community ties since the 1950s (Woolcock & Narayan, 2000).

A significant development of social capital as a theoretical construct emerged during the 1990s when Coleman (1987), Bourdieu (1991) and Putnam (1993) introduced it to the social and political sciences expanding the concept beyond its economic significance (Lee, Arnason, Nightingale, & Shucksmith, 2005; Macbeth, Carson, & Northcote, 2004; Moscardo, 2012). Thereafter, social capital moved beyond the individual's realm to emphasize collective actions by recognizing the value of social networks to "glue" people together (Putnam, 1995; Portes & Sensenbrenner, 1993;Portes, 1998; Shucksmith, 2000) and the role

of trust, social relations and connections in economic development (Falk & Kilpatrick, 2000; Moscardo, 2012).

The existing literature suggests that social capital is not a one-dimensional construct and that it can be characterized in different ways. Many researchers have examined social capital from the network perspective, distinguishing between bonding (internal relationships that occur horizontally within a community) and bridging (ties and relations between individuals or communities across distinct social networks) social capital (Granovetter, 1973; Putnam, 1993). Granovetter (1992) identified the structural and relational dimensions of social capital; he described the structure as the overall pattern of connections within a network of social relationships (presence/absence of network ties and network configuration) while the relational embeddedness as the quality and duration of social ties.

During the late nineties, Nahapiet and Ghoshal (1998) added the cognitive dimension of social capital defined as the set of values, attitudes and beliefs shared by community members. Instead of listing trust under cognitive dimension defining social capital at the community level, many researchers follow Putnam's (1995) lead and consider trust an individual dimension and one critical component of social capital (Leahy & Anderson, 2010). Trust refers to the expectations community members have in other members' good intensions and actions (Dirks, 2000). As most social capital theory is led by discussions of trust (Paxton, 1999); trust serves as the foundation upon which communications among community members are generated (Falk & Kilpatrick, 2000) and enables community members to engage in actions that otherwise would not have been possible (Coleman, 1990). Information sharing, another social capital dimension referring to the mutual sharing of information

between exchange parties (Wu, 2008), captures the reciprocal nature of information flow in networks (Adler & Kwon, 2002) that facilitates access to broader sources of information (Coleman, 1988).

Greater social capital is suggested to increase community commitment and the ability to mobilize collective actions (Ellison, Steinfield, & Lampe, 2007; Helliwell & Putnam, 2004); thus, a community rich in stocks of social capital might be more likely to prosper. A strand of literature suggests that social capital contributes to the desired socio-economic outcomes of communities, including better public health, lower crime rates, and more efficient financial markets (Adler & Kwon, 2002). The examination of the benefits of social capital have focused on four areas: community organizations (e.g., local clubs and associations), networks stressing vertical and horizontal relations between people and within and among organizations, quality of local formal institutions, and existing synergies which integrate the networks and institutional perspectives (Woolcock & Narayan, 2000).

Social Capital in the Tourism Field

Compared to advances in other fields, research exploring the links between tourism and social capital are comparatively lacking and still at the exploratory stage as (McGehee et al., 2010; Moscardo, 2012; Zhao, Ritchie, & Echtner, 2011). The recent quest for sustainable tourism development urges taking a "capitals approach" to assess the sustainability of economic development (Lehtonen, 2004; Moscardo, 2012). Using this approach, sustainability could be interpreted as "the maintenance or increase of the total stock of different types of capital" (Lehtonen, 2004, p. 200-201).

Moscardo (2012) summarized past research linking social capital and tourism development from the tourists, destination, and regional development perspectives. From the tourists' perspective, studies have focused on the social ties that tourism creates between individuals by strengthening relationships between families and friends (Heimtun, 2007; Mura & Tavakoli, 2012) or fostering interactions with others (Ross, 2005). From the destination perspective, research has examined cooperative efforts and marketing alliances of local tourism business and stakeholders through reciprocal exchange of resources (Grängsjö and Gummesson, 2006; Wang & Xiang, 2007). From the regional tourism development perspective, attempts have been made to identify synergistic relationships between tourism and social capital. Although successful regional tourism development depends on the level of social capital, the development of tourism in turn contributes to building regional social capital by influencing the extent of community participation and fostering local entrepreneurship (Macbeth et al., 2004; Zhao et al., 2011).

Among others, studies have attempted to measure social capital through membership in informal and formal associations and networks (e.g., Narayan & Pritchett, 1997) and between norms and values facilitating exchanges (e.g., Fukuyama, 1995; Inglehart, 1997).. Within the tourism literature, several scales have been proposed and used to measure social capital. For example, McGehee et al. (2010) modified Flora's (2004) measurement of various capitals (financial, human, built, natural, political); she and her colleagues also used eight item statements to evaluate the bridging (e.g., "there is strong communication between and among the local organizations and organizations at other levels that focus on tourism) and bonding (e.g., "mutual trust currently exists between and among tourism suppliers", "there is a sense

of a shared future as part of a tourism product") dimensions of social capital among tourism stakeholders in Virginia. To capture a holistic view of social capital in rural tourism settings in Guangxi (China), Zhao et al. (2011) designed a 10-item scale to operationalize the structural, relational, and cognitive dimensions of social capital (Nahapiet & Ghoshal, 1998) among tourism businesses.

Influences of Social Capital

Several attributes have been found to be related with residents' perceptions of social capital. For example, length of residence (McGehee et al., 2010), income (Kim & Won, 2003), socio-economic status (Ryan, Agnitsch, Zhao, & Mullick, 2005), and education (Putnam, 1995) were found positively associated with the overall perceived social capital. The level of tourism involvement has not been found to be significantly associated with overall social capital (McGehee et al., 2010); however, those results regarding different factors' associations with social capital are inconclusive taking into consideration the infancy of tourism research on social capital. Given previous findings, further examination of socio-demographic indicators in relationship with the level of social capital is needed.

Recent studies suggest that social capital has a geospatial dimension (Westlund, Rutten, & Boekema, 2010). In the local networks of industrial districts, spatial proximity has been suggested to mobilize resources within the milieu, allow an intricate network of informal contacts among actors, and help synergies among those with common cultural, psychological, and political backgrounds (Camagni, 1995). Although evidence suggests that proximity builds network ties and facilitates interactions (Camagni, 1995; Inkpen & Tsang, 2005), few

studies have recognized proximity when examining social capital. Furthermore, most of those studies have used nodal areas (i.e., specific communities or towns) as the study setting (McGehee et al., 2010) or rural villages (Park et al., 2012; Zhao et al., 2011).

Thus, the role of geospatial attributes associated with social capital is yet to be examined. As Westlund, Rutten and Boekema (2010) conclude, "a straightforward connection between the two concepts does not emerge" (p. 965). They further suggest that three approaches are needed to conceptualize space toward a better understanding of how it relates to social capital: a horizontal space where distance is continuous; a horizontal space where there are borders and barriers that make distance discontinuous (e.g., urban versus rural borders, state borders, language and ethnicity barriers); a hierarchical space divided into discontinuous levels (e.g., levels varying from neighborhood to county and to state).

In sum, there are limited research exploring the links between tourism development and social capital is scarce. Given that the unique capital of each community is based on its residents (Flora, 2004), in order to thrive their communities, local residents should take the lead in determining community's overall development goal and working to match community capitals with the goals (McGehee et al., 2010). Literature is also scarce regarding the association between geospatial attributes and social capital. Thus, this study aims to investigate residents' perceptions regarding aforementioned five aspects of social capital (*Bonding*, *Bridging*, *Trust*, *Collective Action*, *Information Sharing*) and their associations with local wine tourism development and wine trails' geospatial attributes.

Research Methods

This study was conducted in the Piedmont region of North Carolina where wine and wine tourism developments are recent, which helps minimize the interference of other unrelated factors when examining the influence of geospatial attributes, relationship with the Piedmont region, and demographics on residents' perceptions of social capital. The Piedmont hosts three American Viticultural Areas and a total of 11 wine trails. Two Piedmont wine trails, Haw River and Surry County, were chosen for this study for their peculiar geospatial and tourism characteristics. Both trails are comparable in terms of number of wineries (four in each), medium-length (Haw River = 43 miles; Surry County = 32 miles), and location close (less than 0.1 miles) to a highway. None of these wine trails show signs of having a dominant winery in terms of tourism amenities provided; furthermore, the tourism amenities these wineries provide complement each other.

Despite the aforementioned similarities, both trails have distinctive geospatial and tourism characteristics, which make them suitable for comparison. Geospatially, Haw River is located in the central eastern part of the Piedmont and where wineries are clustered in the center of the trail. Surry County is located in the northwestern Piedmont where wineries are evenly spread along the trail. From a tourism perspective, Haw River offers a more comprehensive tourism experience than Surry County in terms of the variety of amenities provided. Based on their geospatial and tourism similarities and differences, Haw River is considered to have a better geospatial and tourism profile than Surry County.

Survey Instrument and Measurements

A survey instrument was developed to query residents' socio-demographic characteristics, their relationship with the Piedmont region, and their community's level of social capital associated with local wineries. Socio-demographic data garnered were gender, age (using an open-ended format), level of formal education (5 categories ranging from high school degree or less to advanced degree), and annual household income before taxes (6 categories ranging from less than $25,000 to $150,000 or more); household composition (a scale ranging from living alone to living with other adults other than spouse or significant other), and whether they own or rent their house (dichotomous variable). Residents' relationship with the Piedmont region and their wineries was queried through length of residence in the Piedmont (in years), visitation frequency to the Piedmont wine trails in the last three years (5-point scale ranging from never to frequently), and their perceptions of the relationship between Piedmont wineries and communities (5-point Likert scale, ranging from poor to excellent).

A modified scale was used to assess a community's level of social capital (Grootaert, Narayan, Jones, & Woolcock, 2004; McGehee et al., 2010) associated with wine trails. The modified scale included in the instrument comprised 18 items representing five dimensions of social capital: *Bonding* (3 items; e.g., "I talk to my neighbors about visiting local wineries"; "I hang out with friends at local wineries"), *Bridging* (4 items; e.g., "I have acquaintance(s) who own or manage a local winery", "I attend events co-hosted by local wineries and other local businesses"), *Trust* (3 items; e.g., "I trust wineries to make decisions that protect community interests", "My community has a shared vision for local winery development"),

Collective Action (4 items; e.g., "I will volunteer in local winery-related events if needed", "Local wineries support community needs"), and *Information Sharing* (4 items; e.g., "I can easily find information about local winery-related events", "I know where to find information about local winery-related events"). These items were measured in a five-point Likert-type scale (1 = strongly disagree; 5 = strongly agree).

Sampling and Survey Procedures

A total of 663 households residing within a 10-mile buffer on either side along Haw River (n = 401) and Surry County (n = 262) were randomly selected using a stratified sampling technique to capture geospatial (distance) effects on residents. Stratification was performed to include: (1) all zip codes with at least five percent of a zip code's areas falling within the 10-mile buffer, and (2) different distance to wine trails, with half of the sample from each wine trail falling within a 5-mile and a 5-10 mile buffer.

Surveys were distributed using a drop-off/pick-up method to reduce non-coverage error and increase response rate, which are response rates obstacles usually reported in small rural communities (Steele et al., 2001) such as the Piedmont. As indicated by its name, this survey method involved two steps. First, surveys (along with a cover letter and detailed instructions) were dropped off during weekends. The field researcher knocked on the door of sampled households, introduced herself to an adult, explained study purposes, and obtained the adult's consent. Respondents were then instructed to hang completed surveys on their doorknob using a bag provided by the researcher. As scheduled, usually two or three days after, the field researcher returned to pick-up the surveys. If no bag was found on a door, the researcher

knocked on the door and left a stamped envelope along with a brief note requesting that residents mail their completed surveys back.

Data collection spanned October through December of 2013 and yielded 334 completed surveys (51.9% response rate). Specifically, 164 surveys were collected from residents along Haw River (40.9% response rate) and 155 from Surry County (59.2% response rate). The lower response rate along the Haw River was probably because of the distribution method employed during the first week of data collection when surveys were dropped off in selected households without face-to-face interaction. After removing partially completed surveys, 300 questionnaires were retained for statistical analysis.

Data Analysis

Statistical analysis included descriptive statistics, Cronbach's alphas, and multivariate linear regressions ($p < .05$). Descriptive statistics were used to delineate respondents' socio-economic profile, relationships with the Piedmont region and wine trails, and their communities' social capital associated with local wineries. Cronbach's reliability tests were conducted to examine the internal reliability of items comprising the *Bonding, Bridging, Trust, Collective Action, Information Sharing* dimensions of social capital; the 0.33 corrected item scores was used as threshold to retain an item within a dimension (Ho, 2006). Retained items were averaged to create a composite score of each social capital dimension; and overall social capital mean score (of all items) was also calculated.

Multivariate regressions were used to examine the effect of residents' demographics, relationship with the Piedmont region and wine trails, and geospatial attributes of trails (8

independent variables) on communities' level of social capital associated with wine trails (6 dependent variables)[8]. Independent variables included as demographic descriptors were: age, level of formal education, and pre-tax annual household income. Lrelationship with the Piedmont region and wine trails was operationalized through length of residence in the Piedmont, visitation frequency to the Piedmont wine trails, and perceived Piedmont wineries and communities' relationship. Geospatial indicators included distance of respondent's residence to the closest winery (calculated using ArcGIS software), and the geospatial and tourism characterization of the wine trail (where Haw River represents a superior geospatial tourism wine trail and Surry County a moderate one). Multicollinearity tests revealed no correlations among the independent variables; variance inflation factor statistics obtained (VIF > 1.040) were above the conservative minimum scores (VIF > .10) while tolerance statistics (< 1.530) were below conservative maximum scores (< 10.0; Mertler & Vannatta, 2005). Dependent variables included the overall social capital mean score and the composite scores of their five dimensions.

Before conducting multiple linear regressions, *t*-tests and Chi-square tests were conducted on key demographic variables to determine whether respondents from both samples could be merged. Results indicated no significant differences in the age (t = -.833, p = .405), level of formal education (χ^2 = 2.15; p = .708), and pre-tax household income (χ^2 = 1.51, p = .912) between both samples, thus supporting their combination.

[8] Structural equation modeling (SEM) was also attempted. However, the small sample size of this study prevented a good model fit. A SEM output is included in the Appendix C.

Results

Respondents Profile

Respondents were predominantly in their mid-adulthood (*M* = 52.3 years-old), with the majority (65.1%) between 36 and 65 years old; smaller proportions were young adults (15.8%) and senior adults (19.1%) (Table 14). About one quarter of respondents (23.5%) had a high school degree or less, 28.5% some college education, and 47.0% at least a two-year college degree. Consistent with their education level, 48.6% had a pre-tax annual household income below $50,000, 39.2% between $50,000 and $99,999, and 12.2% above $100,000. Most respondents owned their current living place (84.0%) and lived with spouses or significant others (74.0%). Respondents were rooted in the Piedmont region. On average, respondents lived 38 years in the region (*SD* = 20.6); 43.5% have lived in the region for more than 20 years while only 22.6% have lived there for five years or less (Table 15).

Overall, 23.2% of respondents (Surry County, 26.0%; Haw River, 20.3%) visited either Haw River or Surry Country wine trails during the last three years; only 8.9% of respondents visited other Piedmont wine trails at least once in the past three years. Consistent with the sample location (within 10-miles of both wine trails), an average 22. 8% of respondents (Surry County, 24.7%; Haw River, 20.8%) felt mostly connected to either Surry County or Haw River wine trail. However, 40.6% did not feel any connection with the Piedmont wine trails. Almost half (44.9%) of respondents believed an overall good to excellent relationship existed between Piedmont wineries and local communities; yet 27.7% of respondents did not know how to describe such relationship.

Table 14. Socio-demographic profile of responding residents

Socio-Demographic Indicators	Number of Respondents	Percent of Respondents
Gender (n = 296)		
Female	173	58.4%
Male	123	41.6%
Age (n = 292)		
18 - 25 years old	19	6.5%
26 - 35 years old	27	9.3%
36 - 45 years old	54	18.5%
46 - 55 years old	61	20.9%
56 - 65 years old	75	25.7%
66 - 75 years old	41	14.0%
76 years or older	15	5.1%
Mean (in years)		*(52.3)*
Standard Deviation		*(15.3)*
Level of education (n = 298)		
High school graduate or less	70	23.5%
Some college	88	28.5%
Two-year college degree	56	18.8%
Four-year college degree	57	19.1%
Advanced degree	27	9.1%
Mean		*(2.6)*[1]
Standard Deviation		*(1.3)*
Pre-tax household income (n = 237)		
Less than $25,000	48	20.3%
$25,000 - $49,999	67	28.3%
$50,000 - $74,999	54	22.8%
$75,000 - $99,999	39	16.4%
$100,000 or more	29	12.2%
Mean		*(2.8)*[2]
Standard Deviation		*(1.4)*
Whom lived with (n = 300)		
Alone	34	11.3%[3]
Spouse or significant other	222	74.0%
Children younger than 18 years old	80	26.7%
Adult children	39	13.0%
Other adults	37	12.3%
Home ownership (n = 294)		
Homeowners	247	84.0%
Home renters	47	16.0%

[1] This reports the average respondents agreement or disagreement on a 5 point scale from "1 = high school graduate or less" to "5 = advanced degree".

[2] This reports the average respondents agreement or disagreement on a 5 point scale from "1 = less than $25,000" to "6 = $150,000 or more".

[3] Percentages sum to more than 100%, as respondents were able to select multiple categories.

Table 15. Indicators of relationship with the Piedmont region and wine trails

Attachment Indicators	Number of Respondents	Respondents Both Trails
Number of years living in the Piedmont (n = 221)		
5 years or less	9	4.1%
6 - 10 years	19	8.6%
11 - 20 years	28	12.7%
21 - 30 years	33	14.9%
31 - 40 years	29	13.1%
41 - 50 years	34	15.4%
51 - 60 years	37	16.7%
61 years or more	32	14.5%
Mean (in years)		*(38.0)*
Standard Deviation		*(20.6)*
Visit frequency (at least once) to the Piedmont wine trails (n = 300)		
Surry County	78	*26.0%*
Haw River	61	*23.2%*[1]
Yadkin River	47	15.7%
Lexington Loop	33	11.0%
Upper Yadkin	30	9.7%
Swan Creek	25	8.3%
Piedmont Heritage	23	7.7%
Scenic 421	20	6.7%
Midlands	10	3.3%
Wine trail most connected to (n = 280)		
Surry County	71	24.7%
Haw River	56	20.8%
Yadkin River	14	4.9%
Lexington Loop	8	2.8%
Piedmont Heritage	8	2.8%
Swan Creek	4	1.4%
Upper Yadkin	3	1.0%
Scenic 421	3	1.0%
Midlands	0	0.0%
None	113	40.6%
Perceived Piedmont wineries and community relationship (n = 294)		
Excellent	26	8.6%
Good	107	36.3%
Average	48	16.5%
Fair	22	7.3%
Poor	11	3.6%
I don't know	80	27.7%
Mean		*(3.5)*[2]
Standard Deviation		*(1.0)*

[1] Percentages sum to more than 100%, as respondents were able to select multiple categories.

[2] This reports the average respondents agreement or disagreement on a 5 point scale from "1 = poor" to "5 = excellent"; "I don't know" was not included in calculating the mean.

Social Capital toward Wine Trails

Cronbach's tests showed a high internal reliability among the *Bonding* (α = .860), *Bridging* (α = .906), *Trust* (α = .827), *Collective Action* (α = .781), and *Information Sharing* (α = .839) dimensions of social capital in local communities (Table 16). Overall, respondents noted an overall neutral level (M = 3.00) of social capital associated with Piedmont wineries. When examined by dimensions, *Collective Action* was the dimension most highly rated (M = 3.18), closely followed by *Trust* (M = 3.07) and *Information Sharing* (M = 3.07); *Bonding* (M = 2.77) and *Bridging* (M = 2.91) were the least highly rated dimensions of social capital.

When examined by specific item statements, most respondents agreed that local wineries participate in community events (58.9%; M = 3.52; *Collective Action* dimension); they also agreed they can easily find information about local winery-related events (55.8%; M = 3.40) and know where to find information about local winery-related events (52.6%; M = 3.35; *Information Sharing* dimension). Conversely, a third of respondents disagreed that they would hang out with friends at local wineries (32.4%; M = 2.70), or volunteer in local winery-related events if needed (32.4%; M = 2.71; *Collective Action* dimension).

Table 16. Community's social capital associated with Piedmont wineries

Items by Dimensions (n = 290)	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	Mean[1]
Bonding (α = .860)						***(2.77)***
I attend private parties at local winery	14.5%	12.8%	50.2%	20.4%	2.1%	(2.83)
I talk to my neighbors about visiting local winery	13.4%	15.2%	49.7%	20.0%	1.7%	(2.81)
I hang out with friends at local winery	18.4%	14.0%	48.6%	17.0%	2.0%	(2.70)
Bridging (α = .906)						***(2.91)***
I have acquaintance who own or manage local wine-related business	12.4%	11.7%	49.7%	22.4%	3.8%	(2.93)
I attend events co-hosted by local wineries and other local businesses	14.7%	9.3%	45.5%	28.8%	1.7%	(2.93)
I have acquaintance who own or manage a local winery	14.1%	11.4%	50.3%	20.7%	3.5%	(2.88)
I attend events co-hosted by several local winery	15.4%	12.3%	44.9%	25.7%	1.7%	(2.86)
Trust (α = .827)						***(3.07)***
I trust winery to make decisions that protect community interests	11.5%	5.9%	38.5%	41.0%	3.1%	(3.18)
Local residents trust winery to make decisions that protect community interests	10.1%	10.1%	42.5%	35.2%	2.1%	(3.09)
My community has a shared vision for local winery development	9.7%	10.4%	55.3%	23.2%	1.4%	(2.96)
Collective action (α = .781)						***(3.18)***
Local winery support community need	6.2%	4.5%	44.6%	40.2%	4.5%	(3.32)
People in my community participate in local winery-related events	8.0%	8.0%	41.3%	38.9%	3.8%	(3.23)
I will volunteer in local winery-related events if needed	16.2%	16.2%	48.6%	18.6%	0.4%	(2.71)
Local winery participate in community events	4.5%	4.2%	32.4%	53.0%	5.9%	(3.52)
Information sharing (α = .839)						***(3.07)***
I can easily find information about local winery-related events	6.6%	7.6%	30.0%	51.0%	4.8%	(3.40)
I know where to find information about local winery-related events	7.3%	7.6%	32.5%	48.4%	4.2%	(3.35)
My community has a forum to discuss winery-related concerns	9.8%	16.1%	63.2%	10.2%	0.7%	(2.76)
My community has a forum to discuss winery-related opportunities	10.1%	16.4%	62.6%	10.1%	0.7%	(2.75)
Overall Community's Social Capital						(3.00)

[1] This reports the average respondents agreement or disagreement on a 5 point scale from (1) strongly disagree to (5) strongly agree.

Factors Associated with Community's Level of Social Capital

Multivariate regressions resulted in five (out of six) significant models (Table 17). Results indicate that residents' socio-demographic characteristics, relationship with the Piedmont region and wine trails, and geospatial attributes were associated with the overall social capital (R^2 = .149, p < .001), and four of the social capital dimensions; *Bonding* (R^2 = .175, p < .001), *Bridging* (R^2 = .220, p < .001), *Collective Action* (R^2 = .095, p = .026), and *Information Sharing* (R^2 = .105, p = .012); no significant association was found with the *Trust* dimension (R^2 = .045, p = .435). When controlling for other variables, age was the only demographic indicator negatively associated with wine-related *Bonding* (β = -.167, p = .044). Visitation frequency to Piedmont wine trails was positively associated with the overall social capital (β = .326, p < .001), *Bonding* (β = .369, p < .001), *Bridging* (β = .420, p < .001), *Collective Action* (β = .220, p = .004), and *Information Sharing* (β = .169, p = .025). When controlled for other variables, none of the geospatial indicators showed a significant association with social capital.

Table 17. Multiple linear regressions of socio-demographic characteristics, level of the Piedmont relationship, and geospatial attributes on community's social capital

Independent Variables	DV - Social Capital (standardized β and significance)					
	Overall	Bonding	Bridging	Trust	Collective Action	Information Sharing
Demographics						
Age	-.132	.167 *	.146	-.087	-.099	-.078
Education level	-.027	.044	.102	.014	-.025	.119
Annual household income	.135	.089	.163	.080	.114	.126
Relationship with the Piedmont region						
Length of residence in the Piedmont	.120	.102	.131	.081	.126	.098
Visit frequency to Piedmont wine trails	.326 *	.369 *	.420 *	.133	.220 *	.169 *
Perceived Piedmont wineries and communities relationship	.069	.046	.036	-.005	.098	.129
Geospatial attributes						
Residence distance to closest winery	.042	.031	.031	.092	.090	.011
Geospatial-tourism type[1]	.042	.091	.068	.068	-.011	-.083
Model statistics						
R	.386	.419	.469	.212	.308	.325
R^2	.149	.175	.220	.045	.095	.105
p-value	<.00	.001	.001	.435	.026	.012

[1] Haw River is set as the default geospatial-tourism type
* $p < .05$

Discussion and Implications

Residents' perceptions of an overall good relationship between the Piedmont wineries and local communities suggests that wineries are active in their communities by being present and involved in their surrounding communities (Lehtonon, 2004). However, there is much room for increasing wineries' level of involvement, as one-quarter of the respondents were unable to rate such winery-community relationship. Although residents acknowledge relative high levels of *Collective Action* they perceive low levels of *Bonding* and *Bridging*.

These results indicate that a good local winery-community relationship is one-directional; although residents acknowledge the presence of wineries in community events, they do not perceive Piedmont wineries as a place to hang out with friends. As such, it is suggested wineries place future efforts on forging bonding with local communities to increase positive attitudes toward their business (Adler & Kwon, 2002), and bridging out with other businesses and organizations within and outside local community to foster community economic growth (Beugelsdijk & Smulders, 2003).

The overall neutral level of social capital associated with the Piedmont wine trails and its non-significant association with spatial attributes (i.e., residence distance to winery, trail geospatial-tourism types) is likely related to the inception stage of wine tourism in the Piedmont area, and therefore limited residential interest in wine related activities. Nonetheless, it is critical to build wine-related social capital in the Piedmont considering that communities with high levels of social capital attain more desired socio-economic outcomes (Adler & Kwon, 2002) and are more likely to prosper (Ellison, Steinfield, & Lampe, 2007; Helliwell & Putnam, 2004) given their overall capacity-enhancement opportunities (McGehee et al., 2010). Likewise, it is important that wineries increase the *Trust* of their industry among their neighbors, as it can improve the communication network (Falk & Kilpatrick, 2000) that could in turn help branding local wineries.

The positive association found between the residents' visitation frequency to local wineries and communities' wine-related social capital association suggests that wineries and wine trails need to increase their marketing efforts to capture local residents as visitors. Capturing local customers should be a priority since most residents had never visited the

Piedmont wine trails. While as results suggested, increased local visitation would enhance residents' perceptions of social capital. In this regard, emphasis should be placed on increasing overall social capital and *Bonding* among senior neighbors; given older residents may have fewer time constraints and may be more affluent and mature than younger residents and therefore might visit local wineries more frequently (Getz & Brown, 2006). Similarly, although most residents know where to find winery related information and can find such information easily, still the majority have never visited the Piedmont wine trails.

Contrary to the extant literature, length of residence (McGehee et al., 2010), income (Kim & Won, 2003), and education levels (Putnam, 1995) were not found significantly associated with the overall perceived social capital or the dimensions comprising it. These results may be because the Piedmont wineries are still newcomers to their surrounding rural communities, whose residents tend to be more conservative and take longer to embrace new members. The newness of wineries in this area may also explain why demographics, relationship with the Piedmont region, and geospatial attributes were not significantly associated with the *Trust* dimension of social capital.

This study contributes to the scholarship of social capital related to wine tourism by integrating their five main dimensions (*Bonding, Bridging, Trust, Collective Action, and Information Shari*ng) into one scale. In doing so, this study extends findings where social capital associated with tourism development is examined as one dimension along other types of capitals such as human and economic capitals (McGehee et al., 2010); it also complements studies of social capital using single approaches (e.g., network – *Bonding* and *Bridging*) (Zhao et al., 2010). High internal reliability obtained in the five dimensions of this modified

scale suggests its suitability to further examine social capital associated with themed touring routes developments and especially for wine tourism.

By exploring communities' social capital in the Piedmont region where wine tourism is at inception development stage, study results can serve as a baseline for future studies. For example, future longitudinal studies could help monitor changes in the synergistic relationship between tourism and social capital along wine trails at different stages of wine trail development as previously suggested (Moscardo et al., 2004; Moscardo, 2012). Monitoring would be important to examine whether *Trust* inn tourism enterprises is built over time in rural communities, especially when community values may conflict with emerging industries such as wineries and breweries. Results from this study are inconclusive with respect to the role geospatial attributes in building social capital. Future studies should explore the role of geospatial attributes such as residents distance to main attractions and specific geospatial route configurations along other types of themed touring routes (e.g., culinary routes).inception.

Concluding Remarks

This study examined tourism related social capital along wine trails in the Piedmont region of North Carolina, where wine tourism is a recent development. It also identified the influence of residents' demographics, wine trails-community relationship, and geospatial attributes on communities' social capital. In doing so, study results enriched the existing managerial intelligence of wine trails and illuminated future wine tourism development policies. However, caution is advised when extrapolating study results and their implications

to other contexts. Although Haw River and Surry County were selected for being comparable to the nine wine trails in the Piedmont region, they are not representative of wine trails in other contexts, which may display different geospatial and tourism characteristics, be more settled in the tourism industry, or have greater market access (e.g., located in or nearby urban settings).

This study indicates that although overall good social capital exists with respect to wine tourism development in the Piedmont, social capital could be improved with respect to bonding, bridging and trust. Thus, it is suggested that wineries' managers invest more of their time and effort develop residents' interests in visiting their wineries, especially among senior adults. Effort on the part of winery operators to improve social capital in these three areas can also guide trail planners and community leaders to identify areas where they can improve social capital to strengthen residents' quality of life (Kavanaugh & Patterson, 2001).

This study also contributes to the scholarship of tourism overall and wine tourism in particular. Linking wine tourism development with social capital also serves as a starting point for future studies exploring with other types of "capitals approach" as suggested by (Lehtonen, 2004; Moscardo, 2012). Besides that, this study succeeds in building a modified scale, which while abridged, is comprehensive of the five main dimensions of social capital. Contributions are also made in identifying factors (e.g., visitation frequency to wine trails) that can help to build social capital in areas of inception tourism development.

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CONCLUSIONS

Themed touring routes (TTRs) are defined in this dissertation as roads or road segments or even walking trails that link nearby tourism attractions under an overarching theme or product. TTRs have been widely developed around the world aiming to attract visitors and stimulate economic impact to local communities (Briedenhann & Wickens, 2004; Lourens, 2007; Rogerson, 2007). Although TTRs have been delineated surrounding various themes (e.g., natural resources, cultural-heritage, religion, culinary arts), wine trails are the most popular ones leading in number and scope worldwide (America's Wine Trail, 2012; Hardy, 2006). Take North Carolina (NC) as an example - this state has 23 wine trails, nine of which located across the Piedmont Triad, in north central NC.

Several studies have focused on TTRs, mainly addressing issues related to visitors' behaviors and experiences (e.g., Denstadli & Jacobsen, 2011; Scott & Thigpen, 2000), their impacts on local economic development (e.g., Briedenhann & Wickens, 2004), and managerial assessments related to specific routes (e.g., Correia, Passos Ascenção, & Charters, 2004). Specifically related to wine trails, existing studies have focused on marketing issues, such as identifying current and potential visitors and exploring marketing strategies (Hashimoto & Telfer, 2008; Jaffe & Pasternk, 2004), and evaluating trail performance (Correia et al., 2004). Yet, the spatial understanding of TTRs, particularly wine trails, is a missing piece from the current literature, which limits the marketing, managerial, and planning intelligences of these linear tourism settings.

The literature reviewed on TTRs, and specifically on wine trails, calls for a better understanding of three issues. First, as a linear tourism phenomenon, the success of wine trails not only depends on the tourism services and amenities offered by the route as a whole, but also on their geospatial characteristics (Harrill & Potts, 2003; Harrill, 2004). Therefore, understanding the tourism and geospatial variability of wine trails can help to better attract and satisfy different types of tourists. Second, residents' attitudes toward tourism endeavors are positively associated with successful tourism development (Oviedo-Garcia, Castellanos-Verdugo, & Martin-Ruiz, 2008). Therefore, understanding residents' attitudes toward wine tourism in communities along wine trails is critical to attain neighbors' support for further development, and to strengthen the tourism-related positive impacts in their communities. Lastly, wine trails are a network of wineries along one route, and thus the levels of cooperation and interactions of such networks are vital for successful route development (Meyer, 2004; Meyer-Cech, 2005; Rogerson, 2007). Therefore, assessing community wine tourism related social capital in communities along wine trails is imperative to guide trail managers and policy makers toward a successful and sustainable tourism development while forging a healthy community.

Given the need to further understand the aforementioned topics surrounding these three aspects, this study: (1) investigated nine wine trails in the Piedmont region of NC by integrating geospatial (*Spatial Pattern*, *Connectivity*, *Accessibility*) and tourism (*Comprehensiveness*, *Dominance*, *Complementariness*) attributes into an integrated characterization of wine trails; and (2) evaluated attitudes and social capital related to wine

tourism among residents living along two wine trails (Haw River and Surry County). A combination of geospatial and survey methods were used in the development of this study.

Summary of Findings

Results show Piedmont wine trails have an overall good accessibility, their tourism amenities complement well across wineries within the same trail, and show wineries complement each other along the trail well with little signs of having dominant ones. The geospatial and tourism characteristics of the Piedmont wine trails yielded three types of geospatial and tourism characterizations among the study wine trails. Four wine trails had a *Superior* characterization showing a good standing in three out of four indicators examined (high *Accessibility*, high *Comprehensiveness*, low *Dominance*, or moderate *Complementariness*). Three wine trails were *Marginal*, as they obtained high scores in only two of the attributes examined (high *Accessibility*, moderate *Complementariness)*. The remaining two wine trails had a *Poor* characterization, exceling only on their low *Dominance*. This characterization was used to select two Piedmont wine trails, Haw River (*Superior* characterization) and Surry County (*Marginal* characterization) to survey surrounding residents about their attitudes and social capital.

The residents' survey revealed overall neutral attitudes toward Piedmont wineries and limited personal benefits associated with local winery development; residents were most positive about the socio-cultural impacts wine trails have on their community, closely followed by the economic and environmental impacts. Socio-demographic characteristics, levels of wine enthusiasm, and geospatial attributes are associated with their overall

perceived personal benefits, and with the overall attitudes toward wine trails. After controlling for other variables, respondents' visitation frequency to Piedmont wine trails was positively associated with both overall perceived personal benefits, both *Personal Enhancement* and *Community Sentience* dimensions, and overall attitudes and the *Socio-cultural* and *Environmental* dimensions; wine involvement was positively associated with overall perceived personal benefits and *Personal Enhancement*; and age was positively associated with overall residents' attitudes and the *Socio-cultural* and *Environmental* dimension.

Respondents held neutral perceptions of social capital associated with Piedmont wineries. *Collective Action*, especially related to wineries' participation in community events, was the dimension most highly rated, while *Bonding* and *Bridging* were the least favorably viewed. Socio-demographic characteristics, relationship with the Piedmont region and wine trails, and geospatial attributes were associated with the overall social capital, and four social capital dimensions (*Bonding*, *Bridging*, *Collective Action*, *Information Sharing)*. However, no association was found between socio-demographic characteristics, relationship with the Piedmont region and wine trails, geospatial attributes and the *Trust* dimension of social capital. Controlling for other variables, visitation frequency to Piedmont wine trails was positively associated with overall social capital, and the same four dimensions*;* age was significantly associated with the *Bonding* dimension.

Practical Implications and Theoretical Contributions

The identification and quantification of geospatial and tourism measures used in this study appear suitable to characterize and further classify wine trails, thus can be used for enhancing managerial issues such as making strategic plans catered to different types of wine trails. The low levels of *Connectivity* attained across all nine wine trails indicate that the road network systems in the study area is far from ideal, thus call for enhancing local road network systems to boost wine tourism development in Piedmont. In doing so, planners should concentrate on the number and density of connections in road networks regardless of the wine trails' length, as this study found that longer trails do not warrant better levels of connectivity. Winery managers should highlight their easy access through signage along the highway to capture wine enthusiasts driving-by. From the tourism perspective, although Piedmont wine trails are providing a variety of services to their visitors, still much room exists for diversifying their amenities on art-related (e.g., galleries) and outdoor recreation options. When doing so, wine trails managers should carefully consider the services already provided by the comprising wineries as lower *Complementariness* may decrease their overall tourism appeal.

Capturing local customers should be a priority taking into consideration that most residents had never visited the Piedmont wine trails and visitation frequency was found to be positively associated with both residents' overall attitudes and perceptions of social capital. Wineries can capture the local market by hosting popular wine-related activities (e.g., informal wine social groups) with a variety of incentives (e.g., discounts or courtesy wine tastings; Lockshin & Spawton, 2001). Results also suggest that local wineries place more

efforts on communicating to their neighbors about the positive impacts that wineries have on local communities as this can increase their support for future developments (Gursoy & Rutherford 2004; Heffernon, Andereck, & Vogt 2000). They can do so by using a variety of marketing strategies including traditional (e.g., flyers) or social media (e.g., Facebook pages). Although residents acknowledge the presence of wineries in community events, they do not perceive Piedmont wineries as a place to hang out with friends. As such, wineries should forge bonding with their surrounding communities and bridging out with other businesses and organizations within and outside local community as increased levels of *bonding* and *bridging* foster community economic growth (Beugelsdijk & Smulders, 2003).

Besides the aforementioned practical implications, the enhanced spatial understanding of TTRs developed in this study contributes to the scholarship of tourism, TTRs, and wine tourism in three ways. First, this study develops an integrated characterization of wine trails that synthesizes six tourism and geospatial measurements. In doing so, this study not only employs more sophisticated geospatial analysis than the ones currently available in the literature, but also develops three indices to capture a variety of tourism services. Those indices, as well as the spatial analysis, can be used along other types of TTRs for route planning and management. Second, this study extends the existing literature on perceived personal benefits associated with tourism development by expanding its current general scale (i.e., "I would personally benefit from more tourism development in my community", "the amount I feel I benefit personally from tourism in my community"; McGehee & Andereck, 2004) to a seven-item scale representing two dimensions, *Personal Enhancem*ent and *Community Sentience*. This scale could be applied to other tourism destinations including

but not limited to linear tourism settings. Finally, this study advances the literature on wine tourism related social capital by integrating their five main dimensions (*Bonding, Bridging, Trust, Collective Action, Information Shari*ng) into one scale, as compared to previous tourism studies in social capital studies that either examined few dimensions or adopted a single approach usually from the network perspective (McGehee et al., 2010; Zhao et al., 2010).

Study Limitations

Implications outlined from this study should be interpreted with caution when extrapolated to other contexts because of two main limitations. This study purposefully choose wine trails in the Piedmont region because their early development stage helps minimize the interference of other unrelated factors when examining geospatial and tourism characterization, residents' attitudes and community's social capital. However, the sample is by no means representative of other wine trails or wine regions in the state or elsewhere. Regions with different levels of tourism development, regional wine branding, agricultural characteristics (e.g., soil, water), or political structures (e.g., local support, subsidies) may result in different characterizations and levels of residents' attitudes and perceptions of social capital. Also, although the study sample size was large enough for this exploratory study, it is relatively small in number as compared to traditional studies on tourism attitudes and community's social capital. The small sample size limited the possibility to conduct more sophisticated statistical analysis to examine the role of geospatial attributes on these two aspects.

Insights for Future Research

Despite both limitations, this study leads the way for future TTRs studies, especially those focusing on wine trails, in different ways. This study applied *Spatial Pattern*, *Connectivity*, and *Accessibility* for characterizing geospatial attributes of wine trails that resulted in three types of wine trails. However, much room still exists for future research to examine other measures for the each of the geospatial and tourism service indicators for wine trail characterization. For example, besides the Gamma index and shortest distance used in this study, there are many other measures for *Connectivity* (e.g., Alpha index, connected node ratio) and *Accessibility* (e.g., cumulative opportunity). It is thus worthwhile for future studies to explore the suitability of different *Connectivity* and *Accessibility* measures, and identify the most suitable ones for further wine trail characterization.

Similarly, data could be further examined to obtain a better understanding of the geospatial configuration of wine trails. For example, in this study, *Spatial Pattern* is determined by the existence and location of winery clusters, which illuminate the possibility of utilizing cluster analysis to identify spatial groupings of wineries. There may be a research need to determine buffer zone widths based on some objective criteria. Contrasting residents' attitudes and perceptions of social capital between different buffer zones along wine trails (e.g., 5-mile vs. 10-mile buffers), and between wine trails with different geospatial and tourism characterization (e.g., Surry County vs. Haw River) can better capture the geographic differences for further analysis. As per tourism characterization, future research could take nearby tourism attractions (e.g., parks, national forests) into consideration, as these

attractions may have a significant influence on the residents' awareness of the neighboring wineries and wine trails, and thus on their attitudes and perceptions.

This study should also be replicated in other geographic regions to capture a broader spectrum of wine trails with different geospatial characteristics (e.g., spatial patterns, number of comprising wineries) to validate various measurements developed and modified in this study (i.e., tourism characterization, modified residents' personal benefit scale, and wine related social capital scale). Future studies should also consider validating the study's geospatial tourism characterization in other regions that are more mature in wine tourism development (e.g., Napa or Sonoma Valleys in California).

The overall neutral scores of residents' attitudes and their perceptions of social capital may result from not giving respondents the option of "I don't know" in the survey scale, thus pushing some toward the neutral point of the scale. It is therefore advisable that future studies include an "I don't know" option into the attitudes and social capital scales to clearly distinguish residents who are unaware of tourism impacts from those who really have neutral attitudes and perceptions. Qualitative research method can also be used in the future to probe more in-depth explanations for the neutrality in both scales or further test the suitability of items representing each dimension in the scales. This is especially important for understanding residents' perceptions of social capital, as residents' attitudes scales are more structured with relatively rigid item statements and dimensions. Using qualitative research method to detect underlying dimensions of the wine related social capital scale is also desirable, since research on social capital related to tourism development is still at exploratory stage. For example, conducting interviews or focus groups with local residents

can help understand the bonding process among local people and bridging ties between residents and tourism agencies (e.g., Convention and Visitor Bureau, local wine grape councils) and to detect their different roles in developing and promoting wine trails.

Considering this study is a self-funded project, data collection method, sample size and time frame for this study were the best available choices. Given sufficient funding support, future research should consider a larger sample size in terms of number of respondents, and data collection spanning through both peak and low tourism seasons as wine tourism is a seasonal activity (Bruwer, 2003). Having a small sample size was the main reason for this study failing to reach a good model fit from the structural equation modeling (SEM), which attempted to explore the mediating effect of personal benefits on the influence of geospatial attributes on the residents' attitudes. A larger sample size would enable the investigation of the effect of other factors on residents attitudes toward wine tourism, such as religion preferences and behaviors (especially in rural conservative settings), the tourism development stage of the wine setting (emerging vs. mature) and the development process (e.g., bottom up vs. agency lead initiatives).

In sum, this dissertation research and other future research addressing the aforementioned research gaps could help with regional planning, and the optimization of resources in rural communities. Also, the integration and emphasis of the perceptions of local communities into these research and practice responds to the urge for sustainable tourism development, especially in rural areas, and leads to better-off communities.

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APPENDICES

APPENDIX A:

IRB APPROVAL

North Carolina State University is a land-grant university and a constituent institution of the University of North Carolina

Office of Research and Innovation
Division of Research Administration

NC STATE UNIVERSITY

Campus Box 7514
Raleigh, North Carolina 27695-7514

919.515.8754 (phone)
919.515.7721 (fax)

From: Jennifer Ofstein, IRB Coordinator
North Carolina State University
Institutional Review Board

Date: September 18, 2013

Title: Assessing social capital and attitudes associated with wine trails in the Piedmont region

IRB#: 3479

Dear Shuangyu Xu

The research proposal named above has received administrative review and has been approved as exempt from the policy as outlined in the Code of Federal Regulations (Exemption: 46.101. b.2). Provided that the only participation of the subjects is as described in the proposal narrative, this project is exempt from further review. This approval does not expire, but any changes must be approved by the IRB prior to implementation.

NOTE:

1. This committee complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU projects, the Assurance Number is: FWA00003429.

2. Any changes to the research must be submitted and approved by the IRB prior to implementation.

3. If any unanticipated problems occur, they must be reported to the IRB office within 5 business days.

Please forward a copy of this letter to your faculty sponsor, if applicable.
Thank you.

Sincerely,

Jennifer Ofstein
NC State IRB

Project Description: *Describe your project by providing a summary and answering the requests for information below.*

1. **Project Summary. Please make sure to include the purpose and rationale for your study and a brief overview of your methods.**

This study aims to better understand residents' perceptions of local wineries and wine tourism in the Piedmont region. Understanding residents' perceptions is critical to determine the direction of further tourism development in the region. Study results can also serve other stakeholders (e.g., tourism businesses, government) to better respond to the needs and desires of local community members, strengthen partnerships among related sectors and businesses, thus facilitating community development. This study is important taking into consideration the growth of the wine industry (e.g., number of wineries, development of wine trails) in North Carolina (NC), especially in the Piedmont region during the past decade. Residents along wine trails in the Piedmont will be randomly selected to participate in a survey. A drop-off/pick-up method will be used to distribute surveys; the principal investigator will drop off questionnaires to households residing in communities along the three target wine trails (i.e., Surry County Wine Trail, Haw River Wine Trail, and Lexington Loop Wine Trail). Respondents will be asked to place the completed questionnaires in bag (provided by the investigators) and hang it on the door knob to be collected by the principal investigator on designated dates.

2. **Describe your participant population. This includes age range, inclusion/exclusion criteria, and any vulnerable populations that will be targeted for enrollment.**

Altogether 1,200 households residing in communities within a 10-mile buffer spread (on each side) of the three target wine trails will be randomly selected to participate in this study. The target population is household head(s), thus it is unforeseen that vulnerable populations are included in this study.

3. **Describe how potential participants will be approached about the research and how informed consent will be obtained. Alternatively, provide an explanation of why informed consent will not be obtained. Include a copy of recruitment materials, such as, scripts, letters of introduction, emails, etc. with your submission.**

The principal investigator will place a plastic bag on each selected household's door knob containing: (1) a cover letter detailing the study purpose, guidelines about confidentiality and anonymity, the voluntary nature of the study, and contact information of the principal investigator; (2) the survey instrument; and (3) an additional sheet to enter contact information (optional) if the participant would like to be inlcuded for the random drawing of one (out of two) $25 gift cards. Please find attached a copy of the cover letter, the survey instrument, and the drawing form.

4. **Describe how identifying information will be recorded and associated with data (e.g. code numbers used that are linked via a master list to subjects' names). Alternatively, provide details on how study data will be collected and stored anonymously ("anonymously" means that there is no link whatsoever between participant identities and data). Describe management of data: security, storage, access, and final disposition.**

Each annonymous survey will be number coded; data queried in the survey will be input to SPSS for statistical analysis. Contact information for the drawing purposes will be separated from the survey and will not be entered into any type of electronic file. After randomly selected two winners, such information will be destroyed. Note that the survey instrument does not collect any contact information, thus data collected will be annonymous.

5. **Provide a detailed (step-by-step) description of all study procedures, including descriptions of what the participants will experience. Include topics, materials, procedures, for use of assessments (interviews, surveys, questionnaires, testing methods, observations, etc.).**

The principal investigator will drop off study surveys at randomly selected household within 10 miles zone of three target wine trails in the Piedmont region. The principal investigator will record household addresses. Respondents are requested to fill in the survey, place it in the plastic bag provided, and hang it on the door knob for principal investigator to pick up. Specific dates and times for pick-up will be provided, as to minimize the time the completed surveys will be on the front door.

The survey will query about: the influence wineries in the Piedmont region have on the community and on residents' personal benefit, residents' perceptions on how wineries work, residents' past experience on wineries and wine trails, residents' involvement in wine, and residents' demographic information, including age, gender, education, employment status, annual household income before taxes, and length of residence.

6. **Will minors (participants under the age of 18) be recruited for this study:**

   No

7. **Is this study funded?** No
   a. Is this study receiving federal funding? No
   b. If yes, please provide the grant proposal or any other supporting documents.

8. **Do you have a conflict of interest or significant financial interest in this research?**

   No
   a. **What does your plan include for managing this conflict of interest and is it being properly followed?** N/A

9. **HUMAN SUBJECT ETHICS TRAINING**
   *Please consider taking the Collaborative Institutional Training Initiative (CITI), a free, comprehensive ethics training program for researchers conducting research with human subjects. Just click on the underlined link.

12. **ADDITIONAL INFORMATION:**

    a) If a questionnaire, survey or interview instrument is to be used, attach an editable version to this proposal.

    b) Attach an editable version of the informed consent form to this proposal. See the IRB website for a Sample Consent Form and Informed Consent Checklist http://www.ncsu.edu/sparcs/irb/forms.html

    c) Please provide an editable version of any additional materials (i.e., recruitment materials, such as "flyers", recruitment scripts, etc.) that may aid the IRB in making its decision.

**If a survey instrument or other documents such as a consent form that will be used in the study are available, attach them to this request. If informed consent is not necessary, an information or fact sheet should be considered in order to provide subjects with information about the study. The informed consent form template on the IRB website could be modified into an information or fact sheet.*

The Following are categories the IRB office uses to determine if your project qualifies for exemption *(a review of the categories below may provide guidance about what sort of information is necessary for the IRB office to verify that your research is exempt)*:

Exemption Category: *(Choose only one of the following that specifically matches the characteristics of your study that make this project exempt)*

☐ 1. Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

☒ 2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to

the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.
***Please Note- this exemption for research involving survey or interview procedures or observations of public behavior does not apply to research conducted with minors, except for research that involves observation of public behavior when the investigator(s) do not participate in the activities being observed.**

☐ 3. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) require(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

☐ 4. Research, involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

5. Not applicable

☐ 6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration, or approved by the Environmental Protection Agency, or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

APPENDIX B:

SURVEY INSTRUMENT

The Piedmont Wineries Study

1. How often have you visited any of the following wine trails or wineries in the Piedmont region in the last 3 years?	Never	Rarely	Occasionally	Sometimes	Frequently
Haw River Wine Trail: Grove Winery, Glen Marie Vineyards & Winery, Iron Gate Vineyards, Benjamin Vineyards & Winery	❒	❒	❒	❒	❒
Lexington Loop Wine Trail: Childress Vineyards, Weathervane Winery, Junius Lindsday Vineyard, Raylen Vineyards and Winery	❒	❒	❒	❒	❒
Piedmont Heritage Wine Trail: Stonefield Cellars, Grove Winery, Chinqua Penn Vineyards, Autumn Creek Vineyards	❒	❒	❒	❒	❒
Midlands Wine Trail: Zimmerman Vineyards, Horizon Cellars, Silkhope Winery	❒	❒	❒	❒	❒
Scenic 421 Corridor: Alison Oaks Vineyards, Hangover Park Vineyard, Westbend Vineyards	❒	❒	❒	❒	❒
Surry County Wine Trail: Hutton Vineyards, Shelton Vineyards, Round Peak Vineyards, Old North State Winery	❒	❒	❒	❒	❒
Swan Creek Wine Trail: Laurel Gray Vineyard, Raffaldini Vineyards and Winery, Dobbins Creek Vineyards, Buck Shoals Winery and Vineyard, Shadow Springs Vineyard	❒	❒	❒	❒	❒
Upper Yadkin Wine Trail: Brushy Mountain Winery, Elkin Creek Vineyard, Grassy Creek Vineyards, McRichie Winery & Ciderworks	❒	❒	❒	❒	❒
Yadkin River Wine Trail: Stony Knoll Vineyards, Ragapple Lassie Vineyards, Flint Hill Vineyards	❒	❒	❒	❒	❒

2. To which of the following wine trails do you feel *most* connected? *(Select only one)*

❒ Haw River Wine Trail
❒ Lexington Loop Wine Trail
❒ Piedmont Heritage Wine Trail
❒ Midlands Wine Trail
❒ Scenic 421 Corridor
❒ Surry County Wine Trail
❒ Swan Creek Wine Trail
❒ Upper Yadkin Wine Trail
❒ Yadkin River Wine Trail
❒ None of the above

3. How often have you visited a winery or wine trail *outside* the Piedmont region in the last 3 years?

❒ Never ❒ Rarely ❒ Occasionally ❒ Sometimes ❒ Frequently

4. To what extent have wineries in the Piedmont region increased or decreased the following aspects of your community?	Significantly Decreased	Decreased	Stayed the Same	Increased	Significantly Increased
Number of jobs for local residents	❒	❒	❒	❒	❒
Tranquility of the community	❒	❒	❒	❒	❒
Health of local ecosystems	❒	❒	❒	❒	❒
Variety of local businesses (e.g., restaurants, gift shops)	❒	❒	❒	❒	❒
Number of local businesses	❒	❒	❒	❒	❒
Conservation of local heritage (e.g., historic buildings, museums)	❒	❒	❒	❒	❒
Prices of goods and services	❒	❒	❒	❒	❒
Real estate cost and property tax	❒	❒	❒	❒	❒
Beauty of local landscapes	❒	❒	❒	❒	❒
Variety of cultural activities (e.g., art exhibitions, shows)	❒	❒	❒	❒	❒
Economic inequality among residents	❒	❒	❒	❒	❒
Economic stability of the community	❒	❒	❒	❒	❒
Littering	❒	❒	❒	❒	❒
Crime in the community (e.g., theft, vandalism)	❒	❒	❒	❒	❒
Traffic congestion and parking problems	❒	❒	❒	❒	❒
Overcrowding in public areas	❒	❒	❒	❒	❒
Quality of life of Piedmont residents	❒	❒	❒	❒	❒
Tourists' spending	❒	❒	❒	❒	❒
Environmental consciousness (e.g., recycling, clean energy)	❒	❒	❒	❒	❒
Number of local recreational facilities (e.g., parks, golf courses)	❒	❒	❒	❒	❒
Quality of public services (e.g., police, public transportation)	❒	❒	❒	❒	❒
Quality of public infrastructure and facilities (e.g., roads, rest areas)	❒	❒	❒	❒	❒
Sense of community identity	❒	❒	❒	❒	❒
Small-town feeling of the community	❒	❒	❒	❒	❒

5. How much do you agree or disagree with the following personal benefits you have obtained from the wineries in the Piedmont region?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
My property value has increased	❒	❒	❒	❒	❒
The quality of my personal life has improved	❒	❒	❒	❒	❒
I feel my community is a better place to live	❒	❒	❒	❒	❒
My understanding of other cultures has increased	❒	❒	❒	❒	❒
I care more about my community's natural resources	❒	❒	❒	❒	❒
I care more about my community's cultural resources	❒	❒	❒	❒	❒
I have more opportunities to participate in recreational activities	❒	❒	❒	❒	❒

6. **How much do you agree or disagree with the following statements regarding wineries along the nearest wine trail to you in the Piedmont region?**

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
I hang out with my friends and family at local wineries	❒	❒	❒	❒	❒
I attend events co-hosted by several local wineries	❒	❒	❒	❒	❒
I attend events co-hosted by local wineries and other local businesses	❒	❒	❒	❒	❒
My community has a shared vision for local winery development	❒	❒	❒	❒	❒
I have acquaintance(s) who own or manage a local winery	❒	❒	❒	❒	❒
I have acquaintance(s) who own or manage a local wine-related business	❒	❒	❒	❒	❒
I will volunteer in local winery-related events if needed	❒	❒	❒	❒	❒
I trust wineries to make decisions that protect community interests	❒	❒	❒	❒	❒
Local residents trust wineries to make decisions that protect community interests	❒	❒	❒	❒	❒
Local wineries participate in community events	❒	❒	❒	❒	❒
Local wineries support community needs (e.g., sponsor athletics)	❒	❒	❒	❒	❒
I talk to my neighbors about visiting local wineries	❒	❒	❒	❒	❒
I know where to find information about local winery-related events	❒	❒	❒	❒	❒
I can easily find information about local winery-related events	❒	❒	❒	❒	❒
I attend private parties at local wineries (e.g., weddings)	❒	❒	❒	❒	❒
People in my community participate in local winery-related events	❒	❒	❒	❒	❒
My community has a forum to discuss winery-related opportunities	❒	❒	❒	❒	❒
My community has a forum to discuss winery-related concerns	❒	❒	❒	❒	❒

7. **Does anyone in your household currently own, work or volunteer for...?** *(Check all that apply)*

❒ A winery or vineyard
❒ Lodging industry (e.g., hotel, bed and breakfast)
❒ Restaurants (e.g., coffee shops, bars)
❒ Other tourism business (e.g., souvenir shop, golf course)
❒ None of the above

8. **Are you or anyone in your household ...?** (*Check all that apply)*

❒ A subscriber to a wine-related magazine (e.g., Wine Enthusiast, Wine Spectator, etc.)
❒ A member or friend of a wine club (e.g., The Gold Medal, Uncorked Ventures, etc.)
❒ A member of a wine-related organization (e.g., American Wine Society, Wine America, etc.)
❒ A follower of online wine-related social media (e.g., Wine Library TV blog, tweeter @winetwits, etc.)
❒ A participant of any other informal wine social groups
❒ None of the above

9. **Overall, how would you rate the relationship between the Piedmont wineries and the local communities (e.g., residents, businesses, associations, etc.)?**

❒ Poor ❒ Fair ❒ Average ❒ Good ❒ Excellent ❒ I don't know

INFORMATION ABOUT YOU AND YOUR FAMILY

10. Your age: _____ years old

11. Your gender: ❒ Male ❒ Female

12. Your highest level of education:

- ❒ High school graduate or less
- ❒ Some college
- ❒ Two-year college degree
- ❒ Four-year college degree
- ❒ Advanced degree (e.g., M.S., M.D., Ph.D., J.D.)

13. The place you currently live in: ❒ I own it ❒ I rent it

14. With whom do you live at home: *(Check all that apply)*

- ❒ I live alone
- ❒ Spouse or significant other
- ❒ Child(ren) younger than 18 years old
- ❒ Adult child(ren)
- ❒ Other adults (e.g., friends, relatives)

15. Number of total people living at your household: Yourself + Others: _____

16. Number of years you have lived in: This neighborhood: _____ years

The Piedmont area: _____ years

17. Your employment status:

- ❒ Full time employee
- ❒ Part time employee
- ❒ Retired
- ❒ Student
- ❒ Unemployed
- ❒ Other: _____

18. Your annual household income before taxes:

- ❒ Less than $25,000
- ❒ $25,000 - $49,999
- ❒ $50,000 - $74,999
- ❒ $75,000 - $99,999
- ❒ $100,000 - $149,999
- ❒ $150,000 or more

19. Do you have any additional comments regarding the local wineries and wine trails?

_____

_____

_____

Thank You Very Much for Your Help!

If you want to be entered into the drawing for the chance to win one of two (2) $25.00 gift cards, please enter your contact information in the attached form.

APPENDIX C:

STRUCTURAL EQUATION MODELING ATTEMPT

Models	χ^2/DF	CFI	RMSEA
Proposed model	3.311	.849	.088
Modification:			
Relationship with the Piedmont associated with overall attitudes	3.285	.850	.087
After removing ownership of current living place	3.009	.878	.082
After removing the length of residence in the Piedmont	3.099	.883	.084