ABSTRACT

MAO, YUCHEN. Spatial Analysis of Tourism Micro-entrepreneurship and Poverty in North Carolina and its Neighboring States. (Under the direction of Dr. Duarte Morais).

Poverty is generally associated with developing countries in the global South; however, in developed countries like the USA, there are also many areas in relative poverty. Scrutiny of the role of tourism, and of tourism micro-entrepreneurship, as tools for poverty reduction has dramatically increased over the last decade, but few studies have examined the issue in developed countries. Considering that in developed regions there are areas with high levels of poverty while others are growth centers, a regional development perspective is needed to help address how tourism micro-entrepreneurship interacts with sustainable poverty reduction. Accordingly, the purpose of this study is to examine how tourism, poverty, and micro-entrepreneurship interact spatially across North Carolina and its adjacent states, and identify where tourism micro-entrepreneurship has the most potential for promoting local economic development.

First, based on a framework of cluster theory, this study investigates how tourism micro-entrepreneurship, amenities, and the formal tourism sector cluster across the study area, and identifies where such spatial clusters have the potential to promote local development. Second, based on the conceptual framework of spatial heterogeneity, this study uses geographically weighted regression to explore how determinants of tourism micro-entrepreneurship, their effects, and tourism micro-entrepreneurship’s role in helping promote development vary spatially. And third, this study analyzes hotspots of tourism micro-entrepreneurship and economic development based on univariate and multivariate spatial
outlier detection frameworks and the implications for local and regional government to develop effective management practices. Overall, this study revealed that in the areas with relatively high-level of tourism amenities of North Carolina and Virginia, tourism micro-entrepreneurship has been utilized and generally associated with local economic growth, while in some areas of the other states, tourism micro-entrepreneurship has yet to be utilized for economic revitalization.
Spatial Analysis of Tourism Micro-entrepreneurship and Poverty in North Carolina and its Neighboring States

by
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CHAPTER 1:
INTRODUCTION

Areas mired in poverty are throughout the world especially in the Third World countries. However, in the developed countries like USA, there are still many areas in relative poverty as compared to their surrounding areas. Poverty can be measured based on various variables or some combinations thereof, such as per capita GDP, unemployment rate and labor force participation rate (Burkey, 1993). Among others, human development index which is a composite measure on a 0-1 scale using social data in terms of three dimensions including income, health and education is a rather popular alternative (Nijkamp and Abreu, 2009).

Scrutiny of tourism as a tool for poverty reduction has dramatically increased over the last decade (Harrison, 2008; Zhao, Ritchie and Echtner, 2011). The growth of tourism has promoted local development by providing tax revenues, creating employment and improving infrastructure (Rogerson, 2006; Manyara and Jones, 2007). Other benefits brought to local people include sense of pride, external interaction, diversified livelihood, enhanced linkages and enhanced social development which will in turn help alleviate poverty (Garcia-Ramon, Canoves and Valdivinos, 1995; Adams et al., 2004; Nyaupane, Morais and Dowler, 2006). On the flip side, tourism has been criticized for leading to commodification of culture, reinforced dependency, leakage of economic benefits, displacement of people from their original habitats, limited participation of host communities in planning and decision-making as well as uneven distribution of benefits (Hill, Nel and Trotter, 2006; Dressler et al., 2010).
Studies have shown that sustainable local economic development strategies include promoting human capital development, plugging the leaks in the local economy, establishing linkage, and retaining and expanding local economic activities which can help facilitate the growth of self-employment, namely, micro-enterprises (Shane, 2003; Rogerson, 2006). Therefore, tourism micro-entrepreneurship may provide a sustainable way to reduce poverty. The facilitators include low entry level, a relatively low start-up capital for some services offered, the skills and aspirations of host communities, authentic local culture and local awareness of their strengths (Binnes and Nel, 2002; Kajanus, Kangas and Kurttila, 2004; Kiss, 2004; Getz and Carlsen, 2005; Atelijevic, 2009; Harwoord, 2010). However, there are constraints that hinder the formation of tourism micro-entrepreneurship or its sustainability, including irreplaceability of formal employment, oversupply of similar products, high taxation, shortage of basic entrepreneurial skills, weak local market, overly high start-up capital as opposed to the current economic situations of the local people, inefficient regulatory environment, and inadequate infrastructure (Golodner, 2001; Pirttila and Tuomala, 2004; Fairbairn, 2005; Wilkes, 2005; Atelijevic and Doorene, 2007; Lepp, 2007; Cooney and Shanks, 2010; Gauvin, Uchida, Rozelle, Xu and Zhan, 2010; Rive and Rubbelke, 2010; Allen and Lachapelle, 2012; Amadi and Abdullah, 2012).

Poverty alleviation is equivalent to achieving human sustainability, while the fundamental principles of sustainability include futurism, equity, and holism (Saarinen, 2006). A meso approach to sustainability at a regional scale is to solve some issues more easily than at a global or local scale (Van den Bergh and Nijkamp, 1991). Within a region,
different conditions lead to spatial discrepancies of development. As a matter of fact, several research studies have shown that poverty, tourism, and self-employment have their own distinct patterns of spatial diversity in the same region (Bigman and Fokack, 2000; Glasmeier, 2002; Breitenecker, 2010; Li, Yin and Liu, 2011; Court, 2012; Thongdara, Samarakoon, Shrestha and Ranamukhaarachchi, 2012).

Besides, spatial distribution of economic development helps identify the core-periphery patterns, with cores in general being more urban and developed and peripheries in general being more rural and underdeveloped (Buhalis, 1999; Wanhill and Buhalis, 1999). Tourism may follow the core-periphery pattern closely, with cores having higher level of tourism growth than peripheries due to availability of resources and facilities, or run counter to the core-periphery pattern, with peripheries having more tourism activities as pleasure peripheries (Edwards and Fernandes, 1999; Seaton, 1999; Chaperon and Bramwell, 2013).

While the importance of regional development theory and core-periphery model to research on economic development has been acknowledged, tourism as a tool for poverty reduction has seldom been addressed from a regional development perspective. First, relevant studies in terms of community or pro-poor tourism have mostly focused on localities rather than a regional system. Without considering regional factors, issues such as those involving externalities are not easily solved. Second, spatial factors are seldom incorporated into the analysis of the explanatory variables for tourism development. Without considering spatial associations among the observations of some variable, the role of tourism micro-entrepreneurship in reducing poverty can be biased. In an attempt to respond to these issues
this study focuses on identifying where tourism micro-entrepreneurship has played a significant role in reducing poverty or has the potential to reduce poverty, which may not be in accordance with the administrative boundaries.

**Regional development theory**

A regional perspective is necessary when seeking a sustainable way of development (Van den Bergh and Nijkamp, 1991; Saarinen, 2006). A regional system is open since it is subjected to cross-boundary flows and external determinants of its internal processes. Therefore, regional development is not static in nature, but involving complex space-time dynamics (Nijkamp and Abreu, 2009). In the same region, there are various factors that lead to spatial discrepancies of economic development including locational factors, physical factors, infrastructure, human resources, finance and capital, knowledge and technology, industrial structure, quality of life, institutional capacity, entrepreneurial spirit, and community identity and image (Wong, 1998; Garcia-Cabrera and Garcia-Sota, 2008; Breitenecker, 2010). Furthermore, these factors can have their own contributing factors. For example, entrepreneurship is related to gender, age, education, financial support systems, administrative regulations, risk tolerance and market structures (Nijkamp and Abreu, 2009).

Core-periphery patterns can be detected from the spatial distribution of economic development using some spatial outlier detection methods (Buhalis, 1999; Wanhill and Buhalis, 1999). The separation between cores and peripheries can change with time due to external factors and cross-boundary interactions (Van den Bergh and Nijkamp, 1991). The spatial patterns of tourism development may follow the core-periphery pattern closely, with
cores having higher level of tourism growth than peripheries, or run counter to the core-periphery pattern, with peripheries as pleasure peripheries having more tourism activities (Edwards and Fernandes, 1999; Seaton, 1999; Chaperon and Bramwell, 2013). As Butler’s tourism destination life cycle indicates, tourism in a destination will be at different stages of development at different times and the spatial pattern of tourism will change accordingly (Butler, 1980). Therefore, within a region, the interaction of tourism, poverty, and micro-entrepreneurship will in turn change with time.

Besides, two concepts of space and place need to be distinguished from each other. A place usually has geographic or political boundaries based on which policies usually are formulated and implemented (Gnanasekaran et al., 2008; Jia et al., 2009; Arcaya et al., 2012). Space is where proximity might structure the process that does not necessarily follow the geographic or political boundaries and where commonalities can often be identified (Elliott and Wartenberg, 2004; Arcaya et al., 2012). Regional development research should be based on the distinctions between space and place.

**Poverty**

Poverty is based on a comparison of resources to needs. A person or family is identified as poor if its resources fall short of the poverty threshold (Foster, 1998). In other words, poverty means a person or a family persistently and unchangeably lacks basic necessities of life (food, shelter, clean water, clothing, medicine, education, knowledge, electricity, etc.) (Williams, 1999; Nakamura, 2007; Ewhrudjakpor, 2008). The data on families are then aggregated to obtain an overall view of poverty in a community (Foster, 1998). As defined
by May (1999), poverty of entire communities is the inability to command sufficient resources to satisfy a socially acceptable minimum standard of living. Also, poverty can be noted as capability-deprivation such as lack of competence, confidence, and disempowerment since these factors are often the primary causes of poverty (Burkey, 1993; Singer, 2006). Various variables can be used to measure poverty, while some combinations thereof are sometimes necessary since symptoms of poverty are usually correlated with each other (Burkey, 1993). For example, lack of education is much correlated with low income. Gross Domestic Product (GDP) per capita is usually used to measure poverty, while alternative or complementary measures include per-capita consumption, poverty rates, unemployment rates, labor force participation rates or access to public services. Among others, Human Development Index is a rather popular alternative which is on a 0-1 scale using a weighted average of some quantifiable standardized social variables such as per capita income, percentage of population insured and percentage of those with at least a high-school degree (Nijkamp and Abreu, 2009). Even if a measure of poverty is fixed, it still depends on the ways of defining resources, constructing thresholds, and aggregating the resulting data to determine if the people in a place are in poverty (Ruggles, 1990; Ravallion, 1994; Citro and Michael, 1995). Thus, absolute and relative poverty need to be distinguished from each other (Foster, 1998). Areas mired in poverty are throughout the world especially in the Third World countries. In the developed countries, although there are few areas stricken by absolute poverty, there are still many areas in relative poverty as compared to their surrounding areas (Foster, 1998; Nijkamp and Abreu, 2009). Besides, the concept of relative
deprivation is worth a mention. Relative deprivation is premised on that a group or individual’s assessment of his/its own position in a social structure is not evaluated against some absolute standard, but through a social comparison process involving relative perceptions of the position of others (Seaton, 1997). The perception of relative deprivation depends upon whom people compare themselves to (Giddens, 1993). Relative deprivation is often perceived by people in the third world countries when they compare themselves to the visitors from the developed countries. For example, Seaton (1997) indicated the residents in Cuba perceived three types of relative deprivations: tourist-contact induced material deprivation, tourist-provision produced material deprivation and tourism-employment produced income deprivation.

To identify the causes of poverty is the key first step to deal with poverty. A symptom is an indication of something else and produced by the more important underlying causes. Therefore, symptoms of poverty need to be separated from the real causes. The causes can be classified into physical, social, political and economic categories at the local, national and international levels (Burkey, 1993). The identification of the classifications helps facilitate the formulation of strategies to cope with poverty at different levels.

Numerous US States are struggling to cope with a series of issues related to poverty, such as unemployment. North Carolina is unexceptionally making progress in alleviating the specter of poverty in some areas (Johnson, 2003; McCallie, 2006). Admittedly, poverty cannot be eradicated through hastily implemented ad hoc programs so that the alleviation process is generally slow and through carefully planned strategies (Ewhrudjakpor, 2008;
Moreover, some strategies that are originally aimed at alleviating poverty could not really lead to poverty alleviation, but may prevent intensification of poverty (Neumann and Hirsch, 2000; Wunder, 2001). Thus, a distinction between poverty prevention and poverty reduction is also noteworthy.

**Tourism as a tool for equitable development**

The growth of tourism has promoted local development by providing tax revenues, creating employment and improving infrastructure (Rogerson, 2006; Manyara and Jones, 2007). For example, the tourism industry forms an important contributor to North Carolina’s economy, accounting for 4% of the state’s GDP ($15.5 Billion) and 8.7% of all jobs in 2009 (McGehee, Meng and Tepanon, 2006; NCDC, 2009). As such, tourism development has made important contributions to the economic revitalization of North Carolina through job creation, tax revenues, and its synergies with other economic sectors.

Benefits of tourism to the communities and their people are diverse. There are diverse benefits brought by tourism to the communities and their people. Tourism can directly bring economic benefits to some people as shown through the explanation of purchase of development rights (Daniels, 1991). The government may pay willing landowners for not developing their land for the purpose of preserving environment and providing tourism open space for the public. While purchasing the development rights, the government obtains a legal easement. Through just selling their development rights, the landowners still owns the land and can use or sell it for the purpose specified by the easement such as hunting, fishing or other kinds of nature-based tourism. Though the proceeds from the sale of development
rights are taxable based on some laws, the sale of development rights offer landowners a substantial tax savings through reducing taxable value of the land and through reducing the future inheritance taxes. In turn, the savings can be used for some tourism-based livelihoods. Garcia-Ramon, Canoves and Valdovinos (1995) indicated people that had participated in tourism businesses in the remote rural area in Spain perceived improved income, raised standard of living, restoration of farmhouse and preservation of rural heritage, sense of pride, external interaction and being involved in the public realm as tourism-related benefits, which in turn can contribute in helping them get out of poverty. Nyaupane, Morais and Dowler (2006) indicated people in Yunnan Province in the southwest of China thought their enhanced foreign language skills enhanced through contacting international tourists could benefit them in the future. Adams et al. (2004) indicated tourism could benefit local people through diversified livelihood, enhanced linkages, and improved lifestyle. Tourism businesses such as accommodations can use local produce to satisfy the demand of tourists, which helps prevent tourism revenue leakage (Lepp, 2007). Moreover, local people can also benefit through enjoying the food brought by tourists. For example, Lepp (2007) indicated tomato was not originally native to some local village of Uganda, while as local farmers knew about it from tourists and began to grow them by themselves, they could later on either eat or sell the produce to tourists.

On the flip side, tourism has been criticized for resulting in commodification of culture, reinforced dependency, leakage of economic benefits, displacement of people from their original habitats, limited participation of host communities in planning and decision-making
as well as uneven distribution of benefits (Hill, Nel and Trotter, 2006; Dressler, Buscher, Schoon, Brockington, Hayes, Kull, McCarthy and Shrestha, 2010). For example, Manyara and Jones (2007) indicated some community-based tourism enterprises in Kenya reflected a kind of neocolonial mode that enhanced foreign control and donor funding which in turn reinforced dependency. Adams and Hutton (2007) indicated protected areas designated for tourism have excluded local people from using natural resources which originally belonged to them thereby making some of their livelihood opportunity foregone. Nyaupane, Morais and Dowler (2006) mentioned planning of tourism has been in the charge of national government without local input which exacerbates the situations of the economically impoverished and social-culturally marginalized people. Tourists more often than not have higher demands on the resources, the result of which is that more resources are provided to tourists than to the local people (Seaton, 1997). For example, in some water-scarce areas, more water has to be provided to tourists, and the end result is that local people have less water to use and have to scale down the extent to which they engage in water-based productive use, such as beer brewing (Cousins, Smits and Chauke, 2007). Also, tourism-induced infrastructure will compete for resources with the local people, and this will in turn exacerbate their poverty (Seaton, 1997). Another negative impact of tourism lies in the fact that the flux of tourists may make local children dependent upon selling trinkets to tourists or even begging to get spare money (Nyaupane, Morais and Dowler, 2006). When realizing this fast means of making a living, they skip classes, which in turn undermines their education
and mastery of higher levels of skills and techniques that will in the long run affect their livelihoods.

Rogerson (2006) enumerated 6 local economic development strategies that should be supported including community-based economic development, linkage, human capital development, infrastructure and municipal services, leak plugging in the local economy, and retaining and expanding local economic activity. If tourism development could be based on these strategies, tourism as a tool for poverty reduction and its sustainability can be realized. These strategies are closely related to opportunities created for self-employment, which as defined by Shane (2003) is performing work for personal profit rather than for wages paid by other. As a matter of fact, tourism has been taken as a new form of livelihood to expand income sources and facilitate diversification of economic activity of the individuals and households. It may be used by those who originally lived on subsistence farming and forest products to reduce poverty and vulnerability (Bryceson, 2002; Rogerson, 2003; Tomaselli, Timbo and Kozak, 2012). Evidence shows that lack of formal business background and previous experience in the tourism industry is not a big barrier to some tourism business entry (Getz and Carlsen, 2005). Garcia-Ramon, Canoves and Valdovinos (1995) indicated in the remote rural areas in Spain, when some family farms chose to offer tours women can easily be competent since some work serving tourists are very similar to their domestic housework such as cooking food. Very often, people can offer services that don’t need a very high start-up capital such as offering crafts, story-telling or guided tour (Kiss, 2004; Harwood, 2010). Moreover, the skills and aspirations of the host community, the possibilities
for future development opened up by the strength of the local culture and the awareness of
the strength help motivate the locals to produce experiences and products attractive to
tourists (Binns and Nel, 2002; Kajanus, Kangas and Kurttila, 2004; Atelijevic, 2009). In
other words, tourism helps preserve the culture, local knowledge and expertise. For example,
Oakes (1997) indicated ethnic tourism in Guizhou Province in the southwest of China makes
the locals realize the importance of their culture, traditions and lifestyle for their livelihoods
though their homesteads are increasingly encroached by public infrastructure and tourist
facilities. Some of the locals may strive to seek for some cultural traditions on the verge of
being lost, redefine their sense of identity and provide an authentic tour experience for the
tourists. In so doing, the culture is preserved, and can be handed down to the future
generations. Tourism hereby is used as a sustainable means of livelihoods for poverty
reduction.

Some critiques mentioned while tourism micro-enterprises constitute the real economy
for many rural poor, they do not offer a substitute for employment, an assured wage, or much
hope for improving their lives in the future (Mueller, 2006). What is produced often cannot
be sold or markets for such products are limited due to over-supply of similar products, lack
of quality control, high transport costs, or international standards. Other constraints people
may encounter in operating a tourism micro-enterprise include high taxation (Pirttila and
Tuomala, 2004), shortage of basic entrepreneurial skills (Allen and Lachapelle, 2012), weak
local market (Golodner, 2001; Cooney and Shanks, 2010), overly high start-up capital as
opposed to the current economic situations of the local people (Lepp, 2007), inadequate
infrastructure (Fairbairn, 2005; Wilkes, 2005), and inefficient regulatory environment (Ateljevic and Doorene, 2007; Gauvin, Uchida, Rozelle, Xu and Zhan, 2010; Rive and Rubbelke, 2010; Amadi and Abdullah, 2012). Poor locals are among the most vulnerable to the volatility of tourism industry, and even within pro-poor tourism initiatives the poorest segments of society may receive the least economic gains (Prishin, 2001; Torres and Momsen, 2004; Rajaram and Das, 2007; Huang and Confer, 2009). These constraints can be dealt with under some circumstances. Brown (1998) suggested the appropriate form of tourism development for rural Africa is the cooperative since the investment necessary for even the humble tourism development is beyond the means of most people. Cooperatives gather small investments from many people, making it possible to raise the necessary capital. Moreover, business advice, training and availability of financing capital may be required for raising levels of efficiency and service and creating comparative advantages which in turn can help facilitate the formation and long-term success of tourism entrepreneurial ventures (Kaplan, 2004; Becton and Graetz, 2001; Kevane, 2001; Cheng and Li, 2009; Breitenecker, 2010; Imhanlahimi and Idolor, 2010; Kaleem and Ahmed, 2010; Mensah and Benedict, 2010). It should be noted that constraints for local tourism entrepreneurs may sometimes be transformed to facilitate poverty reduction. For example, increased tax rate might enable governments to pay for programs most likely to improve the security, opportunities and empowerment, upon which poverty reduction depends (Singer, 2006).
Justification of the study

Identification of spatial patterns highlights successes and failures in the achievement in some indicator so as to trigger actions to remedy failures. In this study, understanding the spatial differences in economic conditions can help trigger actions to reduce poverty and inequality. Further understanding of the spatial differences in level of tourism micro-entrepreneurship and the potential factors will help identify where tourism micro-entrepreneurship has the potential to be used for poverty or inequality reduction. The relationships between tourism, poverty, and micro-entrepreneurship examined can be helpful for the relevant governments and other important stakeholders in terms of positioning strategies, adjusting policy focus, and redirecting resources.

While it has been suggested that tourism micro-entrepreneurship has played an important role in helping reducing poverty, there are few studies focusing on the effect of regional factors on tourism micro-entrepreneurship’s role in poverty reduction. In other words, comparative analysis of how tourism micro-entrepreneurship has helped reduce poverty in different regions and where tourism micro-entrepreneurship has the potential to reduce poverty has been little conducted. This gap will be addressed in this study through analyzing how tourism micro-entrepreneurship functions differently across the study area.

Currently, few studies have focused on how tourism micro-entrepreneurship helps reduce poverty from a spatial analysis perspective. This study aims to explore how tourism micro-entrepreneurship helps reduce poverty from a spatial analysis perspective, which means the study uses a series of spatial statistical methods combined with geographical
information system (GIS) used for visualization and incorporates the analysis of spatial dependence. Such spatial data analysis could help identify some explanatory variables that can play a role in utilization of tourism micro-entrepreneurship for poverty reduction.

Moreover, very few studies have addressed utilization of tourism micro-entrepreneurship for poverty reduction in developed countries. This study uses North Carolina and its neighboring states in the United States as the study area, which contributes to the knowledge of how tourism micro-entrepreneurship is related to local economic development and poverty reduction in the developed countries. Accordingly, the findings can be used as reference by some other regions with similar conditions.

**Study purpose**

The purpose of this study is to examine how tourism, poverty and micro-entrepreneurship interact spatially across North Carolina and its adjacent states. Specifically, this study uses exploratory spatial cluster analysis to examine the extent to which tourism micro-entrepreneurship is associated with tourism resources and the formal tourism sector and to investigate how the spatial association of such concentrations with poverty reduction differs across the study area; uses geographically weighted regression analysis to examine what might lead to the formation and growth of tourism micro-entrepreneurship, whether these determinants vary across the study area, whether the role of tourism micro-entrepreneurship in poverty reduction also varies across the study area; uses spatial outlier detection methods to identify where there is relatively high or low level of tourism micro-entrepreneurship, tourism resources and economic conditions compared with neighbors in
order to examine the associations of the spatial outliers, which have implications for
utilization of tourism micro-entrepreneurship for poverty reduction.

Research questions

The following three research questions will guide this study:

RQ1: Are there areas composed of several counties with higher level of tourism micro-
entrepreneurship? Can cluster theory and its analytic framework be used for establishing
associations between tourism micro-entrepreneurship and other variables of interest? Do the
spatial clusters of tourism micro-entrepreneurship identified have different components of
competitive advantages? Does the spatial association of such concentrations of tourism
micro-entrepreneurship with developmental conditions differ?

H1a: There are areas composed of several counties with level of tourism micro-
entrepreneurship higher than the study area mean.

H1b: Concentrations of some factors such as tourism resources and the formal tourism
sector are spatially associated with tourism micro-entrepreneurship clusters so they can be
considered as their competitive advantages.

H1c: Different clusters of tourism micro-entrepreneurship are spatially associated with
concentrations of different factors and the degree of association is also different.

H1d: The spatial association of such clusters of tourism micro-entrepreneurship with
developmental conditions differs.

RQ2: Are there any factors that might contribute to tourism micro-entrepreneurship for the
whole study area? Can different determinants of tourism micro-entrepreneurship and
different effects of these determinants be identified across the study area? Does the effect of tourism micro-entrepreneurship as a determinant of human development differ across the study area?

     H2a: There are some global determinants of tourism micro-entrepreneurship.
     H2b: Different determinants of tourism micro-entrepreneurship and different effects of these determinants can be identified across the study area.
     H2c: The role of tourism micro-entrepreneurship in helping improve local human development differs across the study area.

RQ3: Do spatial outliers of tourism micro-entrepreneurship exist? Are spatial outliers of tourism resources associated with spatial outliers of tourism micro-entrepreneurship? Are the associations different across the states? Are spatial outliers of economic conditions associated with spatial outliers of tourism micro-entrepreneurship? Are the associations different across the states? Can some areas be identified for nurturing tourism micro-entrepreneurship?

     H3a: Spatial outliers of tourism micro-entrepreneurship exist.
     H3b: Spatial outliers of tourism resources are associated with spatial outliers of tourism micro-entrepreneurship.
     H3c: These associations differ across the states with some states having stronger associations while others having weaker associations.
     H3d: Spatial outliers of economic conditions are associated with spatial outliers of tourism micro-entrepreneurship.
H3e: These associations differ across the states.

H3f: Some areas where tourism micro-entrepreneurship has a good chance of being nurtured can be identified.

**Delimitations**

The study findings are limited to counties in the State of North Carolina and its adjacent states including Virginia, Tennessee, Georgia, and South Carolina.

**Limitations**

1. County as an administrative unit is not necessarily in accordance with the boundary of homogeneity in the spatial distribution of variables of interest. In other words, county itself may be a region with spatial diversity of the variables, which is not considered by this study.

2. The spatial weights matrix reflecting the spatial relations between counties used for analysis inevitably has its drawbacks. The matrix based on different distance threshold might lead to different findings, while the matrix based on the actual adjacency relations would affect the accuracy in analyzing smaller counties, since they might be affected by some counties that are not direct neighbors.

3. The target counties identified based on GIS are those with either higher or lower variables. This doesn’t mean the counties with some medium-level variable should not be considered. For example, in the counties with higher level of tourism resources, lower human development index, and medium-level of self-employment, tourism micro-entrepreneurship can get opportunity of being developed under certain circumstances.
4. Multiple regression analysis, though incorporating a series of social economic and demographic data, may still omit some important explanatory variables.

**Definitions of terms**

a. Poverty: a low standard of living to some extent. Absolute poverty is said to exist when people lack the means to satisfy their basic needs. Relative poverty refers to lacking a usual or socially acceptable level of money or material possession as compared with others within some geographic area. The Department of Health and Human Services (HHS) issues poverty guidelines each year, which are a simplified form of poverty thresholds to be used for administrative purpose, say, determining financial eligibility for certain federal programs. The poverty thresholds are the original version of the federal poverty measure. They are updated each year by the Census Bureau (Foster, 1998).

b. Human Development Index: a composite statistic used to rank and compare areas at the same geographical level such as countries, states, counties, and cities by level of human development. It has become a standard means of measuring human well-being. In other words, it is an alternative measure of economic growth and development used to assess broader economic development performance than can be assessed through income measures alone. The higher the index, the greater the human well-being is. Usually, HDI includes information on three dimensions: health, education and income. The indicators reflecting the dimensions to be used to compute HDI are different according to the related geographic units, availability of data and the reference standards of different agencies and organizations (Nijkamp and Abreu, 2009).
c. Gini index: A measure of income inequality in 2010 based on the Lorenz curve that shows the relationships between the cumulative percentage of population and the cumulative percentage of income (U.S. Census). It reflects the extent of spatial income inequality. Low Gini coefficient means high equity while high Gini coefficient is corresponding to low equity.

d. Tourism micro-entrepreneurship: when tourism employment is assessed by some governmental agencies such as the U.S. Travel Association, seven industry groups of businesses both directly and indirectly related to tourism are usually taken into account. These include accommodations, auto transportation, entertainment and recreation, food, public transportation, retail, and travel arrangement (U.S. Travel Association). From the recent reports of the economic impact of travel on counties in the states in the study area (U.S. Travel Association), employment from accommodations, food and entertainment and recreation usually account for more than half of the total tourism employment. Two types of tourism micro-entrepreneurship are used throughout the study. One is related to the establishments with not more than 4 employees that provide arts, entertainment, and recreation services, which will be informed in this study as AER. The other is related to the establishments with not more than 4 employees that provide accommodation and food services, which will be informed in this study as AF (U.S. Census). Accordingly, the level of tourism micro-entrepreneurship is represented by number of each type of establishments per 100,000 people.
Self-employment: performing work for personal profit rather than for wages paid by others (Shane, 2003).

**Significance of the study**

**Theoretical significance**

The primary objective of this study is to identify where tourism micro-entrepreneurship may have the potential to promote local development. First, the study proposes an integrated approach to identify such target areas based on secondary data. Second, the study conducts a comparative analysis of the role of tourism micro-entrepreneurship in local development across different regions, which can be extended to different types of destinations, thereby contributing to a systemic approach to such comparative analysis. Third, the spatial data analysis and the application of a series of spatial statistical methods help deepen the understanding of some theories, such as cluster theory, core-periphery theory, central place theory, and externalities theory, and the connection between them, and explore feasibility of these theories used for providing rationale of relevant spatial analysis. Accordingly, when being used for solving some issues that are seldom addressed (e.g., how tourism micro-entrepreneurship have helped stimulate local economic development in the developed country like US), the theories are strengthened.

**Practical significance**

The identification of the counties where tourism micro-entrepreneurship may have the potential to help promote local development can help the relevant governments and policy-makers in positioning strategies, adjust policy focus and redirected resources.
The identification of spatial clusters helps identify different components of competitive advantage across the clusters, and highlight the counties that need to pay more attention to regional issues due to the existence of agglomeration effect.

The identification of the local explanatory variables of tourism micro-entrepreneurship from geographically weighted regression can help facilitate more targeted policy-making by local or regional governments based on regions identified with similar determinants.

The identification of spatial outliers of tourism micro-entrepreneurship can help identify where externalities have the most direct effect and thus the areas where tourism micro-entrepreneurs can be nurtured more easily. The identification of spatial outliers of tourism resources and their association with spatial outliers of tourism micro-entrepreneurship can help encourage those counties with relatively high level of tourism resources to examine the factors why they could not register relatively high level of tourism micro-entrepreneurship.

References


CHAPTER 2:
A SPATIAL CLUSTER ANALYSIS OF RESOURCES, TOURISM, MICRO-ENTREPRENEURSHIP AND DEVELOPMENT IN NORTH CAROLINA AND ITS NEIGHBORING STATES

Abstract

Tourism micro-entrepreneurship has been extensively advocated as providing a sustainable way to foster local and regional economic growth. Using a framework of cluster theory, based on regional development perspective, and considering that there is a general dearth of literature that makes the connection between resources, tourism, and development, this study investigates where tourism micro-entrepreneurship tends to cluster and how spatial association of these clusters with resources, formal tourism sector, and developmental conditions differs across the study area – North Carolina and its neighboring states in southeastern USA. Evidence is found that spatial association of tourism micro-entrepreneurship with variables of interest differs in the study area. For example, in Northern Virginia there is a concentration of tourism micro-entrepreneurship, formal tourism sector, and a high level of development, but there is no concentration of natural and cultural resources. In part of western North Carolina, there is a concentration of tourism micro-entrepreneurship, natural resources, and a medium level of development, but there is no concentration of formal tourism sector. Implications of the findings for areas with clustering of tourism micro-entrepreneurship and those where people might resort to tourism micro-entrepreneurship for poverty reduction are discussed.

Keywords: resources, tourism micro-entrepreneurship, development, cluster theory
Introduction

While tourism has been increasingly considered as a tool for poverty reduction, tourism is not a panacea for developing all economically stagnant regions, since various conditions must converge for its development (Tisdell, 1998). Natural and cultural amenities are considered as necessary conditions for tourism development, since they can be considered as tourist attractions per se, or latent factor inputs for tourism services and products (Power, 1988; Marcouiller, 1998). Moreover, they can be considered as stimulators of regional tourism development. Studies have shown that some amenities such as climate, presence of wilderness areas and large expanses of open space can be important determinants of population and employment growth (Porell, 1982; Kanpp and Graves, 1989). For example, people move to perceived desirable regions, usually for non-economic reasons, such as a physical or cultural environment, which is called amenity migration (Borsdorf et al., 2012). The amenity migrants in turn usually demand high-end shops and restaurants, entertainment, and improvements in infrastructure which provide opportunities for the tourism development in the surrounding areas (Laitos and Ruckriegle, 2013).

Cultural homogeneity, topography, or ecotype, might not follow political or administrative boundaries. Neither might tourism business clusters, since tourism businesses tend to be geographically concentrated in or near amenity-rich areas (Lazerson and Lorenzoni, 1999; Kim et al., 2005). Such tourism clusters and corresponding development can spur local and regional economic growth, although tourism has been criticized for
leakage of economic benefits and limited participation of host communities (Hill, Nel and Trotter, 2006; Dressler et al., 2010).

Looking at some simplistic measure of economic growth overlooks developmental trend in terms of equity and well-being (Marcouiller, Kim and Deller, 2004). Higher per capita income does not signify more equitable income distribution or higher level of well-being since tourism development might make the rich richer, and the poor poorer, and tourism entrepreneurs might live with a lowered quality of life despite higher average per capita incomes.

Considering that there is a general dearth of literature examining the connection between amenities, tourism, and development, and that tourism micro-entrepreneurship has been extensively advocated as providing a sustainable way in fostering local and regional economic growth, this paper aims to contribute to the literature by using exploratory spatial cluster analysis to examine the extent to which amenities and the more formal tourism sector (e.g., small and medium-to-large businesses) are associated with regional concentrations of tourism micro-entrepreneurship; and to investigate how the spatial association of such concentrations with developmental conditions differs across the study area.

Cluster theory and regional development

A business cluster (referred to as cluster here) could be simply defined as a geographic concentration of related firms (McCann and Folta, 2008). This simplified definition of cluster is very similar to definition of industrial districts, which are agglomerations of small and medium enterprises (SMEs) specializing in different parts of a given production activity
(Marshall, 1966). Porter (1998) indicated a cluster is a geographically proximate group of interconnected companies, and other entities important to competition including specialized suppliers, service providers, firms in related industries, and associated institutions in a particular field. What differentiates clusters from industrial districts in Porter’s definition is that a cluster comprises interconnected companies, and complementary competitive advantages (Murray, 1995; Folta et al., 2006; John and Pouder, 2006). The deterministic forces shaping these business clusters are cost reduction and efficiencies (Murray, 1995). As Marhallian agglomeration theory emphasized, the advantages of agglomeration are rooted in reduced costs that arise from three sets of localized economies: the establishment of supportive infrastructure and other collective resources, the growth of various intermediate and subsidiary industries, and the development of a skilled labor pool (Marshall, 1966).

Porter (2000) later mentioned clusters can occur in many types of industries, in small locations, and even in some local industries such as restaurants, antique shops and car dealers. Jacob and de Man (1996) summarized and generalized six dimensions by which a cluster might be characterized through comprehensive literature review: (1) horizontal: numerous direct competitors in the same or closely related industries, (2) vertical: firms at the different stages of the supply chain; (3) lateral: firms in different industries that share common resources; (4) technological: firms in different industries that share technology and/or knowhow; (5) focal: firms influenced by a focal organization, or (6) network quality: various firms in cooperation with each other to various degrees. A cluster can incorporate one or several of such dimensions. Therefore, the boundaries between clusters, industrial
districts and geographic agglomeration become unclear. In turn, they are often interchangeably used despite different origins. At its initial stage, a cluster might have a vertical structure with buyers and suppliers being in geographical proximity based on the principle of cost reduction, while later a cluster can evolve horizontally with spin-offs or relocated businesses seeking access to markets and resources, which can become competitors of the original. Such a cluster continues to grow so as to have the quality of network with firms in proximity either in cooperation or in competition. A tourist destination, as observed, can go through this process of evolution (John and Pouder, 2006). Indeed, Porter (1998) used California wine cluster as a tourism related cluster to illustrate different components were being brought together in a destination. Porter also used cluster theory to identify tourism industry was one of the industries that tend to cluster based on the location quotient of each industry and its spatial distribution (Porter, 2003).

Porter’s cluster theory has also been advocated and proved as suitable for being applied to various tourism destinations (Porter, 1998; Jackson and Murphy, 2002; Bernini, 2009). For example, Jackson and Murphy (2002) used cluster theory to analyze strengths and weaknesses of two Australian cities as tourism destinations. Bernini (2009) assessed the Italian convention industry and its relationships with local infrastructure and tourism product supply based on the framework of cluster theory. The cluster theory’s applicability to tourism appears to be germane. On the one hand, the formation of a tourist destination is based on a conglomeration of numerous participants, activities and facilities who are not necessarily involved in the same economic sectors (Smith, 1994; Bernini, 2009). On the other hand,
image branding and marketing of a destination necessitate different components being brought together (Pearce, 1992; Peel and Lloyd, 2008). Porter himself used cluster theory to identify tourism industry is one of the industries that tend to cluster based on the location quotient of each industry and its spatial distribution (Porter, 2003).

In Porter’s diamond model of competition, he distilled four different components of competitive advantage for clustering of tourism business in a tourism destination (Porter, 1998). (1) demand conditions: a business needs to be within proximity to a large market and understand the current and potential future demand of people for the quality and level of tourism products and services; (2) factor conditions: a business should be based on natural and cultural resources; (3) related and supporting industries: business activities require support from accommodations, food services, attractions, transportation, universities and various governmental agencies; (4) context for firm strategy and rivalry: a business might require cooperation with different businesses within a region and supportive government policies such as those that can supply an educated workforce. This diamond model of competition extending from cluster theory provides us with an insight into a tourism destination or region in which different tourism businesses clusters are being supported by different conditions.

Across a region there is spatial variation in different components of competitive advantage for nurturing or expanding clusters. Therefore, tourism businesses tend to cluster in some areas while dispersing in others. A regional perspective is necessary to gain insight into parts of the region when a sustainable way of development is being sought, since the
parts might be subjected to cross-boundary flows and external determinants of internal process (Van den Bergh and Nijkamp, 1991; Saarinen, 2006; Njikamp and Abreu, 2009). Lazerson and Lorenzoni (1999) indicated that there is cultural homogeneity among a community of people clearly identifiable in terms of geography, history and culture that produces an atmosphere of cooperative and trusting behavior in which an economic action cluster is formed. Also, some types of natural amenities upon which tourism is based are highly correlated within close proximity due to regional differences in climate, topography, geology and ecotype (Kim et al., 2005). Cultural homogeneity and regional natural conditions might not follow political or administrative boundaries such as those between states.

Therefore, to further explore the potential factors contributing to clustering of tourism micro-entrepreneurship and its impact, it is necessary to go beyond a relatively small region (a state) to a larger region (multiple states) in order to get a comprehensive understanding. Moreover, it also facilitates a comparative analysis of why there are clusters in some sub-regions in comparison with other sub-regions with similar conditions, and how tourism micro-entrepreneurship makes an impact in different regions.

**The role of tourism micro-entrepreneurship in development**

As seen in many areas of both developing and developed worlds, increased tax revenues and employment, and improved infrastructure are often cited as benefits from the growth of tourism (Sharpley and Sharpley, 1997; Rogerson, 2006; Manyara and Jones, 2007). Other benefits brought to local people by tourism include improved sense of pride, diversified
livelihoods, interaction with external groups, and enhanced linkages and social development, all of which can contribute in personal economic revitalization (Daniels, 1991; Garcia-Ramon, Canoves and Valdovinos, 1995; Adams et al., 2004; Nyaupane, Morais and Dowler, 2006). On the other hand, tourism has been criticized for leading to commodification of culture, reinforced dependency on foreign or national elites, leakage of economic benefits, displacement of people from their original communities, demonstration effect and limited participation of host communities in planning and decision-making (Fisher, 2004; Hill, Nel and Trotter, 2006; Dressler, Buscher, Schoon, Brockington, Hayes, Kull, McCarthy and Shrestha, 2010).

For individuals and households, tourism has been taken as a new form of livelihood to expand income sources and diversify economic activities. For instance, it may be used by those that originally lived on subsistence farming and forest products to reduce poverty and vulnerability (Bryceson, 2002; Rogerson, 2006; Tomaselli, Timbo and Kozak, 2012). Self-employment is defined as performing work for personal profit rather than for wages paid by others (Shane, 2003). Most self-employed people might employ just a few others, some of which may be family members (Garcia-Ramon, Canoves and Valdovinos, 1995). Tourism micro-entrepreneurship, similarly, refers to the situation when there are fewer than 5 employees in a tourism business (Shane, 2003; Rogerson, 2006).

Tourism micro-entrepreneurship has been extensively advocated for mitigating the negative effects of tourism mentioned above and providing a sustainable way to foster local and regional economic development (Oakes, 1997; Binnes and Nel, 2002; Kajanus, Kangas
Located, tourism micro-entrepreneurship can help host communities preserve and perpetuate traditional culture, knowledge and expertise (Oakes, 1997). Tourism micro-entrepreneurs usually have local knowledge in terms of how to make the best of local resources in a sustainable way so many of them have their own gardens, nurseries, and apiaries. They may also impart their knowledge and skills to their children, who in turn may leverage these for future livelihood strategies. The role of tourism micro-entrepreneurship in stimulating local economic development is also reflected by the fact that some tourism micro-entrepreneurs, because of their rootedness and creativity, are able to reuse and repurpose local areas and buildings for new restaurants, galleries, and boutiques (Clark and Kahn, 1988; Besser, Miller and Malik, 2012). Regionally, tourism micro-entrepreneurship helps diversify tourism products, which will lead to enhanced competitiveness of a region’s travel and tourism industry (Korez-Vide, 2013).

Average per capita income is often used to measure poverty and the extent of economic growth. However, average per capita income does not reflect inequitable income distribution or improved well-being. Therefore, some alternative or complementary measures such as per-capita consumption, poverty rate, unemployment rate, labor force participation rate or access to public services have been used. Among others, human development index emerges as a popular indicator of a community’s level of development because it is calculated with a combination of various quantifiable standardized social variables such as per capita income, life expectancy, and school enrollment and educational attainment (Nijkamp and Abreu,
2009). The Gini index, which indicates the degree of income inequality in a community or region, is also an important indicator of development (Marcouiller, Kim and Deller, 2004).

Although numerous articles on clusters have pointed out the advantages of geographical concentration for businesses, the role of business clusters on regional economic growth are just starting to gain interest, not to mention the studies that assess the influence of tourism micro-entrepreneurial cluster in poverty reduction (Diez-Vial, 2011). Porter (1998) explained that clusters could promote growth, innovation and competiveness in three ways including: a) increasing productivity of current companies, b) driving direction and pace of innovation, and c) stimulating the formation of new businesses. However, he did not do many empirical analyses on how clusters help nurture the new businesses. Nonetheless, there are still some articles on the relationship between clusters and economic growth for our reference (Malmberg et al., 2000; Beaudry and Breschi, 2003; Feser, Renski and Goldstein, 2008). A good example is about the relationship between clusters of employment and technology and new business formation in the Appalachian region (Feser, Renski and Goldstein, 2008). However, this study goes beyond the number of increased new businesses to indicators of poverty, equity, and well-being with the aim of investigating if clustering of tourism micro-entrepreneurship can play a role in development.

**Study area and data**

Numerous US States are struggling to cope with a series of issues related to poverty, such as unemployment. North Carolina in Southeastern United States is unexceptional since many people across the state have been conducting tourism micro-businesses to cope with
being unemployed (Johnson, 2003; McCallie, 2006). As a matter of fact, tourism has significantly contributed to North Carolina’s economy. On the other hand, dozens of counties, especially those in the inner coastal plain, are still with higher level of poverty rate (Johnson, 2003; McCallie, 2006; McGehee, Meng and Tepanon, 2006).

As mentioned above, a regional perspective is necessary to get a comprehensive picture of contributing factors and mechanisms shaping tourism clusters, and how tourism micro-entrepreneurship plays a role in poverty reduction across different spaces. An example using a regional perspective for tourism research is a case study of tourism development in two of the Great Smoky Mountains National Park gateway communities that are in North Carolina and Tennessee respectively, which discovered while tourism development corresponded with total income and job growth, it was also accompanied with other non-income social welfare benefits (Tooman, 1997). Therefore, this study focused on the 534 counties in the State of North Carolina and its adjacent states (i.e., Virginia, Tennessee, Georgia, and South Carolina), which means the primary geographic unit used in the analysis is county.

Secondary county-level data, either measured or estimated for 2010, were collected from various sources including the U.S. Census Bureau, U.S. National Park Service, USDA Forest Service and Economic Research Service, and each state’s Division of Parks and Recreation, Forest Service, Department of Commerce, and official travel and tourism website. Three sets of variables, either directly used or computed, are involved in this study.

When tourism employment is reckoned by some governmental agencies such as the U.S. Travel Association, seven industry groups of businesses both directly and indirectly related
to tourism are usually taken into account, including accommodations, auto transportation, entertainment and recreation, food, public transportation, retail, and travel arrangement. In this study two industry groups were considered based on the data availability and for the purposes of comparison: a) businesses that provide arts, entertainment, or recreation services, and b) businesses that provide accommodation and food services. Tourism micro-entrepreneurship refers to businesses in the two aforementioned groups with 1-4 employees and is represented by AER and AF, respectively. The more formal tourism sector referred to in this study includes the two types of businesses with 5 or more employees. The number of businesses per 100,000 people for each category was computed to better allow for comparisons between counties with very different population densities.

The indicators of resources (natural resources and cultural attractions) are used for exploring the potential factors contributing to tourism micro-entrepreneurial clusters. Those representing natural resources include percentage of water area, and number of national and state parks per 100,000 people. It should be noted the state parks, recreation areas, natural areas and forests were included when counting number of state parks while natural attractions administered by the U.S. National Park Service plus national forests were included when counting number of national parks. Those representing cultural attractions included number of nationally-registered historic places and museums per 100,000 people.

The indicators of development include average per capita income representing wealth, number of physicians per 100,000 people representing health, graduation rate for people 25
years old and over representing health, poverty rate representing poverty, and Gini index that indicates the degree of income inequality.

**Methods**

ArcMap 10 was used to turn data into maps to illustrate and examine the spatial distribution of tourism micro-entrepreneurial clusters, and contrast these with the spatial distribution of natural resources, cultural attractions, the formal tourism sector, and poverty indicators. R statistical software was used to conduct a series of spatial data analysis including calculation of Getis-Ord $G^*_i$ statistic (Getis, 1984; Ord & Getis, 1995) to identify where given indicators tend to cluster or disperse, and k-means clustering analysis to identify where tourism micro-entrepreneurial clusters coexist with indicators and how this coexistence differ across the study area.

$G^*_i$ statistic compares local averages to global averages and thereby helps reveal areas where tourism micro-entrepreneurship and other variables of interest tend to have high or low values. When the geographic unit is county, multicounty areas that might be within a state or span counties in different states can be revealed. It is calculate as:

$$G^*_i(d) = \frac{\sum_j w_{ij} x_j - \bar{x} \sum_j w_{ij}}{s \sqrt{\frac{\sum_j w_{ij}^2 - (\sum_j w_{ij})^2}{n-1}}}$$

for all $j$

where $\{w_{ij}\}$ is a spatial weights matrix with $w_{ij}=1$ when $i$ and $j$ are within a distance $d$ from each other and zero otherwise and:

$$\bar{x} = \frac{\sum_j x_j}{n}; \quad S^2 = \frac{\sum_j x_j^2}{n} - (\bar{x})^2$$
In this study, d is the distance between the centroids of two counties. Selection of distance threshold would affect the value of $G_i^*$ statistic and thus affect the determination of cluster boundaries. This study uses 30 miles as the distance threshold to identify tourism micro-entrepreneurial clusters and clusters of other variables of interest supposing micro tourism businesses might have impact (cooperation, knowledge transfer, etc.) on each other within a distance of 30 miles. The $G_i^*$ statistic is a z-score, so a positive $G_i^*$ statistic greater than 1.96 indicates significantly high values while a negative z-score less than -1.96 indicates significantly low values.

In addition to identify clusters of single variables, a k-means cluster analysis is used to separate $G_i^*$ statistic for variables of interest into different zones in order to examine whether there are any spatial groupings of variables with relatively homogeneous values. Specifically, the k-means cluster analysis will be conducted on tourism micro-entrepreneurship and more formal tourism sector, on tourism micro-entrepreneurship and natural and cultural resources, and on tourism micro-entrepreneurship and poverty-related variables respectively. The number of clusters (k) is set a priori in order to make sure different variables of interest spatially associated with tourism micro-entrepreneurial clusters are identified across the study area. Average $G_i^*$ statistic for each cluster was calculated, and the spatial distribution of the clusters was mapped using GIS. By means of the k-means cluster analysis, analysis of factors including natural and cultural resources, and the formal tourism sectors that are present or absent in the different tourism micro-entrepreneurial clusters is allowed, and
various types of spatial clusters distinguished by a strong inner homogeneity with respect to amenities, tourism, and poverty can be identified.

Results

1. Identification and mapping of tourism micro-entrepreneurial clusters

An examination of the spatial distribution of the businesses that provide arts, entertainment, and recreation services (AER) reveals the coast, northernmost part, and a corner of the central west of Virginia, the coast of North Carolina, some part in the Middle Tennessee, and the North Carolina/Tennessee border had relatively high level of AER (Figure 1). Figure 2 helps give prominence to high and low clustering of AER. Seven high clusters are identified, and given corresponding names based on their regional location: DC cluster (within Washington DC metropolitan area), Shenandoah cluster (within close proximity of Shenandoah National Park), Virginia coast cluster (on the coast of Virginia), Outer Banks cluster (based on Outer Banks in North Carolina), Nashville cluster (within Nashville metropolitan area), Smoky Mountains cluster (within close proximity of Great Smoky Mountains National Park) and Blue Ridge cluster (within close proximity of Blue Ridge Parkway section on North Carolina-Virginia border). These clusters correspond to regional tourism destinations where micro-entrepreneurs are clustered and significantly contribute to the tourism experience. Conversely, in Southern Georgia there is a cluster of counties with markedly low AER.
Figure 1. Spatial distribution of AER

Figure 2. Clusters of AER
An examination of the spatial distribution of the businesses that provide accommodation and food services (AF) revealed that such tourism micro-entrepreneurship took on a somewhat different spatial pattern (Figure 3). The areas near DC metropolitan area, Shenandoah National Park, Great Smoky Mountains National Park and Outer Banks, registered high clustering of AF. Two counties that are situated in the northeast corner of South Carolina, and southwest corner of Georgia respectively, also had relatively high level of AF. Comparatively, low clustering of AF appeared at the corner of the three states including Tennessee, Virginia, and West Virginia which does not fall within the scope of this study (Figure 4).

Figure 3. Spatial distribution of AF
2. Spatial association of tourism micro-entrepreneurship with the formal tourism sector

Figure 5 illustrates the clustering and dispersion of the formal tourism businesses. A visual comparison between Figure 5 with Figures 2 and 4 suggests that all the high clusters of AF tend to coexist with high clusters of the formal tourism businesses. In contrast, however, high clusters of AER do not appear to overlap with high clusters of the formal tourism businesses. Some of AER clusters such as Nashville and Blue Ridge clusters were far from the formal sector clusters. The general tendency is that AER is symbiotic with the formal tourism sector, while the degree of the symbiosis is smaller on the coast than in the interior.
Figure 5. Clusters of the formal tourism businesses

The k-means cluster analysis can help identify where there is symbiosis of several variables, i.e. coexistence of clustering of several variables. The number of clusters for k-means analysis needs to be set a priori. Its determination in examining the spatial association of the formal tourism sector with the two types of tourism micro-entrepreneurship is based on the principle that where there is symbiosis of at least one type of tourism micro-entrepreneurship with the formal tourism sector and where clustering of tourism micro-entrepreneurship exist without the clustering of the formal tourism sector can be identified.

After several trials, 5 is found to be a relatively ideal number to identify such clusters. The results indicates in cluster 1 both types of micro-entrepreneurship tended to coexist with more formal sector, while in cluster 3 AER tended to cluster without the existence of clustering of AF or the formal tourism sector (Table 1). To simplify visualization and
highlight the two cluster groups in which there was higher level of AER, just cluster 1 and 3 are shown in the map (Figure 6). The k-mean cluster analysis with k set a priori to whatever value could not find other cluster groupings such as independent AF clusters and the coexistence of the two types of micro-entrepreneurship clustering without the existence of clustering of the formal tourism sector.

Based on and compared with AER clusters identified above, Figure 6 shows that in Virginia coast, Nashville, and Blue Ridge clusters, the formal tourism sector tends not to cluster. This finding might be called into question since there are lots of hotels, restaurants and music venues in Nashville. However, based on the target variable which is the formal tourism businesses per 100,000 people and the method for finding clusters in this study, the degree of the formal tourism sector’s clustering in Nashville area is non-significant ($G^*_1 < 1.96$). The finding also indicate in the three clusters, micro businesses that provide arts, entertainment and recreational facilities tend to outnumber the formal tourism businesses. Alternatively, the situation might be when visitors have varieties of options for tourism experiences offered by micro-entrepreneurs, they feel supporting facilities have yet to be developed to keep pace with tourism micro-entrepreneurship. In the center of Shenandoah and Outer Banks clusters, clustering of AF and the formal tourism sector were present, while they disappeared in the periphery of the clusters. This might indicate that the center of the clusters were regional tourist destinations, which spun off and helped fuel AER distributed in a wider region. Comparatively, Smoky Mountains cluster is a relatively sound tourist destination with all types of tourism businesses, either formal or micro, complementary to or
competing against each other. The DC cluster, on the other hand, somewhat overlapped with a AF cluster to its east, it can be understood this whole area as a tourist destination is relatively sound, with AER being concentrated in its west, and AF and the formal sector being concentrated in its east.

Table 1. Results of k-means (k=5) cluster analyses on $G_i^*$ statistic of tourism micro-entrepreneurship and formal businesses

<table>
<thead>
<tr>
<th>C</th>
<th>n</th>
<th>AER</th>
<th>AF</th>
<th>The formal tourism sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23</td>
<td>3.107</td>
<td>5.426</td>
<td>3.381</td>
</tr>
<tr>
<td>2</td>
<td>183</td>
<td>-0.256</td>
<td>-0.484</td>
<td>-0.219</td>
</tr>
<tr>
<td>3</td>
<td>29</td>
<td>3.994</td>
<td>0.823</td>
<td>1.262</td>
</tr>
<tr>
<td>4</td>
<td>125</td>
<td>0.818</td>
<td>0.521</td>
<td>1.124</td>
</tr>
<tr>
<td>5</td>
<td>174</td>
<td>-1.397</td>
<td>-0.863</td>
<td>-1.250</td>
</tr>
</tbody>
</table>

Figure 6. Mapped results of k-means (k=5) cluster analysis on tourism micro-entrepreneurship and the formal tourism sector
3. Spatial association of tourism micro-entrepreneurship with resources

Figures 7 through 11 illustrate where natural resources and cultural attractions tend to cluster in the study area. Compared with the previous maps, it is apparent that most tourism micro-entrepreneurial clusters tended to be within close proximity of either natural resources or cultural attractions. The exception is the Nashville cluster. Also, the two clusters of cultural attractions in Georgia are not near any tourism micro-entrepreneurship clusters.

Figure 7. Clusters of historic places
Figure 8. Clusters of museums

Figure 9. Clusters of national parks
Figure 10. Clusters of state parks

Figure 11. Clusters of water areas
Based on the similar principle of identifying clusters, 15 is found to be a relatively ideal number to identify where tourism micro-entrepreneurship tend to cluster with different resources, and where clustering of tourism micro-entrepreneurship exist without the clustering of any resource. Therefore, the k-means cluster analysis with the number of clusters (k) set a priori to 15 identifies 4 combinations of high level of tourism micro-entrepreneurship and its potential resource factors (Table 2). Cluster 1 near Washington DC metropolitan area has high clustering of AF without the presence of clustering of any natural or cultural resources listed. Cluster 5 on the Virginia coast has coexistence of high clustering of AER, state parks, water areas, and historic places. Cluster 11 near Great Smoky Mountains and Shenandoah National Park has coexistence of high clustering of both types of tourism micro-entrepreneurship, national parks, and historic places. Cluster 13 near Outer Banks has the presence of high clustering of both types of micro-entrepreneurship, state parks, water areas, and museums (Figure 12). It should be noted that Nashville and Blue Ridge clusters and the AF cluster in South Carolina northeast corner are not identified by this cluster analysis method. The similarity of their resource conditions to those in other areas without the presence of high clustering of tourism micro-entrepreneurship makes them assigned to the same clusters in which tourism micro-entrepreneurship tends not to cluster.
Table 2. Results of k-means (k=15) cluster analyses on $g_i^*$ statistic of tourism micro-entrepreneurship and natural and cultural resources

<table>
<thead>
<tr>
<th>Cluster</th>
<th>N</th>
<th>AER</th>
<th>AF</th>
<th>State parks</th>
<th>National parks</th>
<th>Water areas</th>
<th>Historic places</th>
<th>Museums</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>1.597</td>
<td>5.395*</td>
<td>-1.440</td>
<td>-0.993</td>
<td>-1.013</td>
<td>-1.592</td>
<td>-1.662</td>
</tr>
<tr>
<td>2</td>
<td>61</td>
<td>-0.525</td>
<td>-0.223</td>
<td>0.592</td>
<td>-0.001</td>
<td>-0.592</td>
<td>-0.523</td>
<td>0.789</td>
</tr>
<tr>
<td>3</td>
<td>22</td>
<td>0.178</td>
<td>0.262</td>
<td>-0.267</td>
<td>-0.893</td>
<td>3.925*</td>
<td>-0.147</td>
<td>0.026</td>
</tr>
<tr>
<td>4</td>
<td>49</td>
<td>-0.690</td>
<td>-0.960</td>
<td>-0.048</td>
<td>-0.758</td>
<td>-0.518</td>
<td>1.367</td>
<td>-0.051</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>5.162*</td>
<td>0.534</td>
<td>3.397*</td>
<td>0.423</td>
<td>3.588*</td>
<td>5.308*</td>
<td>0.337</td>
</tr>
<tr>
<td>6</td>
<td>42</td>
<td>1.434</td>
<td>0.069</td>
<td>-0.307</td>
<td>-0.752</td>
<td>-0.516</td>
<td>0.698</td>
<td>-0.678</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>1.731</td>
<td>0.755</td>
<td>0.099</td>
<td>-1.041</td>
<td>10.482*</td>
<td>0.843</td>
<td>0.645</td>
</tr>
<tr>
<td>8</td>
<td>17</td>
<td>-0.845</td>
<td>-0.177</td>
<td>1.879</td>
<td>-0.388</td>
<td>-0.022</td>
<td>4.011*</td>
<td>4.496*</td>
</tr>
<tr>
<td>9</td>
<td>19</td>
<td>-0.390</td>
<td>-1.150</td>
<td>3.309*</td>
<td>-0.739</td>
<td>-0.740</td>
<td>0.563</td>
<td>-0.436</td>
</tr>
<tr>
<td>10</td>
<td>122</td>
<td>-1.514</td>
<td>-0.860</td>
<td>-0.771</td>
<td>-0.850</td>
<td>-0.686</td>
<td>-1.006</td>
<td>-0.517</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>3.895*</td>
<td>4.186*</td>
<td>-0.016</td>
<td>6.210*</td>
<td>-0.874</td>
<td>2.481*</td>
<td>1.485</td>
</tr>
<tr>
<td>12</td>
<td>34</td>
<td>1.308</td>
<td>0.961</td>
<td>-0.723</td>
<td>2.557*</td>
<td>-0.995</td>
<td>1.013</td>
<td>0.138</td>
</tr>
<tr>
<td>13</td>
<td>3</td>
<td>6.387*</td>
<td>8.566*</td>
<td>2.635*</td>
<td>1.790</td>
<td>9.171*</td>
<td>1.972*</td>
<td>7.474*</td>
</tr>
<tr>
<td>14</td>
<td>30</td>
<td>0.668</td>
<td>0.709</td>
<td>1.872</td>
<td>4.492*</td>
<td>-0.926</td>
<td>-0.336</td>
<td>0.867</td>
</tr>
<tr>
<td>15</td>
<td>91</td>
<td>-0.097</td>
<td>-0.364</td>
<td>-0.790</td>
<td>-0.654</td>
<td>-0.601</td>
<td>-1.133</td>
<td>-0.906</td>
</tr>
</tbody>
</table>

Notes: * denotes significantly high values that are greater than 1.96.

Figure 12. Mapped results of k-means (k=15) cluster analysis on tourism micro-entrepreneurship and resources.
4. *Spatial association between tourism micro-entrepreneurship and indicators of development*

Tourism micro-entrepreneurship has been assumed to be associated with where high and low average per capita income tended to cluster in the study area is visualized in Figure 13. It is apparent that just some AER clusters including DC, Virginia coast and Nashville clusters were in proximity to where the counties with high average per capita income tended to concentrate. All the AER clusters are far from where the counties with low average per capita income tended to concentrate.

![Figure 13. High/low clustering of average per capita income](image)

Figure 13. High/low clustering of average per capita income

Figure 14 illustrates where high and low high school graduation rate for people 21 years old and over tended to cluster in the study area. It looks that most tourism micro-
entrepreneurial clusters are within close proximity of high clustering of high school graduation rate except near the Smoky Mountains and Blue Ridge clusters. It should be noted that the Blue Ridge cluster seemed to coexist with low clustering of high school graduation rate.

![Figure 14. High/low clustering of high school completion rate](image)

Physicians tended to concentrate within metropolitan areas of medium and large cities such as DC, Atlanta, Memphis, Charlotte, Nashville, and so on (Figure 15). There was not much overlapping between high clustering of physicians and tourism micro-entrepreneurial clusters unless the clusters such as DC and Nashville clusters were just within metropolitan areas.
Figure 15. High clustering of number of physicians per 100,000 people

Figure 16 illustrates where poverty rates tended be high or low in the study area. The spatial distribution is similar to that of average per capita income, therefore, the spatial association with tourism micro-entrepreneurial clusters is also similar. Some tourism micro-entrepreneurial clusters including DC, Virginia coast, Shenandoah and Nashville clusters are in proximity to where poverty rate tended to be low. All the tourism micro-entrepreneurial clusters are away from where high poverty rate tended to concentrate.
Figure 16. High/low clustering of poverty rate

Figure 17 illustrates where more equitable or inequitable distribution of income tended to be located in the study area. Low Gini coefficient which means more equitable distribution tends to be close to those areas with low poverty rate, though correspondence between high Gini coefficient that means more inequitable distribution and high poverty rate is not identified. Accordingly, some tourism micro-entrepreneurial clusters including DC, Virginia coast, Shenandoah and Nashville cluster are in proximity to the areas where there is relatively equitable distribution of income. All the tourism micro-entrepreneurial clusters are away from where there is relatively inequitable distribution of income.
The k-means cluster analysis helps identify where tourism micro-entrepreneurship tends to be spatially associated with indicators of poverty, equity and well-being. 8 is found to be a relatively ideal number of clusters for identifying different combinations of tourism micro-entrepreneurship and the indicators. The result is that 3 combinations of high level of tourism micro-entrepreneurship with different indicators are identified (Table 2). Cluster 1 has much overlapping with Smoky and Out Banks clusters and contains part of Shenandoah cluster. In this cluster, two types of tourism micro-entrepreneurship tend to concentrate while there is no indication of high or low clustering of any poverty-related variable. Cluster 5 contains Virginia coast cluster, part of DC and Shenandoah Clusters, and some counties within Atlanta metropolitan areas. In this cluster with relatively high level of AER, poverty
rate and Gini coefficient were low, and average per capita income and high school graduation rate were high. The reason that part of Atlanta metropolitan area is classified into this cluster might be its values indicating poverty-related conditions are very similar to other areas in this cluster although its values for tourism micro-entrepreneurship was not significantly high. In Cluster 6 containing DC lodging and food cluster, all indicators indicate positive aspects: lower poverty rate, more equitable distribution of wealth, and higher human development indicators (Figure 18). This cluster analysis still did not identify Nashville and Blue Ridge clusters, and the AF cluster in South Carolina’s northeast corner. Anyhow, Nashville cluster tended to register lower poverty rate and higher level of human development. On the contrary, Blue Ridge cluster tended to have relatively low high school graduation rate, and South Carolina cluster tended to be close to where poverty-related indicators are not optimistic.

<table>
<thead>
<tr>
<th>Clustering</th>
<th>N</th>
<th>AER</th>
<th>AF</th>
<th>Poverty rate</th>
<th>Gini coefficient</th>
<th>Per capita income</th>
<th>Physicians</th>
<th>High sch. grad. rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17</td>
<td>4.189*</td>
<td>4.936*</td>
<td>-0.475</td>
<td>-0.471</td>
<td>0.085</td>
<td>-0.489</td>
<td>0.790</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
<td>0.612</td>
<td>-0.311</td>
<td>-1.834</td>
<td>-0.552</td>
<td>2.207*</td>
<td>4.739*</td>
<td>2.561*</td>
</tr>
<tr>
<td>3</td>
<td>96</td>
<td>0.127</td>
<td>0.037</td>
<td>0.750</td>
<td>1.092</td>
<td>-0.621</td>
<td>-0.223</td>
<td>-0.267</td>
</tr>
<tr>
<td>4</td>
<td>114</td>
<td>-0.789</td>
<td>-0.761</td>
<td>0.172</td>
<td>-0.375</td>
<td>-0.887</td>
<td>-0.584</td>
<td>-0.977</td>
</tr>
<tr>
<td>5</td>
<td>57</td>
<td>2.017*</td>
<td>0.403</td>
<td>-3.664*</td>
<td>-2.496*</td>
<td>3.351*</td>
<td>0.044</td>
<td>2.671*</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>1.600</td>
<td>5.004*</td>
<td>-5.731*</td>
<td>-3.913*</td>
<td>11.742*</td>
<td>3.586*</td>
<td>5.190*</td>
</tr>
<tr>
<td>7</td>
<td>110</td>
<td>-1.353</td>
<td>-0.750</td>
<td>2.573*</td>
<td>1.293</td>
<td>-2.068*</td>
<td>-0.792</td>
<td>-2.230*</td>
</tr>
<tr>
<td>8</td>
<td>106</td>
<td>0.087</td>
<td>-0.081</td>
<td>-1.165</td>
<td>-0.685</td>
<td>0.753</td>
<td>0.245</td>
<td>1.333</td>
</tr>
</tbody>
</table>

Notes: * denotes significantly high values that are greater than 1.96 or low values that are less than -1.96.
Figure 18. Mapped results of k-means (k=8) cluster analysis on tourism micro-entrepreneurship and indicators of development

Discussion

Looking back at cluster theory and its diamond analytic framework (Porter, 1998), natural and cultural resources can be viewed as one of the factor conditions, the formal tourism sector is one of the related and supporting conditions and human capital conditions can be one of the components of the context for business existence and rivalry. Demand conditions are beyond the scope of this study since the variables for demand conditions are hard to determine unless questionnaire survey is conducted to understand the tourist origins.

Based on the results for the spatial association of tourism micro-entrepreneurship with the formal sector, natural and cultural resources, and indicators of development, tourism
micro-entrepreneurial clusters identified in the study area can be said to have different components of competitive advantages. Factor conditions for DC cluster do not include any category listed, which might be because Washington DC is not in the study area, and its historic places and museums are not counted toward the factor conditions. For Nashville cluster, although there is no favorable factor identified, the micro tourism businesses are themselves attractions and can constitute competitive advantage. Numerous music attractions in Nashville set a good example. Otherwise, the disadvantages in one component or two can be made up for by the advantages in another (Table 4). It is noteworthy that most clusters are spatially associated with the existence of high clustering of natural or cultural resources, while high clustering of natural or cultural resources are not necessarily spatially associated with any tourism micro-entrepreneurial clusters. For example, the two clusters of historic places are not corresponding to high level of tourism micro-entrepreneurship, which might be because other conditions like low level of human and financial capital restrains the growth of tourism entrepreneurship.

Some interesting findings can be summarized from looking at the results for the spatial association of tourism micro-entrepreneurial clusters with indicators of development. Clusters within metropolitan areas (DC and Nashville) tend to have the presence of high level of health represented by larger number of physicians per 100,000 people, good wealth represented by higher average per capita income, high level of human capital represented by higher high school graduation rate, and low poverty rate. Clusters either within Virginia or within close proximity to large metropolitan areas tended to have higher level of human
development, and higher level of equity represented by lower Gini coefficient. It’s why Virginia coast and Shenandoah cluster also register better in terms of these variables.

Virginia coast cluster did better because of its close proximity to Great Richmond Region (Table 5). With view to Porter’s diamond model of competition (Porter, 1998), tourism micro-entrepreneurship can constitute one of the components of competitive advantage for the local development in the Virginia’s clusters.

Table 4. Exploring competitive advantages of tourism micro-entrepreneurial clusters

<table>
<thead>
<tr>
<th>Cluster</th>
<th>factors</th>
<th>Formal sector</th>
<th>Human capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>N/A</td>
<td>Y</td>
<td>High</td>
</tr>
<tr>
<td>Virginia coast</td>
<td>State parks, Water areas, Historic places</td>
<td>N</td>
<td>High</td>
</tr>
<tr>
<td>Shenandoah</td>
<td>National parks, Historic places</td>
<td>Y</td>
<td>Medium-to-high</td>
</tr>
<tr>
<td>Smoky</td>
<td>National parks, Historic places</td>
<td>Y</td>
<td>Medium</td>
</tr>
<tr>
<td>Outer Banks</td>
<td>State parks, Water areas, museums</td>
<td>Y</td>
<td>Medium</td>
</tr>
<tr>
<td>Blue Ridge</td>
<td>National parks, State parks</td>
<td>N</td>
<td>Low-to-medium</td>
</tr>
<tr>
<td>Nashville</td>
<td>N/A</td>
<td>N</td>
<td>High</td>
</tr>
</tbody>
</table>

Table 5. Exploring symbiosis of tourism micro-entrepreneurship with indicators of development

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Wealth</th>
<th>Health</th>
<th>Education</th>
<th>Poverty</th>
<th>Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>Virginia coast</td>
<td>high</td>
<td>medium</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Shenandoah</td>
<td>Medium-to-high</td>
<td>medium</td>
<td>Medium-to-high</td>
<td>Low-to-medium</td>
<td>Medium-to-high</td>
</tr>
<tr>
<td>Smoky</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Outer Banks</td>
<td>medium</td>
<td>medium</td>
<td>Medium</td>
<td>medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Blue ridge</td>
<td>medium</td>
<td>medium</td>
<td>Low-to-medium</td>
<td>medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Nashville</td>
<td>high</td>
<td>high</td>
<td>High</td>
<td>Low</td>
<td>medium</td>
</tr>
</tbody>
</table>
Limitations

The analysis focused on identifying clustering of high level of tourism micro-entrepreneurship in the study area. $G_i^*$ statistic can help us identify clusters that are across different states, but this is not without drawbacks. First, use of $G_i^*$ statistic can lead to ignorance of intraregional clusters. For example, a tourism micro-entrepreneurial cluster appears within the Atlanta metropolitan area if $G_i^*$ statistic is calculated based on average value of the state of Georgia rather than average value of the study area. The larger average value of the study area will make such sub-regional high clustering non-significant. Second, outliers might not be detected. $G_i^*$ statistic for a specific county with a higher value of a variable can be pulled down by its surrounding low values. As a matter of fact, in the study area there is a striking variation in tourism employment rate, which is the ratio of number of tourism employment to the total employment. In 2010, 72 counties among the 534 had tourism employment rate greater than national tourism employment rate which was 5.58%. This means location quotient of tourism industry in these counties is greater than 1 when based on national tourism employment rate. Of the 72, 4 were in Tennessee, 6 were in South Carolina, 8 were in Georgia, 14 were in North Carolina, and 40 were in Virginia. Considering there is high correlation between tourism employment rate and number of micro tourism businesses per 100,000 people, it is no wonder why tourism micro-entrepreneurial clusters are identified mostly in Virginia and North Carolina. The opposite case is that outliers pulled up $G_i^*$ statistic of the surrounding counties with low values, so that a false cluster is identified. Anyway, this analysis is not going to detect outliers or identify such
false clusters. One of the assumption here is the radiation effect of the outlier is large enough for the identified false cluster to take effect. For example, a tourism destination in one county might drive economic growth in the surrounding counties. Another assumption is that the outliers are affected to a large extent by factors in neighboring counties. An example is that higher level of tourism micro-entrepreneurship in a county is stimulated by natural and cultural amenities in other counties, while it is inconvenient for tourism businesses to be developed in these counties due to the existence of the natural resources (e.g., swamps that are unsuitable to be developed) or cultural resources (e.g., few businesses that are allowed near historic sites under state protection). Logical thinking is that these resources and micro tourism businesses tend to cluster together. Therefore, the results from the false clusters will hardly deviate from the real results.

Spatial weights matrix based a distance threshold for calculating $G_l^*$ statistic is better than adjacency matrix since some counties, especially city counties, are so small that for them spatial dependence should not be restricted to neighboring counties and it is reasonable variables of interest have impact on each other within a distance. However, determination of distance inevitably involves some subjectivity. This study uses 30 miles as the distance threshold to identify tourism micro-entrepreneurial clusters and clusters of other indicators of interest supposing micro tourism businesses might have impact on each other within a distance of 30 miles. Results will be different based on different distance thresholds. Smaller distance threshold will lead to fewer numbers of high values identified and thereby a couple
of single-county clusters. Larger distance threshold will cause a much larger region (e.g., most of Virginia) to become a cluster, which obviously does not have practical significance.

Number of clusters for k-means analysis need to be set a priori, which also unavoidably involves some subjective judgment. Its determination is based on constant experimentation in order to find difference in variables of interest across clusters and make the results look more reasonable, the k value set for each cluster analysis is not necessarily the best though.

Cluster analysis reflects the current status, and could not detect the dynamic development process. We could just identify spatial association of variables of interest and judge if some variables might be factors of others. Some causal relationships need to resort to regression analysis to ascertain.

Conclusion

This study used exploratory spatial cluster analysis to examine the spatial relationships between tourism micro-entrepreneurship, resources, the formal tourism sector and indicators of development. The aim is to identify clusters of tourism micro-entrepreneurship, their potential driving forces and the correlation of them with development.

Across the study area, there were tourism micro-entrepreneurial clusters that were generally located in Virginia and North Carolina. These clusters coexisted with clustering of resources, formal sector or human capital, which echoes Porter’s diamond model of competition (Porter, 1998). He argued there were different components of competitive advantage for clustering of tourism businesses, while this study identifies some components of competitive advantage for clustering of micro tourism businesses.
Why didn’t tourism micro-entrepreneurial clusters appear in the states other than Virginia and North Carolina? This might be because of the existence of some restraining factors, such as low financial and human capital, and low demand, although there are clusters of resources in these states such as a state park cluster in central Tennessee, two historic place and museum clusters in southern Georgia, and high percentage of water areas on the coast of Georgia and South Carolina.

Future research necessitates some other analyses such as regression analysis that can help identify the determinants of the formation and growth of tourism micro-entrepreneurial clusters and some restraining factors. Spatial autocorrelation needs to be incorporated in the regression since micro tourism businesses tend to be affected by nearby businesses rather than businesses in different regions. As a matter of fact, identification of clusters have proved the existence of such spatial autocorrelation. Besides, states need to be incorporated as dummy variable, since the mean values in states are different which might be due to some unknown factors within some states. Similar spatial regression analysis can be conducted to identify the relationship between tourism micro-entrepreneurial clusters and local development. Dependent variables might be change in per capita income, in poverty rate or in Gini coefficient. A series of socio-economic and demographic variables such as change in educational attainment and employment structure should be controlled for.

The focus of this study is spatial associations between tourism micro-entrepreneurship and variables of interest, therefore, the causal relationships have yet to be explored in the future research. Besides, spatial heterogeneity, which means in different regions the
determinants for tourism micro-entrepreneurship and change in economic conditions can be different, might exist in the study area. Relevant statistical methods can be used to detect the existence of spatial heterogeneity, which can then be dealt with by the increasingly popular geographically weighted regression.

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CHAPTER 3:
TOURISM MICRO-ENTREPRENEURSHIP, ITS DETERMINANTS AND HUMAN DEVELOPMENT IN NORTH CAROLINA AND ITS NEIGHBORING STATES:
A GEOGRAPHICALLY WEIGHTED REGRESSION APPROACH

Abstract: The focus of this paper is on exploring whether determinants of two types of tourism micro-entrepreneurship and their effects vary across the study areas, and whether tourism micro-entrepreneurship can help reduce poverty and inequality, and the spatial difference of the impact. To do so, we use a local modeling technique, geographically weighted regression (GWR) to identify county-level characteristics that serve as drivers of tourism micro-entrepreneurship, their local effects, and associations of tourism micro-entrepreneurship with human development level and degree of the associations across different areas in North Carolina, and its neighboring states. A k-means cluster analysis based on GWR local coefficients is used to delineate distinct areas of associations. The results are compared between OLS as a global modeling technique and GWR, and between different types of tourism micro-entrepreneurship.

Key words: tourism micro-entrepreneurship, determinant, human development, geographically weighted regression

Introduction
Tourism has gained increasing popularity in being taken by individuals and households as a new form of livelihood to deal with unemployment or to expand income sources (Boyd, 2012; Capriello et al., 2013). No matter what stimulates the formation of these tourism
businesses, they often share some common characteristics that include being family operated and small-scale (Bryceson, 2002; Rogerson, 2006; Tomaselli, Timbo and Kozak, 2012). Tourism micro-entrepreneurship refers to the situation when there are fewer than 5 employees in a tourism business (Shane, 2003; Rogerson, 2006).

The evaluation of the spatial distribution of entrepreneurial activities suggests spatial context plays an important role in shaping entrepreneurship since the influencing factors such as resources, labor force availability and cultural values vary between different areas (Garcia-Cabrera and Garcia-Soto, 2008; Breitenecker, 2010; Court, 2012). Similarly, spatial variation of tourism micro-entrepreneurship is contingent upon local circumstances in terms of influencing factors such as the formal tourism sector and amenities (Marcouiller, Kim and Deller, 2004; Daskalopoulou and Liargovas, 2008). Micro tourism businesses can be either nature-based or culture-based, while formal business sector can be either contributing or inhibiting factors of tourism micro-entrepreneurship. In some areas, micro businesses might bog down when facing competition from larger businesses, while in some others more formal tourism businesses can help spin off new micro businesses (Mandelman and Montes-Rojas, 2009; Fiess, Fugazza and Faloney, 2010; Boyd, 2012). Other factors that might have an impact on tourism micro-entrepreneurship might include unemployment, self-employment, population density, the extent of being urban, human capital, household income, and racial composition (Edwards and Fernandes, 1999; Seaton, 1999; Peterson et al., 2005; Mengistae, 2006; Cho et al., 2007; Sequeira and Rasheed, 2006; Boyd, 2012; Chaperon and Bramwell, 2013).
Poverty can be measured by a variety of variables or some combinations of these variables such as per capita income, poverty rate, and human development index. These variables or indices are not without their drawbacks. At the micro scale, tourism micro-entrepreneurship can help bring extra income, cope with unemployment, or lead to greater investment in enhancing skills and knowledge which are all the reflections of poverty reduction (Nyaupane, Morais and Dowler, 2006; Manyara and Jones, 2007). At the macro scale, tourism micro-entrepreneurship is considered as a local and regional economic driver (Toye, 1987; Dassen-Housen, 2002).

This paper aims to explore the potential determinants of tourism micro-entrepreneurship, its association with local economic conditions, and the variations in determinants and association across the study area. For example, is the effect of natural amenities on tourism micro-entrepreneurship greater in some areas with higher entrepreneurial culture represented by self-employment rate? Is the effect of formal tourism sector on tourism micro-entrepreneurship greater in some areas with higher level of amenities? This spatial variation in these relationships is referred to as spatial heterogeneity (Fotheringham et al., 2002).

This paper includes spatial consideration in examining variables as potential determinants of tourism micro-entrepreneurship by using geographically weighted regression (GWR). In doing so, this paper bridges a gap between known associates of tourism micro-entrepreneurship at the county level and unknown associates at the regional level. In
addition, this paper examines the relationship between tourism micro-entrepreneurship with human development.

Most of the previous research that modelled start-up, growth or survival of businesses on predictor variables has tended to investigate the relationships using global statistical methods including standard ordinary least squares regression (OLS) and spatial regression that take into account spatial autocorrelation. Studies employing such global regression analysis often use categorizations of areas such as states within a higher geographical unit (e.g., a region covering multiple states) as a dummy variable to take account of roles of places with a priori set boundaries (Fotheringham et al., 2004; Cho et al., 2007). However, the roles of places may not reflect reality since they can hide the roles of some sub-regions which might stride over several categorizations.

This paper compares modelling results of tourism micro-entrepreneurship from OLS and GWR. In the case of regional growth, it is reasonable to assume that the effect of explanatory variables is not contained within spatial units, especially if these units are relatively small (Shearmur et al., 2007). Since the unit of analysis in this paper is county, it is reasonable to assume tourism micro-entrepreneurship in one county can be affected by factors in neighboring counties. For example, people in a county with higher unemployment rate might be driven into tourism micro-entrepreneurship conducted in neighboring counties with favorable conditions. The application of GWR deals with spatial non-stationarity. In different spaces within a region, both the determinants of tourism micro-entrepreneurship and their role reflected by extent or whether it is positive or negative can be different. The same
might be true for the relationships between tourism micro-entrepreneurship and poverty-related variables. GWR allows an analyst not to have to set a priori boundaries under which circumstances space is continuous without following political or administrative boundaries such as those between states.

**Determinants of tourism micro-entrepreneurship**

Tourism businesses can concentrate in some regions while disperse in other regions. Many studies have focused on analyzing factors that promote site selection decision made by tourism businesses (Moutinho and Paton, 1991; Lerner and Haber, 2001; Lin and Juan, 2010; Akbaba, 2012). These factors can be site-specific, which means some significant factors in a region might become non-significant in other regions or a region has some unique factors that other regions do not have. Various reasons why people conduct micro tourism businesses are enumerated as follows. Although it is hard to make an exhaustive list of factors, they will provide precious reference values when determining the explanatory variables used in the empirical model aimed at identify their relationships with tourism micro-entrepreneurship.

Amenities can lead to tourism micro-entrepreneurship in different ways. Tourism micro-entrepreneurship can be used as a new form of livelihood to expand income sources and diversify economic activities. Farm tourism can be an extension of subsistence farming based on natural and cultural amenities existent on people’s heritage farms (Bryceson, 2002; Rogerson, 2006; Tomaselli, Timbo and Kozak, 2012). Studies show people working on the farm can easily become used to offering tourism services since some work serving tourists is very similar to their domestic housework (Garcia-Ramon, Canoves and Valdovinos, 1995;
Phelan and Sharpley, 2012). Amenities, especially natural amenities can motivate people’s migration. Studies show people tend to move to some places in the near future after they have travelled there and been captivated (Beale and Johnson, 1998; Rudzitis, 1999). Some studies also indicate people would like to give up high salary in exchange for better amenities (Roback, 1988; Deller and Tsai, 1999). Naturally, some migrants with higher level of skills and education attainment would conduct tourism businesses simply out of interest or as an income source (Marcouiller, Kim and Deller, 2004).

Unemployment is also likely to lead to tourism micro-entrepreneurship. Studies shows people do need previous working experiences in tourism or related business background to conduct tourism businesses (Getz and Carlsen, 2005). This low entry barriers make tourism a makeshift means to deal with unemployment for people, especially those in areas with relatively higher level of tourist amenities. Tourism’s easy entry is also reflected by the fact that some services such as crafts, story-telling and guided tour can be offered without very high start-up capital and economic return is fast (Kiss, 2004; Harwood, 2010). Boyd (2012) indicated people become self-employed in the informal sectors as petty traders or personal-service providers in order to escape the rigors of unemployment. It is assumed the informal sectors can include tourism micro-entrepreneurship.

While tourism micro-entrepreneurship may be driven by unemployment, more formal tourism sector is also expected to be a factor influencing tourism micro-entrepreneurship. Local people can become tourism micro-entrepreneurs by providing a series of services such as food, guided tour, and taxi needed by guests in more formal tourism sector such as hotels
(Adams et al., 2004; Lepp, 2007). People working in the more formal tourism sector can resign to become micro-entrepreneurs using previously accumulated experiences and established network (Mandelman and Montes-Rojas, 2009).

Self-employment can also be a determinant of tourism micro-entrepreneurship. Self-employed people are themselves conducting businesses, it is supposed when conditions permit they could convert their current businesses to tourism or expand them by incorporating tourism components (Mandelman and Montes-Rojas, 2009; Franck, 2011). Therefore, it is assumed that higher self-employment rates might lead to higher levels of tourism micro-entrepreneurship, although this relationship has yet to be examined.

Population density may also be linked to pattern of tourism micro-entrepreneurship. Tourism businesses may not need to be within close proximity to market and labor force as some other industries do. Some micro tourism businesses are close to the major tourist destinations such as national parks around which population density is low. However, the attractions that cater to visitors from across the country and even abroad are limited, some micro tourism businesses need to rely on proximity to market to exist. Population density has proved to be a significant determinant of the growth of some types of businesses (Cho et al., 2007; Mayers et al., 2012), while its significance in determining the formation of micro tourism businesses has yet to be proved and is assumed to rely on local circumstances.

The effect of the extent of being rural or urban on tourism micro-entrepreneurship may also be varying over space. Core-periphery theory has been widely used in the investigation of tourism and its formational cause. Case studies have shown in some cases tourism might
occur primarily in peripheral areas that are called pleasure periphery, while in some other cases tourism occurred mainly in core areas due to availability of resources and facilities (Edwards and Fernandes, 1999; Seaton, 1999; Chaperon and Bramwell, 2013). Traditionally, urban areas can be considered as cores while rural areas can be considered as peripheries. Micro-entrepreneurs might select site of doing their businesses in urban or rural setting depending on their expected tourism demand of their products and services, on their lifestyle, or on the demand of their businesses on infrastructure, facilities and resources. Therefore, it is supposed relationship between the extent of being urban and tourism micro-entrepreneurship is significantly positive or negative in some areas, and not significant in other areas.

Human capital can also be a determinant of the start-up and growth of micro tourism businesses. Sequeira and Rasheed (2006) identified human capital can play a significant role in driving start-up and growth of small businesses. Mengistae (2006) indicated given competitive pressure the probability of small businesses survival and the expected growth rate conditional on survival both increase with entrepreneurs’ human capital. Human capital can have various forms. For example, Sequeira and Rasheed used English language proficiency, increase in education and prior business experience as indicators of human capital, while educational attainment is used by United Nations Development Programme (UNDP) as a major measure of a country’s human capital (Sequeira and Rasheed, 2006).

According to the U.S Census Bureau, a vacant home is categorized as either a rental property, a property listed for sale, or a property for seasonal or recreational use. Vacant
housing, as seasonal homes, can be a factor attracting tourists, especially in the areas that provide access to the region’s scenic views and natural and cultural resources (Mendonsa, 1983; Deller, Marcouiller, and Green, 1997; Hirono, 2010). Therefore, if tourism micro-entrepreneurs are aware of the business opportunities the vacant housing might bring, they might conduct businesses nearby, which indicates vacant housing might play a role in nurturing tourism micro-entrepreneurship.

Besides, household income and racial composition can also be significantly related to tourism micro-entrepreneurship. Although there is a general dearth of literature that investigate the relationship of household income and racial composition with micro tourism businesses, there are numerous articles that have identified median household income and racial composition such as proportions of African Americans and Hispanics can be significantly related to formation or growth of some types of businesses (Peterson et al., 2005; Cho et al., 2007).

These potential determinants of tourism micro-entrepreneur can be highly correlated. For example, population density might be highly correlated with the extent of being urban and racial composition might be highly correlated with educational attainment. These correlations will be dealt with in the later regression analysis by checking multicollinearity. The variables that are detected as highly correlated with other predicator variables will be eliminated from the empirical model.
Association of tourism micro-entrepreneurship with human development

Poverty can be measured based on various variables or some combinations of them, such as per capita GDP, unemployment rate, labor force participation rate and accessibility to public services. The relationship between tourism micro-entrepreneurship and poverty can be bi-directional. As mentioned previously, household income that reflects the extent of household poverty can affect the formation and growth of tourism micro-entrepreneurship, while tourism micro-entrepreneurship can in turn help bring extra income and expand economic activities so as to reduce poverty to some extent. Similarly, unemployment rate as an issue that could lead to poverty can stimulate nurturing of tourism micro-entrepreneurship, and tourism micro-entrepreneurship will lead to decline of percentage of people unemployed (Boyd, 2012).

Average per capita income has been criticized to be a biased variable in reflecting the poverty level of some unit of analysis. Its calculation is based on the arithmetic mean which means an area with higher average per capita income might have more people living under poverty line, and the higher value is just because it is pulled up by income of a few richest people.

Poverty rate is percent of people who were in poverty in a calendar year based on income. Census bureau would use some poverty threshold to determine if a person is in poverty. However, it do not take into account difference in level of consumption across different regions. People in the areas with higher poverty rate might live generally better than
those in the areas with lower poverty rate just because their actual expenditures as compared to their income is lower (Greene, 1991).

Human development index is often considered as a good indicator of poverty level. It is calculated using some combinations of indicators of performance in dimensions including wealth, health and education (Nijkamp and Abreu, 2009). It is assumed poverty level should not be measured simply by income, but by indicators of human development and well-being that are related to sustainability of poverty reduction. The indicators used to calculate human development index can be different based on unit of analysis, data availability and focus of research. For example, United Nations used per capita income, life expectancy, and school enrollment and educational attainment as indicators of the dimensions to calculate human development index for countries of the world. Evidence shows one of the benefits from tourism micro-entrepreneurship can be more investment in children’s education (Nyaupane, Morais and Dowler, 2006).

This paper is not restricted by research on whether tourism micro-entrepreneurship can really bring people extra income, help tourism micro-entrepreneurs get out of poverty, or drive them to improve their educational investment, but on the research question of whether high level of tourism micro-entrepreneurship can be related to high human development.

**Study area**

North Carolina, situated in southeastern USA, has three major geographic regions: the Coastal Plain, the Piedmont, and the Mountains. There is spatial variation in tourism micro-entrepreneurship across the state with counties in the mountains and on the coast tending to
have higher rate of micro tourism businesses. Such concentrations of tourism micro-entrepreneurship might extend to mountains or coastal regions in neighboring states, since the boundaries of natural amenities as factors of tourism micro-entrepreneurship may not follow the administrative or political boundaries between states. Similarly, the boundaries of high human development level as a result of tourism micro-entrepreneurship may not be consistent with state boundaries either. Using a region that covers several states as study area can facilitate comparison of effect of places with a priori set boundaries such as states with effect of spaces without such boundaries such as some sub-regions striding over parts of two or several states.

This paper, therefore, uses the region composed of North Carolina and its neighboring states including Tennessee, Virginia, South Carolina, and Georgia as the study area. In doing so, the sub-regions with unique relationships between various factors and tourism micro-entrepreneurship and those between tourism micro-entrepreneurship and poverty-related variables would be identified using some statistical methods. The relationships and sub-regions identified can help analysts and policy maker better solutions proposed and policy made based on a lower level of geographical unit which in this paper is a single state versus the region composed of a single state (North Carolina) and its neighboring states. More specifically, this paper focuses on the 534 counties in the study area, since the primary geographic unit of analysis is county, which means this study uses data at the county level to identify relationships.
Data and measures

The U.S. Census Bureau surveys – County Business Patterns has data available on two types of micro businesses that are very tourism-related, micro businesses that provide arts, entertainment, and recreational facilities and micro businesses that provide accommodation and food services. Therefore, tourism micro-entrepreneurship which is the main focus of this study refers to either of these two types of micro tourism businesses. When investigating the relationships between potential predictor variables with tourism micro-entrepreneurship, two dependent variables used representing level of two types of tourism micro-entrepreneurship are actually the number of the two above-mentioned micro businesses per 100,000 people. The independent variables used include national parks, state parks, percentage of water area, historic places nationally registered, museums, unemployment rate, more formal tourism sector, self-employment rate, population density, urban-rural continuum code, high school graduation rate for people 25 years old and over, per capita income, percentage of African Americans, percentage of Hispanics and percentage of vacant housing. Table 1 presents the definition of variables and data sources used in modeling the relationships between potential predictor variables and tourism micro-entrepreneurship.

The number of each micro tourism business per 100,000 people becomes independent variable when examining their relationships with human development level. The human development index by the UNDP has inspired researchers to present more effective index (Lind, 1993; Carlucci and Pisani, 1995). Among others, principal component analysis (PCA) has been extensively used for finding an optimal linear combination of indicators
representing the three dimensions of human development in contrast to the simple average of each index (Anderson, 1984; Pang, Liu and Zhang, 2001).

| Table 1. Variable Definitions and Sources for Modeling Tourism Micro-entrepreneurship |
|---------------------------------|---------------------------------|-----------------|
| Variable                        | Definition                                      | Data Source                                    |
| **Dependent variable**          |                                                |                                              |
| Tourism micro-entrepreneurship - arts, entertainment, and recreation | Number of establishments in arts, entertainment, and recreational facilities with 1-4 employees per 100,000 population in 2011; | U.S. Census Bureau Survey – County Business Patterns |
| Tourism micro-entrepreneurship - lodging and food | Number of establishments in accommodation and food services with 1-4 employees per 100,000 population in 2011 | U.S. Census Bureau Survey – County Business Patterns |
| **Explanatory variables**       |                                                |                                              |
| National park ratio             | Number of national parks (including national recreation areas, natural landmarks and forests) per 100,000 people | U.S. National Park Service & USDA Forest Service |
| State park ratio                | Number of state parks (including state recreation areas, natural areas and forests) per 100,000 people | Forest Service and Division of Parks and Recreation of each state |
| Percentage of water area        | Total water surface area divided by total area | U.S. Census |
| Museum ratio                    | Number of museums per 100,000 people in 2010 | Each states’ official travel and tourism website |
| Historic places ratio           | Number of historic places nationally registered per 100,000 people in 2010 | U.S. National Park Service |
| Formal tourism sector ratio     | Number of establishments in arts, entertainment, recreational facilities, accommodation and food services with > 4 employees per 100,000 people in 2010 | U.S. Census |
| Unemployment rate               | Percent of unemployed in labor force for population 16 years and over in 2010 | U.S. Census |
| Self-employment rate            | Percent self-employed workers in own not incorporated business for civilian employed among in population 16 years and over in 2010 | U.S. Census |
| High school graduation rate     | Percent high school graduate or higher for population 25 years and over in 2010 | U.S. Census |
| Per capita income               | Total income of all people 15 years old and over by the total population in 2010 | U.S. Census |
| Population density              | Population per square mile of land area in 2010 | U.S. Census |
| Percent African American        | Number of African Americans divided by total population in 2010 | U.S. Census |
| Percent Hispanic                | Number of Hispanics divided by total population in 2010 | U.S. Census |
| Percent vacant housing          | Number of vacant housing units divided by total housing units | U.S. Census |
| Rural county                    | Urban=0, rural=1, 2003                          | USDA Economic Research Service                |
The advantage of PCA often mentioned is that it considers both interdependence among and variability in the components variables that could not be considered by arithmetic mean (Vyas and Kumaranayake, 2006). Inspired by a North Carolina Human Development report by Robert Mulligan, human development index used in this study for each county is a combination of per capita income, high school graduation rate for people of 25 years and over, and number of physicians per 100,000 population that represent the three dimensions of human development: wealth, education and health, using PCA. In this study, PCA is carried out in JMP Pro 9. Specially, eigenvalues, explaining proportion of the PCs, and loading of variables for PCs are provided. Accordingly, eigenvector $a_{ij} = \mu_{ij} / \sqrt{\lambda_i}$ where $\lambda_i$ is the loading of each variable for $PC_i$, $\mu_{ij}$ is eigenvalue of $PC_i$, $i=1, 2, 3$ representing three principal components, $j=1, 2, 3$ representing three indicators. Then the comprehensive human development score is calculated based on PCA, using $y_k = b_1 x_{k1} + b_2 x_{k2} + b_3 x_{k3}$ and $b_i = a_{1i} \theta_1 + a_{2i} \theta_2 + a_{3i} \theta_3$, $i=1, 2, 3$, where $\theta$ is the explaining proportions of the jth PCs, $k=1, 2, \ldots 534$ representing counties in the study area, $x_{ki}$ is the standardized value of a variable for each county.

The definition of variables and data sources used in modeling the relationships between tourism micro-entrepreneurship and human development are presented in Table 2.
Table 2. Variable Definition and Sources for Modeling Tourism Micro-entrepreneurship and Human Development

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variable</td>
<td>Human development score (computed)</td>
<td>A measure of people’s long-term well-being. The scale was constructed by combining three measures including per capita income, high school graduation rate for people of 25 years and over, and number of physicians per 100,000 population in 2010</td>
</tr>
<tr>
<td>Explanatory variables</td>
<td>Tourism micro-entrepreneurship - arts, entertainment, and recreation</td>
<td>Number of establishments in arts, entertainment, and recreational facilities with 1-4 employees per 100,000 population in 2009;</td>
</tr>
<tr>
<td></td>
<td>Tourism micro-entrepreneurship - lodging and food</td>
<td>Number of establishments in accommodation and food services with 1-4 employees per 100,000 population in 2009</td>
</tr>
</tbody>
</table>

Methodologies

Everything is related to everything else, but near things are more related than distant things (Tobler, 1979). This means observations that are close to each other tend to have similar values. When such spatial autocorrelation exists among the observations of some variable, the basic assumption of regression that the observations are independent is violated and the results will not be right. Spatial error model (SEM) and spatial lag model (SLM) are two oft-used models to deal with the issue of spatial dependence (Anselin, 1988). SLM deals with spatial dependence in the values of the dependent variable, while SEM deals with spatial dependency in error terms which might be because some important explanatory variables are missing or there is spatial dependency in the values of dependent variables, or some of independent variables, or both.
Although SEM and SLM take into account spatial autocorrelation problems, the effect of these explanatory variables in the models represented by their regression coefficient still remains fixed over the entire study area as it is in the standard multiple regression approaches, such as ordinary least squares linear regression (OLS). Multicollinearity, i.e. the presence of linear correlations between explanatory variables, might cause estimation problems (Chatterjee and Hadi, 2006). The variance inflation factor (VIF) is often used for checking multicollinearity in model fitting. VIF for the predictor variable $x_i$ is obtained by the equation which is $VIF_i = 1/(1 - R_i^2)$, in which $R_i^2$ is the multiple determination coefficient for the linear regression of $x_i$ on the other covariates. Generally, VIF values greater than ten suggests the the existence of multicollinearity, i.e. that at least covariates are highly correlated (Freund and Littell, 2000).

Over the last decade, geographically weighted regression (GWR) has emerged as a proposed alternative to account for spatial dependency as compared to SEM and SLM (Fotheringham, Brunsdon, and Charlton, 2002). It captures spatial variations in the regression coefficients as opposed to fixations in the regression coefficients estimated from OLS, SEM and SLM. Since an explanatory variable takes different values across a given geographical space, and OLS parameters reflect the average effects across space, the originally significant explanatory variable might become non-significant as the study area is scaled down. Therefore, it becomes nonsensical when the actual explanatory variable could not be identified for a sub-region and the variable identified by OLS across the whole region is falsely considered as explanatory for this sub-region. The case in this study might be that
natural resources in the whole study area appear to be determinants of tourism micro-
entrepreneurship while actually in some areas cultural resources play a major role while
natural ones only play a marginal role.

In statistical terms, if Y represents the dependent variable, Xs represent independent
variables, and βs represent regression coefficients representing the effects of independent
variables, using GWR will identify different βs and significant Xs for each observation point
(county in this study). The specific GWR model for each observation point is specified as:

\[ y_i = \beta_{i0} + \sum_{k=1}^{m} \beta_{ik} x_{ik} + \epsilon_i, \epsilon_i \sim N(0, \sigma^2), i = 1, 2, ..., n \]

Where \( y_i \) is the dependent variable at county i, \( x_{ik} \) is the value of the \( k \)th explanatory variable
at county i, \( \beta_{ik} \) is the local regression coefficient for the \( k \)th explanatory variable, \( \beta_{i0} \) is the
intercept parameter for county i, and \( \epsilon_i \) is the random disturbance, which follows an
independent normal distribution with zero mean and homogeneous variance.

The matrix calculation for the estimated regression coefficients is

\[ \hat{\beta}_i = (X^T W_i X)^{-1} X^T W_i Y, i = 1, 2, ..., n \]

Where \( W_i = \text{diag}(w_{i1}, w_{i2}, ..., w_{in}) \) is the N×N diagonal weight matrix whose off-diagonal
elements are 0 and the diagonal elements are the weights of all observations relative to i, X is
the matrix of exogenous variables with a first column of 1s for the intercept, Y is the vector
of the dependent variable for all counties, and \( \hat{\beta}_i = (\hat{\beta}_{i0}, \hat{\beta}_{i1}, ..., \hat{\beta}_{im})^T \) is the vector of m+1
local regression coefficients at location i. A distance decay function, a means where Tobler’s
law can be incorporated, defines the weights assigned to observation i from other
observations. One of the most commonly used distance decay function is the bi-square nearest neighbor function:

\[ w_{ij} = \begin{cases} 
[1 - (d_{ij}/b)^2]^2 & \text{if } d_{ij} < b \\
0 & \text{otherwise}
\end{cases} \]

Where \( d_{ij} \) is the Euclidean distance from centroid of county \( j \) to centroid of county \( i \), \( b \) is bandwidth, which is the maximum distance over which spatial dependence is thought to exist. Thus, counties which are nearer to county \( i \) have a greater influence than more distant counties and counties beyond the bandwidth are excluded from the regression coefficient calculation.

The optimum bandwidth needs to be determined when estimating a model (Jivraj, Brown and Finney, 2013). If the study area has observations sparse in one part of the region and dense in another part, distance-based bandwidth will include few observations in the sparse region resulting in less precise estimates (Ali, Partridge and Olfert, 2007). An adaptive weight function that selects a fixed number of nearest observations for each county rather than the fixed distance can deal with this issue (Fotheringham, Brunsdon and Charlton, 2002). In this study, an adaptive bi-square model is used to determine the optimum bandwidth in terms of maximum fixed number of near observations to be included in the GWR to make sure to get the smallest sum of squared residuals. Akaike Information Criterion with a greater penalty for extra parameters (AICc), and adjusted \( r \) squared, the indicators of goodness of fit will be used to compare GWR with other models. \( \beta \)s and significant Xs identified based on GWR model tend to be similar for nearby local
observations, which will facilitate the identification of sub-regions where the relationships between independent and dependent variables tend to be constant. The k-means cluster analysis helps identify such sub-regions.

In summary, the reasons that justify the use of GWR are as follows. GWR can provide researchers with greater detail and accuracy from a local analysis perspective. Problem of spatial autocorrelation is taken into consideration. GWR makes it possible to analyze how relationships vary over space, to gain an understanding of possible causing factors through investigating the spatial pattern of the local estimates and to recognize where the independent variables have greater or lesser explanatory power. GWR facilitates exploration of spatial clusters, which are not restricted by administrative boundaries.

Three major softwares are used to get the results. R statistical software was used to conduct OLS, multicollinearity diagnostics based on variance inflation factor (VIF), and k-means cluster analysis. The software package GWR 4.0 was used to conduct GWR, and ArcMap 10 was used for visualization of results.

**Results**

*Determinants of micro businesses that provide arts, entertainment and recreation (AER)*

The OLS regression analysis for identifying the determinants of number of micro businesses that provide arts, entertainment and recreation (AER) per 100,000 people indicates historic places, more formal tourism sector, per capita income and percentage of vacant housing tend to be significantly associated while state parks also tend to be slightly but significantly associated (Table 3). The variable inflation factor (VIF) for all the predictor
variables are less than 4.0, which suggests the nonexistence of multicollinearity that might cause estimation problems.

Geographical variability test of local coefficients by GWR indicates there is a significant spatial variation in the effects of national parks, museums, historic places, high school graduation rate, per capita income, and percent vacant housing since the difference of criterion value for them is negative (Table 4) (Blainey and Mulley, 2013). GWR also helps convert some independent variables originally set as local to global based on the measure of goodness of fit such as AIC. After the local to global variable selection, national parks, museums, historic places, high school graduation rate, per capita income, and percent vacant housing remain to have different effects across the study area, while the formal tourism sector appears to be a significant global determinant (Table 5 and 6).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>S.E.</th>
<th>t-value</th>
<th>p-value</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>16.539330</td>
<td>0.528510</td>
<td>31.294</td>
<td>0.0000***</td>
<td></td>
</tr>
<tr>
<td>National parks</td>
<td>0.820129</td>
<td>0.655548</td>
<td>1.251</td>
<td>0.2115</td>
<td>1.542</td>
</tr>
<tr>
<td>State parks</td>
<td>-1.199725</td>
<td>0.600599</td>
<td>-1.998</td>
<td>0.0462*</td>
<td>1.297</td>
</tr>
<tr>
<td>Percent water area</td>
<td>1.167830</td>
<td>0.610726</td>
<td>1.912</td>
<td>0.0564</td>
<td>1.336</td>
</tr>
<tr>
<td>Historic places</td>
<td>3.021848</td>
<td>0.605020</td>
<td>4.995</td>
<td>0.0000***</td>
<td>1.311</td>
</tr>
<tr>
<td>Museums</td>
<td>0.293613</td>
<td>0.625061</td>
<td>0.470</td>
<td>0.6385</td>
<td>1.399</td>
</tr>
<tr>
<td>The formal tourism sector</td>
<td>5.899300</td>
<td>0.663502</td>
<td>8.891</td>
<td>0.0000***</td>
<td>1.576</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.134996</td>
<td>0.599051</td>
<td>0.225</td>
<td>0.8221</td>
<td>1.285</td>
</tr>
<tr>
<td>Self-employment rate</td>
<td>1.180222</td>
<td>0.636117</td>
<td>1.855</td>
<td>0.0641</td>
<td>1.451</td>
</tr>
<tr>
<td>High school graduation rate</td>
<td>-0.885746</td>
<td>0.933194</td>
<td>-0.949</td>
<td>0.3431</td>
<td>3.118</td>
</tr>
<tr>
<td>Per capita income</td>
<td>5.236776</td>
<td>0.982689</td>
<td>5.329</td>
<td>0.0000***</td>
<td>3.458</td>
</tr>
<tr>
<td>Population density</td>
<td>-0.462926</td>
<td>0.713039</td>
<td>-0.649</td>
<td>0.5166</td>
<td>1.821</td>
</tr>
<tr>
<td>Percent Africa Americans</td>
<td>-0.376132</td>
<td>0.591602</td>
<td>-0.636</td>
<td>0.5250</td>
<td>1.256</td>
</tr>
<tr>
<td>Percent Hispanics</td>
<td>-0.949308</td>
<td>0.576454</td>
<td>-1.647</td>
<td>0.1001</td>
<td>1.190</td>
</tr>
<tr>
<td>Percent vacant housing</td>
<td>3.069400</td>
<td>0.754361</td>
<td>4.069</td>
<td>0.0000***</td>
<td>2.055</td>
</tr>
<tr>
<td>Urban-rural divide</td>
<td>-0.244854</td>
<td>0.670860</td>
<td>-0.365</td>
<td>0.7153</td>
<td>1.614</td>
</tr>
</tbody>
</table>

Notes: *** and * denote statistically significant at the 0.1 percent and 5 percent level, respectively.
### Table 4. Spatial Variability Test of Local Coefficients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Difference of Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-4.858</td>
</tr>
<tr>
<td>National parks</td>
<td>-4.358</td>
</tr>
<tr>
<td>State parks</td>
<td>2.059</td>
</tr>
<tr>
<td>Percent water area</td>
<td>1.413</td>
</tr>
<tr>
<td>Historic places</td>
<td>-18.122</td>
</tr>
<tr>
<td>Museums</td>
<td>-0.776</td>
</tr>
<tr>
<td>The formal tourism sector</td>
<td>2.659</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>1.090</td>
</tr>
<tr>
<td>Self-employment rate</td>
<td>0.205</td>
</tr>
<tr>
<td>High school graduation rate</td>
<td>-2.930</td>
</tr>
<tr>
<td>Per capita income</td>
<td>-2.796</td>
</tr>
<tr>
<td>Population density</td>
<td>3.033</td>
</tr>
<tr>
<td>Percent African Americans</td>
<td>0.862</td>
</tr>
<tr>
<td>Percent of Hispanics</td>
<td>3.175</td>
</tr>
<tr>
<td>Percent vacant housing</td>
<td>-22.659</td>
</tr>
<tr>
<td>Urban-rural divide</td>
<td>1.394</td>
</tr>
</tbody>
</table>

### Table 5. Fixed (Global) Coefficients from GWR

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>S.E.</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State parks</td>
<td>-1.071378</td>
<td>0.584426</td>
<td>-1.833</td>
<td>0.0673</td>
</tr>
<tr>
<td>Percent water area</td>
<td>-0.669639</td>
<td>0.737116</td>
<td>-0.908</td>
<td>0.3640</td>
</tr>
<tr>
<td>The formal tourism sector</td>
<td>4.651868</td>
<td>0.673949</td>
<td>6.902</td>
<td>0.0000***</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.307722</td>
<td>0.596919</td>
<td>0.516</td>
<td>0.6064</td>
</tr>
<tr>
<td>Self-employment rate</td>
<td>0.939694</td>
<td>0.654899</td>
<td>1.435</td>
<td>0.1519</td>
</tr>
<tr>
<td>Population density</td>
<td>0.594899</td>
<td>0.741321</td>
<td>0.802</td>
<td>0.4226</td>
</tr>
<tr>
<td>Percent Africa Americans</td>
<td>-0.219464</td>
<td>0.667457</td>
<td>-0.329</td>
<td>0.7424</td>
</tr>
<tr>
<td>Percent Hispanics</td>
<td>-0.283509</td>
<td>0.564563</td>
<td>-0.502</td>
<td>0.6158</td>
</tr>
<tr>
<td>Urban-rural divide</td>
<td>-0.390349</td>
<td>0.654200</td>
<td>-0.597</td>
<td>0.5510</td>
</tr>
</tbody>
</table>

Notes: *** denotes statistically significant at the 0.1 percent.

### Table 6. Summary Statistics of the GWR Varying (Local) Parameter Estimates Including the Overall Percentage of Negative (% −) and Positive (% +) Values

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Lower Quartile</th>
<th>Median</th>
<th>Upper Quartile</th>
<th>Maximum</th>
<th>% −</th>
<th>% +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>12.46</td>
<td>13.81</td>
<td>16.53</td>
<td>18.01</td>
<td>19.48</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>National parks</td>
<td>-6.92</td>
<td>-1.54</td>
<td>0.76</td>
<td>2.27</td>
<td>4.99</td>
<td>42.9</td>
<td>57.1</td>
</tr>
<tr>
<td>Museums</td>
<td>-5.28</td>
<td>-1.07</td>
<td>0.76</td>
<td>2.12</td>
<td>5.38</td>
<td>37.1</td>
<td>62.9</td>
</tr>
<tr>
<td>Historic places</td>
<td>-1.52</td>
<td>0.30</td>
<td>1.73</td>
<td>5.46</td>
<td>8.61</td>
<td>18.2</td>
<td>81.8</td>
</tr>
<tr>
<td>High school graduation rate</td>
<td>-9.52</td>
<td>-2.19</td>
<td>-0.44</td>
<td>1.62</td>
<td>7.94</td>
<td>56.9</td>
<td>43.1</td>
</tr>
<tr>
<td>Per capita income</td>
<td>-3.97</td>
<td>2.70</td>
<td>4.49</td>
<td>6.45</td>
<td>17.06</td>
<td>7.3</td>
<td>92.7</td>
</tr>
<tr>
<td>Percent vacant housing</td>
<td>-0.33</td>
<td>0.89</td>
<td>2.26</td>
<td>4.86</td>
<td>11.99</td>
<td>1.9</td>
<td>98.1</td>
</tr>
</tbody>
</table>
Local variables do not necessarily function everywhere which means their effects might be non-significant in some parts. As a result, each of the varying local predictor variables is not associated with AER in more than half of the counties in the study area. Although parameter estimates for some variables such as historic places, per capita income, and percent vacant housing include both negative and positive values, only positive values are significantly associated (Table 7). Based on AICc and adjusted R-squared as criteria, OLS and GWR can be compared with each other. Lower AICc and higher adjusted R-squared indicate better model fitting (Fotheringham et al., 2002; Jivraj et al., 2013), so GWR model after local to global variable selection is a good improvement over multiple OLS model (Table 8).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Significance range</th>
<th>Percent non-significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>12.46-19.48</td>
<td>0</td>
</tr>
<tr>
<td>National parks</td>
<td>-6.17-4.18</td>
<td>78.7</td>
</tr>
<tr>
<td>Museums</td>
<td>-5.28-5.38</td>
<td>66.9</td>
</tr>
<tr>
<td>Historic places</td>
<td>2.84-8.61</td>
<td>67.2</td>
</tr>
<tr>
<td>High school graduation rate</td>
<td>-9.52-7.94</td>
<td>81.1</td>
</tr>
<tr>
<td>Per capita income</td>
<td>2.53-17.06</td>
<td>50.4</td>
</tr>
<tr>
<td>Percent vacant housing</td>
<td>2.70-11.99</td>
<td>67.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>AICc</th>
<th>r² (adj.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple OLS regression</td>
<td>4207.0</td>
<td>0.403</td>
</tr>
<tr>
<td>GWR before local to global variable selection</td>
<td>4161.5</td>
<td>0.469</td>
</tr>
<tr>
<td>GWR after local to global variable selection</td>
<td>4139.9</td>
<td>0.515</td>
</tr>
</tbody>
</table>
The spatial distribution of local parameter coefficients for the geographically varying explanatory variables of AER are explored visually (Figure 1 to 6). The lightest color represents non-significant local effects, the lighter color represents negative effects, and the darker color represents positive effects. The darker the color, the larger the local effects.

The geographic distribution of the local effects of national parks on AER is shown in Figure 1. The counties with the positive effects are clustered in the area that spans the borders between Tennessee, Georgia, and North Carolina, which means in this area counties with more national parks per 100,000 people tend to have higher AER. Relatively, it is surprising that there are negative and statistically significant coefficients for national parks clustered in the eastern Virginia and in part of the central North Carolina which means in these two areas counties with more national parks per 100,000 people tend to have lower AER. Based on results from the literature, we hypothesized that higher levels of natural amenities would have a positive influence on tourism micro-entrepreneurship. One explanation is that in these areas, micro-entrepreneurs that provide arts, entertainment and recreational facilities might have active pro-environmental attitudes, which makes them choose to conduct their businesses in counties without national parks, or with fewer average national parks (Xu, Chen, Lu and Fu, 2006). Alternatively, they are not allowed to conduct businesses within the boundaries of national parks that makes them select sites for their businesses in neighboring counties (Brandon, Gorenflo, Rodrigues and Waller, 2005).

Figure 2 illustrates the geographic distribution of the local effects of museums. The counties with the positive effects are clustered in the area covering the central North Carolina
and central Virginia, and in the southwestern Georgia. However, in the area covering the eastern Virginia, and northeastern North Carolina, the counties with more museums per 100,000 people tend to have lower AER, which is similar to the local effects of national parks in this area. It is also surprising and runs counter to the hypothesis that higher levels of cultural amenities would have a positive influence on tourism micro-entrepreneurship by having a multiplier effect that increases local economic activity and creates jobs (Crispin-Little, 1995; Barile, 1999). One interpretation might be that the formal cultural sector overcrowds the tourism business space, cannibalizing all the informal sectors in which tourism micro-entrepreneurs generally operate so that they select their business sites in the counties in which there are fewer average number of museums. However, there is a dearth of literature in supporting this interpretation. The other interpretation can be that the existence of the formal cultural sector might lead to higher rental fees and taxes in the surrounding areas, which frighten away micro-entrepreneurs (Kuentzel and Ramaswamy, 2005).

The local effects of historic places are shown in Figure 3. As opposed to local effects of national parks and museums, the effects of historic places tend to be positively associated with tourism micro-entrepreneurship in the eastern Virginia. Actually, their positive effects cover a larger area that is not just eastern Virginia, which shows historic places might play an important role in nurturing tourism micro-entrepreneurship. To consider Figure 1, 2 and 3 together, in the eastern Virginia, when a county has higher average number of nationally registered historic places, it tends to attract more tourism micro-entrepreneurs. It is reasonable since various studies have confirmed that visitors attracted by historic places can
stay longer and spend more money than others, providing an important boost to local economies (Kohtz, 2012). However, when this county has higher average number of national parks or museums or both, the level of tourism micro-entrepreneurship in this county decreases.

The spatial distribution of the local effects of high school graduation rate as an indicator of human capital is illustrated in Figure 4. The effects tend to be negative in the area that covers central Tennessee and its surroundings, southwestern corner of North Carolina, and part of the Northernmost Georgia. On the contrary, the positive effects exist in northeastern Virginia, and the area covering part of western North Carolina and part of Northwestern South Carolina. This pattern mirror the results from the literature that people do not necessarily need high skills to conduct tourism businesses, and some tourism businesses have very low entry barriers while some need relatively sophisticated skills and training (Garcia-Ramon, Canoves and Valdovinos, 1995; Getz and Carlsen, 2005).

The spatial distribution of the local effects of per capita income as an indicator of financial capital is shown in Figure 5. The significant local effects located primarily in most of Tennessee, western Georgia, eastern and central North Carolina, and eastern and central Virginia are all positive, which means people in these areas tend to conduct tourism businesses when they have more financial capital in hand. It is interesting that per capita income has the highest effect in Tennessee, when the effects of high school graduation rate in most of the state tend to be negative. The explanation might be that in this area, when a
county with higher average per capita income registers higher human capital, its people might have invested in other industries considered more profitable than tourism.

The spatial distribution of the local effects of percent vacant housing is illustrated in Figure 6. The eastern Virginia and North Carolina register the highest effects, while the western Virginia, part of the western North Carolina, and part of the central northern Tennessee also have its significant effects. In these areas, tourism micro-entrepreneurs might have in mind that vacant housing could be used as vacation homes which in turn offers business opportunities to surrounding areas so they tend to select their business sites within the counties with higher percentage of vacant housing.

Figure 1. Local effect of national parks
Figure 2. Local effect of museums

Figure 3. Local effect of historic places
Figure 4. Local effect of high school graduation rate

Figure 5. Local effect of per capita income
In Table 9, 9 of 24 criteria provided by the NbClust package built in the R statistic software suggested a 3-cluster solution is a good fit to the local effects on AER. Mean GWR parameter estimates for each group identified of the local effects on AER by k-means cluster analysis indicate:

In the area covering the eastern and northern Virginia and eastern North Carolina, percent vacant housing, historic place and average per capita income appear positively related to tourism micro-entrepreneurship, while national parks and museums tend to inhibit tourism micro-entrepreneurship.

In the area covering most of Tennessee, small part in the northern Georgia and the southwestern corner of North Carolina, per capita income and national park tend to be
positively related to tourism micro-entrepreneurship while the counties with higher school graduation rate tend to register lower level of tourism micro-entrepreneurship.

In other areas in the study area, all the 6 geographically varying local variables appear positively related to tourism micro-entrepreneurship, in spite of their relatively low marginal effects. However, the effects of historic places and percent vacant housing tend to be non-significant when referring to Table 7.

<table>
<thead>
<tr>
<th>Number of clusters</th>
<th>0</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
<th>7</th>
<th>12</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of criterion</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 9. Number of Clusters Chosen by 24 Criteria for Local Effects**

<table>
<thead>
<tr>
<th>K</th>
<th>c</th>
<th>N</th>
<th>National park</th>
<th>Museum</th>
<th>Historic place</th>
<th>High school graduation rate</th>
<th>Per capita income</th>
<th>Percent vacant housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>99</td>
<td>2.238</td>
<td>-0.170</td>
<td>1.721</td>
<td>-6.141</td>
<td>12.699</td>
<td>2.496</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>313</td>
<td>0.730</td>
<td>1.778</td>
<td>1.302</td>
<td>0.106</td>
<td>3.415</td>
<td>1.732</td>
<td></td>
</tr>
</tbody>
</table>

**Table 10. Mean GWR Parameter Estimates for Each Group Identified by k-means Cluster Analysis**

Micro businesses that provide arts, entertainment and recreation

Note: * means the value is within the range of non-significance.
**Figure 7.** Clusters of spatial heterogeneity

*Determinants of micro businesses that provide accommodation and food services (AF)*

Similarly, the OLS regression for identifying the determinants of number of micro businesses that provide accommodation and food services per 100,000 people suggests that national parks, percent water area, museums, the formal tourism sector, population density, and percent vacant housing tend to be significant determinants (Table 11). Multicollinearity is monitored and found to be within tolerable limits (VIF < 4.0). However, test by GWR4 software indicates the presence of non-stationary effects of national parks, museums, the formal tourism sector, self-employment rate, high school graduation rate, and percent vacant housing (Table 12). After local to global variable section based on goodness of fit measures, the local variables that have different effects across the study area are identified including
national parks, museums, the formal tourism sector, and percentage of vacant housing, while self-employment rate and population density originally recognized as having different effects across the study area have been set as fixed (global) predictor variables. The estimates from the GWR regression indicate population density and per capita income appear to be significant global determinants (Table 13 and 14).

<table>
<thead>
<tr>
<th>Table 11. Findings from Multiple OLS Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>National parks</td>
</tr>
<tr>
<td>State parks</td>
</tr>
<tr>
<td>Percent water area</td>
</tr>
<tr>
<td>Historic places</td>
</tr>
<tr>
<td>Museums</td>
</tr>
<tr>
<td>The formal tourism sector</td>
</tr>
<tr>
<td>Unemployment rate</td>
</tr>
<tr>
<td>Self-employment rate</td>
</tr>
<tr>
<td>High school graduation rate</td>
</tr>
<tr>
<td>Per capita income</td>
</tr>
<tr>
<td>Population density</td>
</tr>
<tr>
<td>Percent Africa Americans</td>
</tr>
<tr>
<td>Percent Hispanics</td>
</tr>
<tr>
<td>Percent vacant housing</td>
</tr>
<tr>
<td>Urban-rural divide</td>
</tr>
</tbody>
</table>

Notes: ***, and ** denote statistically significant at the 0.1 percent, and 1 percent level, respectively.
Table 12. Spatial Variability Test of Local Coefficients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Difference of Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.879</td>
</tr>
<tr>
<td>National parks</td>
<td>-2.068</td>
</tr>
<tr>
<td>State parks</td>
<td>3.471</td>
</tr>
<tr>
<td>Percent water area</td>
<td>3.129</td>
</tr>
<tr>
<td>Historic places</td>
<td>1.939</td>
</tr>
<tr>
<td>Museums</td>
<td>-0.233</td>
</tr>
<tr>
<td>The formal tourism sector</td>
<td>-9.971</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.876</td>
</tr>
<tr>
<td>Self-employment rate</td>
<td>-1.648</td>
</tr>
<tr>
<td>High school graduation rate</td>
<td>0.404</td>
</tr>
<tr>
<td>Per capita income</td>
<td>-2.848</td>
</tr>
<tr>
<td>Population density</td>
<td>1.077</td>
</tr>
<tr>
<td>Percent African Americans</td>
<td>2.471</td>
</tr>
<tr>
<td>Percent of Hispanics</td>
<td>1.509</td>
</tr>
<tr>
<td>Percent vacant housing</td>
<td>-9.866</td>
</tr>
<tr>
<td>Urban-rural divide</td>
<td>1.618</td>
</tr>
</tbody>
</table>

Tables 13. Fixed (Global) Coefficients from GWR

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>S.E.</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State parks</td>
<td>-0.592284</td>
<td>1.208182</td>
<td>-0.490</td>
<td>0.6242</td>
</tr>
<tr>
<td>Percent water area</td>
<td>-0.246123</td>
<td>1.483654</td>
<td>-0.166</td>
<td>0.8683</td>
</tr>
<tr>
<td>Historic places</td>
<td>0.730537</td>
<td>1.244017</td>
<td>0.587</td>
<td>0.5573</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>2.370909</td>
<td>1.255112</td>
<td>1.889</td>
<td>0.0594</td>
</tr>
<tr>
<td>Self-employment rate</td>
<td>1.761685</td>
<td>1.352785</td>
<td>1.302</td>
<td>0.1934</td>
</tr>
<tr>
<td>High school graduation rate</td>
<td>-3.463356</td>
<td>1.862518</td>
<td>-1.860</td>
<td>0.0635</td>
</tr>
<tr>
<td>Per capita income</td>
<td>4.248268</td>
<td>2.152138</td>
<td>1.974</td>
<td>0.0489*</td>
</tr>
<tr>
<td>Population density</td>
<td>6.168397</td>
<td>1.459920</td>
<td>4.225</td>
<td>0.0000***</td>
</tr>
<tr>
<td>Percent African Americans</td>
<td>-0.114980</td>
<td>1.375577</td>
<td>-0.084</td>
<td>0.9334</td>
</tr>
<tr>
<td>Percent Hispanics</td>
<td>-0.637765</td>
<td>1.149875</td>
<td>-0.555</td>
<td>0.5794</td>
</tr>
<tr>
<td>Urban-rural divide</td>
<td>0.452283</td>
<td>1.295600</td>
<td>0.349</td>
<td>0.7272</td>
</tr>
</tbody>
</table>

Notes: *** and * denote statistically significant at the 0.1 percent and 5 percent level, respectively.

Table 14. Summary Statistics of the GWR varying (Local) Parameter Estimates Including the Overall Percentage of Negative (% −) and Positive (% +) values.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Lower Quartile</th>
<th>Median</th>
<th>Upper Quartile</th>
<th>Maximum</th>
<th>% −</th>
<th>% +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>40.01</td>
<td>50.49</td>
<td>53.27</td>
<td>56.83</td>
<td>69.93</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>National parks</td>
<td>-34.90</td>
<td>-2.20</td>
<td>3.85</td>
<td>9.60</td>
<td>32.89</td>
<td>36.5</td>
<td>63.5</td>
</tr>
<tr>
<td>Museums</td>
<td>-17.58</td>
<td>-1.19</td>
<td>2.01</td>
<td>6.06</td>
<td>17.46</td>
<td>33.1</td>
<td>66.9</td>
</tr>
<tr>
<td>The formal tourism sector</td>
<td>13.76</td>
<td>17.41</td>
<td>20.78</td>
<td>26.24</td>
<td>39.20</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Percent vacant housing</td>
<td>-5.13</td>
<td>4.03</td>
<td>7.30</td>
<td>10.96</td>
<td>30.86</td>
<td>9.2</td>
<td>90.8</td>
</tr>
</tbody>
</table>
Although the local parameter estimates for national parks and percent vacant housing include both positive and negative values, only part of the positive values are significantly related (Table 15). Table 15 also indicates more formal tourism sector appear to be positively related to such tourism micro-entrepreneurship everywhere in the study area. Compared with the OLS model, the GWR model improves the amount of variance explained by the predictor variables with an adjusted R-squared value from 0.633 to 0.744. The AICc is 4902.9 lower in the local model indicating better fit (Table 16).

**Table 15. Significance of Local Coefficients**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Significance range</th>
<th>Percent non-significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>40.01-69.93</td>
<td>0</td>
</tr>
<tr>
<td>National parks</td>
<td>4.31-32.89</td>
<td>69.1</td>
</tr>
<tr>
<td>Museums</td>
<td>-17.58-17.46</td>
<td>77.2</td>
</tr>
<tr>
<td>The formal tourism sector</td>
<td>13.76-39.20</td>
<td>0</td>
</tr>
<tr>
<td>Percent vacant housing</td>
<td>6.78-30.86</td>
<td>59.7</td>
</tr>
</tbody>
</table>

**Table 16. Comparison of Fit for Multiple OLS Regression and GWR Models**

<table>
<thead>
<tr>
<th>Model</th>
<th>AICc</th>
<th>$r^2$ (adj.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple OLS regression</td>
<td>5033.0</td>
<td>0.633</td>
</tr>
<tr>
<td>GWR before local to global variable selection</td>
<td>4988.7</td>
<td>0.672</td>
</tr>
<tr>
<td>GWR after local to global variable selection</td>
<td>4902.9</td>
<td>0.744</td>
</tr>
</tbody>
</table>

The local coefficient estimates are also mapped to explore non-stationarity visually (Figure 8, 9, 10 and 11). The effects of national parks are significant and positive in the area covering the eastern and central Virginia, and eastern North Carolina, and in the area covering the eastern Tennessee, southwestern North Carolina, part of the northern Georgia, and some counties in the northwestern South Carolina with the highest parameter estimates
along the Virginia-North Carolina border (Figure 8). This result is to a great extent corresponding to the fact that national parks such as Great Smoky Mountains National Park, Shenandoah National Park, and North Carolina national seashores tend to be clustered in the areas. National parks should be able to attract tourism micro-entrepreneurs, and naturally, they are significantly and positively associated with tourism micro-entrepreneurship.

The spatial distribution of the local regression coefficients of museums is illustrated in Figure 9. The positive association is found in the western Virginia, southwestern Georgia, and southeastern North Carolina. However, it is surprising to identify the negative association in the northeastern Virginia, and in some counties near the border between Tennessee, Virginia and West Virginia which is not included in the study area. In the two areas, counties with more museums per capita tend to have lower level of tourism micro-entrepreneurship in terms of offering lodging and food services. In these counties, there might already be more formal businesses that offer lodging and food, against which micro-entrepreneurs could not or do not want to compete. Another explanation might be that museums and micro businesses tend to cluster in different counties while they are still close to each other in geography so they can meet the various demands of the same visitor groups.

The spatial distribution of the local effects of more formal tourism sector is shown in Figure 10. The relationship is significant and positive everywhere in the study area with the highest estimates in the northeastern Virginia, in the area covering the southeastern Virginia and eastern North Carolina, and in the area consisting of the southwestern corner of North Carolina, northwestern corner of South Carolina, northeastern corner of Georgia and
southeastern corner of Tennessee. The finding that the local effects of more formal tourism sector tend to be high in the northeastern Virginia, and the counties near the Tennessee-Virginia border contradicts with the assumption that micro businesses do not cluster with museums due to the existence of more formal tourism sector. As a matter of factor, in these areas, micro businesses tend to cluster with more formal tourism sector, but this association decreases due to the existence of museums.

The spatial distribution of the local effects of percentage of vacant housing is shown in Figure 11. The significant relationships tend to be located in the central and western Tennessee, in the region consisting of the northeastern corner of Tennessee, southwestern corner of Virginia, and part of western North Carolina, and in the region covering the coastal area of Virginia, eastern and southeastern North Carolina, eastern South Carolina and part of the eastern Georgia with the highest parameter estimates in the coastal region of North Carolina. One explanation for the strong positive association between percentage of vacant housing and micro-entrepreneurship in the coastal region of North Carolina is that in this area micro businesses that provide lodging and food services and vacant houses some of which are used as vacation home for attracting vacationers and visitors are well complementary to each other in order to cater to various demands.
Figure 8. Local effect of national parks

Figure 9. Local effect of museums
Figure 10. Local effect of the formal tourism sector

Figure 11. Local effect of percent vacant housing
In Table 17, 8 of 24 criteria also suggested a 3-cluster solution for the local effects on AF. Mean GWR parameter estimates of the local effects on AF for each group identified by k-means cluster analysis indicate:

In the area covering the eastern Virginia and eastern North Carolina, in the area covering the eastern Tennessee, southwestern corner of North Carolina, northwestern corner of South Carolina and northeastern corner of Georgia, and in the southeastern Georgia, more formal tourism sector, percent vacant housing, and national parks tend to be positively related to AF, while counties with more average number of museums tend to have lower AF.

In the area covering the southwestern and southern central Georgia, and in the area covering the northeastern South Carolina, and part of the southern central and southeastern North Carolina, all the local variables but national park are positively related to tourism micro-entrepreneurship. Although national parks appear to be negatively related, their effects are non-significant when referring to Table 15. The local effects of percentage of vacant housing also tend to be non-significant.

In other areas, museums, more formal tourism sector, and percent vacant housing tend to be significantly and positively related to a degree different than their effects in other clusters while the effects of national parks tend to be non-significant.

<table>
<thead>
<tr>
<th>Table 17. Number of Clusters Chosen by 24 Criteria for Local Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of clusters</td>
</tr>
<tr>
<td>Number of criterion</td>
</tr>
</tbody>
</table>
### Table 18. Mean GWR Parameter Estimates for Each Group Identified by k-means Cluster Analysis

<table>
<thead>
<tr>
<th>K</th>
<th>c</th>
<th>n</th>
<th>National park</th>
<th>museum</th>
<th>The formal tourism sector</th>
<th>Percent vacant housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>152</td>
<td>17.104</td>
<td>-2.876</td>
<td>29.399</td>
<td>9.629</td>
</tr>
<tr>
<td>2</td>
<td>307</td>
<td>1.726</td>
<td>4.730</td>
<td>20.468</td>
<td>7.366</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>-19.040</td>
<td>2.049</td>
<td>16.760</td>
<td>5.479</td>
<td></td>
</tr>
</tbody>
</table>

Note: * represents within the range of non-significance.

---

**Figure 12. Clusters of spatial heterogeneity**

*The association of AER with human development*

Bivariate analysis indicates across the study area, AER tends to be significantly related to human development score. It can be understood that the counties with higher AER tend to have higher level of human development. However, GWR model suggests the local effects of AER on human development score tend to be varying geographically across the study area, which signifies the existence of spatial heterogeneity.
### Tables 19. Bivariate OLS Regression

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Estimate</th>
<th>S.E.</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>human development score</td>
<td>0.300255</td>
<td>0.042022</td>
<td>7.145</td>
<td>0.0000***</td>
</tr>
</tbody>
</table>

Notes: *** denotes statistically significant at the 0.1 percent level.

### Table 20. Spatial Variability Test of Local Coefficient

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Difference of Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>human development score</td>
<td>-38.138</td>
</tr>
</tbody>
</table>

After the spatial distribution of the local effects of AER is visualized, we can identify both the locations where they have a significant association with level of human development represented by human development index and the direction (negative or positive) of this relationship (Figure 13). In Figure 13, red areas are those in which AER tends to be significantly and positively associated with human development score. In other areas, AER tends not to be associated with level of human development. The findings again mirror the fact that improved income, increased investment in education and raised standard of living might be related to tourism micro-entrepreneurship (Garcia-Ramon, Canoves and Valdovinos, 1995; Adams et al., 2004).
The association of AF with human development

The findings from bivariate analysis suggest AF also tends to be significantly and positively associated with human development score across the study area. Spatial variability test of local coefficients for AF as independent variable by GWR4 model suggests the effects of AF on human development score tend to be spatially varying, indicating spatial heterogeneity.

Table 21. Bivariate OLS Regression

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Estimate</th>
<th>S.E.</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>human development score</td>
<td>0.192501</td>
<td>0.043193</td>
<td>4.457</td>
<td>0.0000***</td>
</tr>
</tbody>
</table>

Notes: *** and ** denote statistically significant at the 0.1 percent and 1 percent level, respectively.
Table 22. Spatial Variability Test of Local Coefficient

<table>
<thead>
<tr>
<th>Variable</th>
<th>Difference of Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>human development score</td>
<td>-17.458</td>
</tr>
</tbody>
</table>

Spatial distribution of the local effects of AF is shown in Figure 14. Red areas are those where AF tends to be significantly and positively associated with human development score. They are primarily located in the central Tennessee, part of the central and eastern North Carolina, the area along the north Carolina-South Carolina border, the eastern South Carolina and part of the northwestern Georgia. In other areas, AF appear to have nothing to do with human development.

Figure 14. Local association with human development score
Discussion

The findings show that the determinants of the two types of micro-entrepreneurship (AER and AF) have both similarities and differences across the study area. The formal tourism sector tends to be a significant global determinant of AER, which mirror the findings of other literature (Admas et al., 2004; Lepp, 2007; Mandelman and Monetes-Rojas, 2009). On the one hand, AER depends on more formal tourism sector for existence; on the other hand, AER tends to be spun off from the formal tourism sector.

Population density tends to be a significant global determinant of AF, which is in accordance with the findings of other literature that have identified population density can be a significant determinant of some types of businesses such as restaurants and retail stores (Cho et al., 2007; Mayers et al., 2012). It is reasonable that where there is higher population density there is more average number of micro businesses that provide lodging and food services since the great majority of their customers might be local residents rather than tourists.

The following analysis highlights some areas based on previously identified clusters of local effects on both AER and AF.

In the eastern North Carolina and eastern Virginia, the formal tourism sector and percent vacant housing tend to be positively associated with both AER and AF, while museums tends to be negatively associated with both of them. The local determinants of AER still include historic place, high school graduation rate, and per capita income all of which are positively associated. Although national parks are significantly associated with both, the directions of
their effects are different. AF tends to cluster with national parks due to positive effects while AER tends to partition with national parks due to negative effects. AF and AER tend to cluster together with the formal tourism sector in a network of competition and cooperation which somewhat indicate there might be some relatively mature tourist destinations in this large area. The extent of micro tourism businesses’ clustering with the formal tourism sector decreases as the average number of museums increases. The interpretation can be that the existence of museums might impose more constraints on micro businesses such as higher rental fees and taxes, which easily frighten away micro entrepreneurs, as indicated by Kuentzel and Ramswamy (2005). The strong positive effects of percentage vacant housing on tourism micro-entrepreneurship echoes the identified fact that vacant housing can be a factor attracting tourists, and therefore play a role in nurturing tourism micro-entrepreneurship (Mendonsa, 1983; Deller, Marcouiller, and Green, 1997; Hirono, 2010). Thus, it is reasonable that a relatively high percentage of vacant housing in this area is corresponding to relatively high levels of tourism micro-entrepreneurship. The interpretation for clustering of AF with and partitioning of AER with national parks is that AF is more likely complementary, while AER is more likely competitive as attractions per se as shown by as shown by Admas et al. (2004) and Lepp (2007). Accommodation and food are necessities for visitors to national parks, while the visitors might skip AER as compared with scenic views in national parks. The clustering of historic places with AER echoes the finding that historic places can stimulate visitors to stay longer and spend more money, and therefore form a boost to local economy (Kohtz, 2012). The positive association of high school
graduation rate and per capita income with AER rather than AF somewhat indicates AER might need higher start-up capital or maintenance cost as shown by Garcia-Ramon, Canoves and Valdovinos (1995) and Getz and Carlsen (2005), this is not always the case though.

Near the corner of North Carolina, South Carolina, Tennessee, and Georgia, the formal tourism sector is still positively associated with both AER and AF, while percent vacant housing is only associated with AF. Both national parks and museums are positively but slightly associated with AER. The explanation might be that in this area AER tends to be complementary as attractions per se to cater to multiple demands of visitors (Adams et al, 2004; Lepp, 2007). In this area, the marginal effects of historic places become non-significant, and those of high school graduation rate and per capita income become lower than in the eastern North Carolina and eastern Virginia. A similar area is located in the southeastern Georgia.

In central and western Tennessee, both the formal tourism sector and museums are significantly associated with both tourism micro-entrepreneurship. However, the effects of museums have different directions. Museums tend to be positively associated with AF but negatively associated with AER. The interpretation might be that AER as attractions might compete against museums while AF functions as complementarity as shown by Adams et al. (2004) and Lepp (2007). The marginal effects of per capita income and national park on AER tend to be the strongest compared to those in other areas while the marginal effects of percent vacant housing on AF is also very high.
In the area surrounding the eastern border between North Carolina and South Carolina, both the formal tourism sector and museums are positively and significantly associated with both AER and AF. The explanation might be in this area AER tend to be complementary to museums instead of competing against them (Adams et al, 2004; Lepp, 2007). Percentage of vacant housing is not significantly associated with either, which is worth noting since in other areas with higher percentage of vacant housing, it appears to be a determinant of at least one type of tourism micro-entrepreneurship, as indicated by other literature (Mendonsa, 1983; Deller, Marcouiller, and Green, 1997; Hirono, 2010). An area covering southwestern and southern central Georgia is similar.

Both AER and AF have positive influence on human development score in central TN, part of northwestern GA, central NC, and northern and eastern SC, while the influence of AER covers a broader area. It appears that in the areas near some relatively large cities such as Atlanta in GA, Nashville in Tennessee, Charlotte and Raleigh in NC, and Charleston in SC, tourism micro-entrepreneurship tends to be positively associated with human development. One interpretation can be that higher level of human development is usually associated with higher income and thus higher start-up capital (Lepp, 2007); another interpretation is that tourism micro-entrepreneurship can lead to improved human development (improved income, increased investment in education and raised standard of living) (Garcia-Ramon, Canoves and Valdovinos, 1995; Adams et al., 2004). Apparently, higher level of human development in these areas are not just because of higher level of tourism micro-entrepreneurship, therefore, the former interpretation looks more reasonable.
Conclusion

The purpose of this study is to find out the potential drivers of tourism micro-entrepreneurship, how they vary across the study area, and whether tourism micro-entrepreneurship can play a role in helping improve human development. Significant determinants of micro businesses that provide arts, entertainment, and recreation services (AER) identified include national park, museum, historic place, high school graduation rate, per capita income, and percent vacant housing while those of micro businesses that provide accommodation and food services (AF) identified include national park, museum, the formal tourism sector, and percent vacant housing. They vary in both degree and direction across the study area. Besides, the areas with significant spatial association of tourism micro-entrepreneurship with human development are identified.

However, some of the results from the literature are not mirrored by the findings. For example, the role of unemployment rate and self-employment rate appear to be non-significant both globally and locally; even GWR cannot identify some regularity in relationships between rural counties and tourism micro-entrepreneurship in any regions. Circumstances alter cases, so when the same methodologies and selected variables are used in other areas, determinants might be different. At different times, determinants and their effects might also be different. Therefore, using data in different years might result in different determinants of and effects on tourism micro-entrepreneurship. The future research can be conducting a comparative analysis of spatial heterogeneity between the study area and
a comparison area, or exploring time series data to investigate the dynamics of spatial heterogeneity.

This study did not detect outliers of any variable. Outliers might not impact much on the global regression model, since there are large enough samples. However, it might impact the identification of some significant relationships in some areas by GWR. Deletion of outliers will make study area incomplete, while retaining them might lead to estimation bias. An expanded study is planned to explore outliers of the variables to check the possibility for them to impact on relationships identified in some specific areas.

References


CHAPTER 4:
SPATIAL OUTLIER DETECTION:
TOURISM MICRO-ENTREPRENEURSHIP, RESOURCES, AND DEVELOPMENT
IN NORTH CAROLINA AND IT NEIGHBORING STATES

Abstract: Tourism micro-entrepreneurship has been widely advocated as providing a sustainable local economic development strategy. Various factors have led to the formation and growth of tourism micro-entrepreneurship. Different areas can register different levels of tourism micro-entrepreneurship. Detection for spatial outliers has been applied in various fields of study since it enables the discovery of some irregular spatial patterns that are worth further attention. Identification of spatial outliers of tourism micro-entrepreneurship can help identify where tourism agglomeration externalities might have the most direct effect and guide resource allocation and redistribution by regional governments. On the other hand, central place theory indicates tourism has greater likelihood of being successfully developed in spatial outliers of economic conditions as central places with high level of tourism resources. As yet, there is few literature identifying spatial outliers of tourism micro-entrepreneurship in a large area and their driving factors. This paper uses both univariate and multivariate spatial outlier detection methods for identifying spatial outliers of tourism micro-entrepreneurship, tourism resources and economic conditions, and seeks to investigate any association between these outliers. The results indicate spatial outliers of tourism micro-entrepreneurship are relatively strongly associated with the difference in tourism resources, but weakly associated with economic condition variables. However, based on central place theory, some target counties across the study area are identified with greater potential to use tourism micro-entrepreneurship for local economic development.
Introduction

As tourism has been extensively advocated as a poverty reduction tool throughout the world, scrutiny of the role tourism plays in poverty reduction has dramatically increased over the last decade (Harrison, 2008; Zhao, Ritchie and Echtner, 2011). However, few studies have demonstrated tourism’s potential to significantly reduce poverty levels (Blake, 2008). On the other hand, tourism micro-entrepreneurship has been considered as providing a sustainable local economic development strategy when other conditions are favorable (Shane, 2003; Rogerson, 2006). Various factors such as amenities (Power, 1988; Marcouiller, 1998), accessibility (Edwards and Fernandes, 1999; Seaton, 1999; Cho et al., 2007; Mayers et al., 2012; Chaperon and Bramwell, 2013), entrepreneurial climate (Mandelman and Montes-Rojas, 2009; Franck, 2011) and the existence of supporting facilities (Adams et al., 2004; Lepp, 2007; Mandelman and Montes-Rojas, 2009) have led to the formation and growth of tourism micro-entrepreneurship. Such factors vary in both kind and degree across a large region. Accordingly, different areas in a region can register different levels of tourism micro-entrepreneurship. Similarly, various factors contribute to local economic development. As Wong (1998) summarized, the factors include locational factors, physical factors, infrastructure, human resources, finance and capital, knowledge and technology, industrial structure, quality of life, institutional capacity, business culture, and community identity and
image. Therefore, different areas can register different levels of economic development due to different kinds of factors.

Outliers are observations that appear to deviate markedly from other observations in a sample (Barnett and Lewis, 1994). They can be used alternatively with deviations, exceptions, anomalies, irregularities in many different applications. Spatial outliers are spatially referenced objects whose non-spatial attribute values are significantly different from those of their spatial neighbors (Lu, Chen and Kou, 2004). They are anomalies in the spatial context, and different from the traditional outliers, since they do not necessarily deviate from all the other spatial points (Chen et al., 2008).

Everything is related to everything else, but near things are more related than distant things (Tobler, 1979). However, such spatial autocorrelation is violated by the existence of spatial outliers, which can help reveal valuable information from large spatial data sets (Chen, Miao and Zhang, 2010; Lee, Kang and Kang, 2011; Filzmoser, Ruiz-Gazen and Thomas-Agnan, 2013). Detection for spatial outliers has been applied in various fields of study including ecology, economy, public health, sociology, agriculture, transportation, etc. It can help identify geographical units with unique demographic and socio-economic conditions (Lu, Chen and Kou, 2004; Dariusz and Barbara, 2010), pinpoint incidents such as those in terms of crime, environmental pollution, and disease (Prastawa et al., 2004; Lin and Brown, 2006; Liu et al., 2013), and discover abnormal patterns such as those of traffic (Shekhar, Lu and Zhang, 2003). Although many studies focused on how to use spatial outlier detection methods to identify spatial outliers without explaining the rationale behind them,
there are still some explaining why spatial outliers are identified and analyzing the
importance of spatial outliers to practices. For example, Sinha et al. (2007) argued spatial
outliers of environmental pollution have an important role in the formulation of remediation
strategies; Zhang et al. (2008) presented the importance of identifying hotspots of soil
contamination for local governments to develop effective management practices.

Across a region, some areas register relatively high level of tourism micro-
entrepreneurship, i.e. larger number of tourism businesses with not more than 4 employees
divided by total population, while some others register low level of tourism micro-
entrepreneurship. Otherwise, some areas might have much higher level of tourism micro-
entrepreneurship than their neighbors and some others might have much lower level than
their neighbors. Under such circumstances these areas can be said to be spatial outliers of
tourism micro-entrepreneurship. Spatial outliers of tourism micro-entrepreneurship can help
pinpoint where tourism micro-entrepreneurship has the potential to be nurtured. Industry
clusters can spin off businesses (Romer, 1986), therefore, the neighbors of the spatial outliers
might be target points on which local governmental policy focus should be to encourage
tourism micro-entrepreneurship. Also, the spatial outliers can guide reasonable and equitable
resource allocation or redistribution by regional government (Matsumoto, 2008; Sole-Olle,
2013). A different mechanism might exist and lead to an outlier that deviates so much from
other observations (Hawkins, 1980). Therefore, some factors might lead to or be associated
with anomalies in spatial distribution patterns of tourism micro-entrepreneurship.
Based on the positive correlation identified between tourism micro-entrepreneurship and the existence of tourism resources (Power, 1988; Marcouiller, 1998; Laitos and Ruckriegle, 2013), this study deems the existence of spatial outlier of tourism micro-entrepreneurship is due to difference in tourism resources compared with surrounding areas, i.e. resource spatial outliers. Moreover, based on the inextricably interaction between local economic conditions and tourism (Clark and Kahn, 1988; Kiss, 2004; Nyaupane, Morais and Dowler, 2006; Manyara and Jones, 2007; Croes and Vanegas, 2008; Harwood, 2010; Besser, Miller and Malik, 2012), this study also considers the existence of spatial outlier of economic conditions is associated with tourism micro-entrepreneurship spatial outliers. Central place theory can help the developers understand the threats and opportunities facing the local economy and formulate unique strategies that address its strengths and weaknesses (Malizia and Feser, 1999). Spatial outliers of economic conditions are equivalent to central places of the economy. Identification of spatial outliers in this study based on central place theory assists in finding the locations that have greater likelihood of successfully developing tourism. Tourism micro-entrepreneurs can start their businesses either in the central places or in the surrounding areas under different circumstances (King, 1984).

To date, there is limited literature identifying spatial outliers of tourism micro-entrepreneurship in a large area, not to mention on the factors causing these spatial outliers. Also, the associations of these spatial outliers with local economic conditions has yet to be explored. This study is aimed at filling these gaps by identifying spatial outliers of tourism micro-entrepreneurship, tourism resources and economic conditions respectively, to examine
the associations between them. Specifically, the purpose of this study is to examine if spatial outliers of tourism micro-entrepreneurship is related to the difference in tourism resources, and if spatial outliers of economic conditions is related to the difference in tourism micro-entrepreneurship. The findings will have both theoretical implications in terms of central place theory and practical implications for utilization of tourism micro-entrepreneurship for local development.

Methods used for detecting spatial outliers can be grouped into two categories, graphic approaches based on visualization of spatial data through which spatial outliers can be highlighted and quantitative methods through which spatial outliers are tested to be significantly distinguished from their neighbors (Lu, et al., 2004). Spatial lag scatter plot, variogram clouds and pocket plots are representative examples of graphic approaches (Cressie, 1991; Anselin, 1993b). Local Moran’s I statistics is the most common quantitative method used to detect spatial outliers (Cliff and Ord, 1981; Anselin, 1993a; Levine, 2004; Harries, 2006). Accordingly, Moran scatterplot is used to visualize the local Moran’s I statistics (Anselin, 1993a). However, the methods mentioned above generally deal with univariate spatial outliers, while spatial outliers with multivariate attributes have not often been detected. Lu et al. (2004) and Chen et al. (2008) proposed methods in identifying multivariate spatial outliers by modifying Mahalanobis distance multivariate outlier detection method. This study would refer to these multivariate spatial outlier detection methods in identifying spatial outliers, since identifying spatial outliers with multiple attributes can avoid
privileging certain kinds of attributes and help assess the general conditions (Besser, Miller, and Malik, 2012).

We begin this analysis with a discussion of the significance of identifying relevant spatial outliers. Then, we introduce both univariate and multivariate spatial outlier detection methods. Following that, we detect spatial outliers of tourism micro-entrepreneurship, tourism resources, and economic conditions respectively. Finally, we discuss key considerations and implications based on spatial outliers and associations identified.

**Significance of identifying spatial outliers**

When an outlier is identified, it can provide insights that could radically change our understanding of the underlying process (Chawla and Sun, 2006). A traditional outlier of tourism micro-entrepreneurship might be due to the existence of extremely high or low level of tourism resources (Power, 1988; Marcouiller, 1998), high or low level of accessibility (Edwards and Fernandes, 1999; Seaton, 1999; Cho et al., 2007; Mayers et al., 2012; Chaperon and Bramwell, 2013), high or low level of entrepreneurial climate (Mandelman and Montes-Rojas, 2009; Franck, 2011), or the existence or nonexistence of other supporting facilities such as hotels and shopping centers (Adams et al., 2004; Lepp, 2007; Mandelman and Montes-Rojas, 2009). Spatial outliers of tourism micro-entrepreneurship can also be due to the existence of these factors. Spatial autocorrelation assumes similarity of the factors that lead to tourism micro-entrepreneurship for places near each other (Kim, Marcouiller and Deller, 2005). When most potential factors are similar, why a spatial point is anomalous in level of tourism micro-entrepreneurship compared with its neighbors is worthy of concern.
Significance of identifying spatial outliers of tourism micro-entrepreneurship primarily lies in the following aspects.

First, the spatial outliers have the potential to promote regional tourism micro-entrepreneurial activities, therefore their identification can help identify where tourism micro-entrepreneurship tends to grow fast, i.e. their neighbors. Agglomeration externality is a term used to describe externalities that arise from the spatial concentration of economic activities (Romer, 1986). Its significance has been the subject of many empirical studies (Glaeser et al., 1992; Henderson et al., 1995; Rosenthal and Strange, 2003). Some studies have identified its role in promoting regional innovation activities (Feldman and Audretsch, 1999; Paci and Usai, 1999). Moreover, studies have indicated an entrepreneur has the propensity to start a new business in an industry he/she has previous experience in since the experience in the industry reduces the likelihood of new business failure and enables the new businesses to grow faster and be more profitable (Bruderl et al., 1992; Dahlstrand, 1997; Gimeno et al., 1997; Bruderl and Preisendorfer, 1998). Therefore, agglomeration of tourism micro-entrepreneurship could bring forward the tourism development of their surrounding areas, while their neighbors are where such agglomeration externalities might have the most direct effect.

Second, identification of spatial outliers can help guide reasonable and equitable resource allocation or redistribution by regional government (Matsumoto, 2008; Sole-Olle, 2013). Certainly, such resource redistribution and allocation entails detection of spatial patterns of tourism resources, economy and other possible variables of interest. When spatial
outliers of tourism resources appear not to be spatial outliers of tourism micro-entrepreneurship, regional governments should seek to nurture tourism micro-entrepreneurs in these areas with relatively high level of tourism resources by measures such as enhancing infrastructure and facilities, implementing tax credits, and ensuring the improvement of quality of life (Wong, 1998). Besides, spatial outliers of tourism micro-entrepreneurship may also be spatial outliers of economic conditions. In these spatial outliers, tourism micro-entrepreneurship might have already helped promote local economic development. Thus, regional governments should explore the feasibility of tourism micro-entrepreneurship being nurtured in other areas for local economic development and channel resources to them for their tourism development if such feasibility is proved.

Moreover, the identified spatial outliers with relatively high values can have demonstration effect (Haugland, 2011). Specifically, the demonstration effect of the spatial outliers of tourism micro-entrepreneurship is reflected by the fact that they can help bring forward the growth of tourism micro-entrepreneurship in their surrounding areas since their neighbors can seek to identify what might inhibit the growth of their tourism micro-entrepreneurship and take corresponding measures to improve it (Bramwell and Sharman, 1999). Alternatively, spatial outliers with lower level of tourism micro-entrepreneurship can draw lessons based on the identification of the relevant factors. For example, if the existence of a spatial outlier is due to resource shortage or underdevelopment, stakeholders might manage to solve these issues by intensifying investment in building a good image or offering

On the other hand, significance of identifying spatial outliers of economic conditions and tourism resources can be explained by central place theory. Centrality is related to the importance of economic activities and infrastructure. Spatial outliers of economic conditions are more often than not central places of economy. Jurisdictions within a region often differ in terms of tourism development potential due to their locations and centrality (Daniels, 2007). Therefore, when both central and non-central places have similar tourism resources, central places have greater likelihood of successfully developing tourism. The framework thus allows planners to identify target areas where tourism can be promoted. However, central place theory is not always suitable to explain the location of economic activity such as tourism (Fujita, Krugman and Venables, 1999). For example, remote places can be also successful in developing tourism activities due to unique natural resources and community settings even if goods and services are difficult to obtain in these remote places (Wang, 1999). Therefore, spatial outliers of tourism resources can also become target areas where tourism development can be promoted.

**Study area and data**

As mentioned above, global spatial outliers are not necessarily local spatial outliers and vice versa. To verify the proposition, this study uses the region that covers North Carolina and its neighboring states including Virginia, Tennessee, Georgia and South Carolina as the target area. The states vary in many aspects (e.g. economy, urbanization, etc.). For instance,
percentage of urban counties in Georgia is 46.5% while that in Virginia is 60.4%; the average per capita GDP in Georgia in 2010 was 25184.25 while that in Virginia in 2010 was 32293.45.

County-level data in these states are examined since the spatial points among which spatial outliers are detected are counties. There are totally 534 counties in the study area. Two types of micro tourism businesses are analyzed in this study. They are establishments with not more than 4 employees that provide arts, entertainment and recreational facilities and those that provide accommodation and food services respectively. Accordingly, the number of each type of establishments per 100,000 people is used to represent the level of each type of tourism micro-entrepreneurship. The data of three years from 2009 through 2011 are extracted from US Census. Variables of tourism resources include national parks, state parks, water area, museums and nationally-registered historic places, which latest data are collected from various sources including the U.S. Census Bureau, U.S. National Park Service, USDA Forest Service and Economic Research Service, and each state’s Division of Parks and Recreation, Forest Service, and official travel and tourism website. Accordingly, number of national parks, state parks, museums and historic places per 100,000 people and percentage of water area are used for identifying spatial outliers of tourism resources. The variables of economic conditions include average per capita income, poverty rate, and Gini index, which reflect economic conditions of a county from three different perspectives. The relevant data of 2010 are collected from US Census. Means of the values of the variables used in each state are listed for later reference (Table 1).
Table 1. Means of Variables by States

<table>
<thead>
<tr>
<th>State</th>
<th>AER</th>
<th>AF</th>
<th>NP</th>
<th>SP</th>
<th>WA</th>
<th>MU</th>
<th>HS</th>
<th>PCI</th>
<th>PR</th>
<th>GI</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>21.4</td>
<td>66.6</td>
<td>2.4</td>
<td>2.4</td>
<td>6.6</td>
<td>6.5</td>
<td>45.8</td>
<td>21620</td>
<td>17.6</td>
<td>0.446</td>
</tr>
<tr>
<td>GA</td>
<td>10.6</td>
<td>52.2</td>
<td>0.9</td>
<td>2.1</td>
<td>2.8</td>
<td>8.4</td>
<td>44.2</td>
<td>19716</td>
<td>19.8</td>
<td>0.444</td>
</tr>
<tr>
<td>SC</td>
<td>14.5</td>
<td>55.1</td>
<td>0.9</td>
<td>2.2</td>
<td>4.7</td>
<td>5.2</td>
<td>48.5</td>
<td>20226</td>
<td>20.0</td>
<td>0.455</td>
</tr>
<tr>
<td>TN</td>
<td>15.2</td>
<td>48.3</td>
<td>1.2</td>
<td>3.5</td>
<td>2.5</td>
<td>6.8</td>
<td>41.9</td>
<td>20094</td>
<td>18.3</td>
<td>0.444</td>
</tr>
<tr>
<td>VA</td>
<td>23.4</td>
<td>70.2</td>
<td>3.2</td>
<td>2.9</td>
<td>7.1</td>
<td>7.6</td>
<td>71.5</td>
<td>25558</td>
<td>13.4</td>
<td>0.424</td>
</tr>
<tr>
<td>Total</td>
<td>17.0</td>
<td>59.0</td>
<td>1.8</td>
<td>2.6</td>
<td>4.7</td>
<td>7.3</td>
<td>51.3</td>
<td>21650</td>
<td>17.5</td>
<td>0.440</td>
</tr>
</tbody>
</table>

Note: AER means micro businesses that provide arts, entertainment, and recreational facilities per 100,000 people in 2010; AF means micro businesses that provide accommodation and food services per 100,000 people in 2010; NP means number of national parks per 100,000 people; SP means number of state parks per 100,000 people; WA means percentage of water area; MU means number of museums per 100,000 people; HS means number of nationally registered historic sites per 100,000 people; PCI means average per capita income; PR means poverty rate; and GI means Gini index.

Methodology

Univariate spatial outlier VS multivariate spatial outlier

A multivariate spatial outlier is not necessarily an outlier in each feature. On the other hand, a spatial outlier in several features is not necessarily a multivariate spatial outlier. The methods used for identifying univariate spatial outliers are different from those used for identifying multivariate spatial outliers. The most commonly used method for detecting univariate spatial outliers are local Moran’s I statistics and the corresponding Moran scatterplot (Anselin, 1993a; Anselin, 1995). Other methods for identifying univariate spatial outliers have been proposed and applied in various fields of study (Portnov and Rattner, 2004). An example is index of relative income (IRI) proposed by Portnov and Rattner (2004).

The equation for calculating index of relative income (IRI) is as follows:

\[ IRI_i = \frac{\sum_{j=1}^n (I_j P_j)}{\sum_{j=1}^n P_j} \]
Where \( I_i \) is the average per capita income in unit of analysis \( i \); \( I_j \) is the average per capita income in unit of analysis \( j \), located within the access range from the subject unit of analysis \( i \); \( P_j \) is population size of unit of analysis \( j \), and \( n \) is the overall number of towns located within the access range from the subject unit of analysis \( i \). \( IRI > 1 \) means that a subject unit of analysis is poorer than its surrounding units of analysis while \( IRI < 1 \) indicates that it is richer than its neighbors. A threshold needs to be set to determine if a subject unit of analysis is a spatial outlier, i.e. its value is different from its neighbors’ to a marked extent.

As yet, the methods presented are primarily used for identifying univariate spatial outliers. Some scholars have presented methods to identify multivariate spatial outliers (Lu et al., 2004; Chen, et al., 2008). For example, Lu et al. (2004) proposed two spatial outlier detection algorithms based on Mahalanobis distance to analyze county-level data with multiple demographic attributes, and identified the two algorithms based on the average of the attribute values from neighborhoods and on the median of the attribute values respectively detected similar spatial outliers. The rationale is that multiple attributes might be associated with spatial objects, and detecting multivariate spatial outliers can help identify local anomalies that are different from those identified based on univariate spatial outlier detection methods and that can lead to more practical policy implications. Moreover, some factors might exist and function in leading to these univariate spatial outliers that violate the rule of spatial autocorrelation. Multivariate spatial outliers detection can help identify such factors. Therefore, this study mainly uses multivariate spatial outlier detection method in identifying spatial outliers.
**Methods**

Local Moran’s I is the index used to describe the locations of spatial clusters and spatial outliers (Harries, 2006). This study used the Local Moran’s I index to identify univariate spatial outliers of tourism micro-entrepreneurship. The equation is as follows (Cliff and Ord, 1981; Levine, 2004):

\[
I_i = \frac{x_i - \bar{x}}{\sigma^2} \sum_{j=1,j\neq i}^{n} w_{ij}(x_j - \bar{x})
\]

Where \(\bar{x}\) is the mean value of \(x\) with the sample number of \(n\); \(x_i\) is the value of the variable at location \(i\); \(x_j\) is the value at other locations (where \(j \neq i\)); \(\sigma^2\) is the variance of \(x\); and \(w_{ij}\) is a spatial weight between \(x_i\) and \(x_j\). The results based on using Local Moran’s I index are affected by the selection of study area and the definition of spatial weight function (Zhang et al., 2008). In this study, \(w_{ij}\) equals 1 when \(i\) and \(j\) are adjacent to each other and 0 otherwise. Local Moran’s I will be calculated within the study area to detect global spatial outliers and within each state to detect local spatial outliers respectively.

Local Moran’s I can be standardized and the significance of a spatial autocorrelation can be tested (Liu et al., 2013). A significantly positive standardized Local Moran’s I value (usually greater than 1.96) implies the value of this observation is similar to its neighbors. This observation might have a high value in a high value neighborhood (high-high) or have a low value in a low value neighborhood (low-low). Meanwhile, a significantly standardized negative Local Moran’s I value (usually smaller than -1.96) implies the value of this observation is different from the values of its neighbors. This observation might have a high
value in a low value neighborhood (high-low) or have a low value in a high value neighborhood (low-high), thereby being a spatial outlier. To determine a spatial outlier is high-low or low-high needs to compare its value (x) with the mean value (\(\bar{x}\)). Usually, when x is greater than \(\bar{x}\), the spatial outlier is high-low while when x is smaller than \(\bar{x}\), the spatial outlier is low-high.

Detection of spatial outliers with multiple attributes is using the method proposed by Lu et al. (2004). Rocke and Woodruff (1996) presented that the Mahalanobis distance works well in identifying scattered outliers, but not in identifying clustered outliers. This method is based on a modified version of Mahalanobis distance that takes into consideration this issue. The equation for the Mahalanobis square distance is \(D^2 = (x - \bar{x})^T \Sigma^{-1} (x - \bar{x})\), while Lu et al. (2004) used \(h(x)\) which is the difference between the attribute vector for each spatial point and summary statistics of attribute values of the k nearest neighboring spatial points instead of x. Accordingly, detection of spatial outliers is based on checking the Mahalanobis distance of \(h(x_i)\) which is \(d^2(x_i) = (h(x_i) - \mu)^T \Sigma^{-1} (h(x_i) - \mu)\), \(\mu = \frac{1}{n} \sum_{i=1}^{n} h(x_i)\), covariance matrix \(\Sigma = \frac{1}{n-1} \sum_{i=1}^{n} [h(x_i) - \mu] [h(x_i) - \mu]^T\), and \(h(x_i) = f(x_i) - g(x_i)\). The attribute vector \(f(x_i) = (f_1(x_i), f_2(x_i), ..., f_p(x_i))^T\) is p-dimensional which means there are p attribute values corresponding to each spatial point. The vector \(g(x_i) = (g_1(x_i), g_2(x_i), ..., g_p(x_i))^T\) returns average or median value or of each attribute of all the k nearest neighbors of point \(x_i\). The Mahalanobis distance of \(h(x_i)\) is assumed to be distributed as \(\chi^2_p\) which is the chi-square distribution with p degrees of freedom. When the distance is larger than a predetermined
number, the corresponding spatial point is considered to be a spatial outlier. Within a certain area, the results from this method of multivariate spatial outlier detection could vary with choice of neighbors (fixed k nearest neighbors or geographically adjacent ones), and choice of summary statistic $g(x_i)$ (average or median).

In Lu et al.’s study, they detected spatial outliers of multiple demographic attributes based on both the average and the median which lead to similar results. Moreover, they chose the spatial points with the 10 largest Mahalanobis square distance of $h(x_i)$ as spatial outliers.

Univariate spatial outlier detection method will be compared with multivariate method. To avoid complicating analysis, this study detects multivariate spatial outliers just based on the average of attribute values. Moreover, this study picks those adjacent to each spatial point as its neighbors rather than fixed number of nearest neighbors. $\chi^2_p(0.05)$ is the upper 5th percentile of a chi-square distribution with $p$ degrees of freedom, and the pre-defined threshold used in this study. A spatial point is determined as a spatial outlier when its Mahalanobis square distance is greater than the threshold. In other words, if the distance is greater than the threshold, the spatial point is assumed to be within the upper 5th percentile of a chi-square distribution and therefore a spatial outlier. The threshold $\chi^2_p(0.05)$ depends on $p$ which is the number of multiple attributes. For example, the threshold to determine multivariate spatial outliers of economic status is $\chi^2_3(0.05)=7.81$, since there are 3 variables of interest. All attribute values of the variables of interest are standardized in case larger values of some variables dominate the detection of spatial outliers. R statistical software is
used for conducting detection of spatial outliers, and ArcMap 10 is used for visualizing the results.

**Results**

*Univariate spatial outliers*

Spatial outliers of AER (tourism micro-entrepreneurship in terms of providing arts, entertainment, and recreational facilities) are identified using local Moran’s I statistics for 2009, 2010, and 2011 based on the whole study area and each state respectively. The findings are visualized in Figure 1 through 6. It can be seen global spatial outliers based on the study area are not necessarily local spatial outliers based on each state, and vice versa. In different years, the spatial outliers identified are also different.

![Map of North Carolina with marked outliers](image)

**Figure 1.** 2009 Tourism micro-entrepreneurship univariate spatial outliers using mean of the study area
Figure 2. 2010 Tourism micro-entrepreneurship univariate spatial outliers using mean of the study area

Figure 3. 2011 Tourism micro-entrepreneurship univariate spatial outliers using mean of the study area
When spatial outlier detection is based on each state, some local spatial outliers arise, including those identified in South Carolina and Georgia, although there are hardly global spatial outliers identified in these two states. The average level of tourism micro-entrepreneurship in South Carolina and Georgia is relatively low compared with that in the study area, therefore, when spatial outliers are detected based on the whole study area, it is hard for counties with level that is not high enough to be detected as spatial outliers even if they are really spatial outliers compared with their neighbors. It is marked one of the global spatial outliers, Polk in Tennessee, is not identified as a local spatial outlier, which is because its value is not high compared with its neighboring counties in Tennessee, although its value is high compared with its neighboring counties in other states including North Carolina and Georgia.

Figure 4. 2009 Tourism micro-entrepreneurship univariate spatial outliers using mean of each state
Figure 5. 2010 Tourism micro-entrepreneurship univariate spatial outliers using mean of each state

Figure 6. 2011 Tourism micro-entrepreneurship univariate spatial outliers using mean of each state
Multivariate spatial outliers

To deal with the temporal variation of spatial outliers, multivariate spatial outlier detection uses data from 3 years. Spatial outliers of AF (tourism micro-entrepreneurship in terms of providing accommodation and food services) have not yet been identified by univariate spatial outlier detection method, while multivariate spatial outlier detection incorporates the data of this type of tourism micro-entrepreneurship. Therefore, totally 6 attributes are used in multivariate spatial outlier detection. Limited by space, only multivariate spatial outliers based on the study area are detected, while those detected based on each state will be detected in the future relevant research. The findings of multivariate spatial outliers are visualized in Figure 7.

Figure 7. Multivariate spatial outliers of tourism micro-entrepreneurship based on the study area
There are altogether 54 tourism micro-entrepreneurship multivariate spatial outliers identified. The top 15 ones (15 ones with the largest distance) are listed (Table 2). Some spatial outliers such as Hyde, Dare and Swain in North Carolina, and Falls Church and Lexington in Virginia are due to high values of both types of tourism micro-entrepreneurship. Some ones such as Middlesex and Charles City in Virginia, and Polk in Tennessee are just due to high AER while some others such as Williamsburg, Fairfax City and Lancaster in Virginia are just due to high AF. There are spatial outliers without high values in either AER or AF such as Bland and Craig in Virginia. The explanation might be that the 6 variables of interest co-function to make these counties distinguished from their neighboring counties.

<table>
<thead>
<tr>
<th>Rank</th>
<th>County</th>
<th>Distance</th>
<th>2009 AER</th>
<th>2009 AF</th>
<th>2010 AER</th>
<th>2010 AF</th>
<th>2011 AER</th>
<th>2011 AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Falls Church, VA</td>
<td>111.90</td>
<td>3.09</td>
<td>9.02</td>
<td>3.48</td>
<td>9.96</td>
<td>4.29</td>
<td>8.92</td>
</tr>
<tr>
<td>2</td>
<td>Middlesex, VA</td>
<td>91.49</td>
<td>6.54</td>
<td>0.55</td>
<td>7.39</td>
<td>0.13</td>
<td>8.27</td>
<td>0.79</td>
</tr>
<tr>
<td>3</td>
<td>Williamsburg, VA</td>
<td>82.18</td>
<td>0.50</td>
<td>4.20</td>
<td>0.35</td>
<td>2.34</td>
<td>-0.59</td>
<td>4.34</td>
</tr>
<tr>
<td>4</td>
<td>Hyde, NC</td>
<td>70.31</td>
<td>2.73</td>
<td>7.03</td>
<td>2.33</td>
<td>4.92</td>
<td>2.24</td>
<td>4.63</td>
</tr>
<tr>
<td>5</td>
<td>Dare, NC</td>
<td>64.78</td>
<td>7.47</td>
<td>8.30</td>
<td>7.69</td>
<td>8.89</td>
<td>6.81</td>
<td>9.16</td>
</tr>
<tr>
<td>6</td>
<td>Polk, TN</td>
<td>54.03</td>
<td>3.60</td>
<td>0.51</td>
<td>4.01</td>
<td>-0.11</td>
<td>5.37</td>
<td>-0.22</td>
</tr>
<tr>
<td>7</td>
<td>Martinsville, VA</td>
<td>43.06</td>
<td>0.23</td>
<td>0.49</td>
<td>0.76</td>
<td>2.02</td>
<td>2.60</td>
<td>1.48</td>
</tr>
<tr>
<td>8</td>
<td>Lexington, VA</td>
<td>42.2</td>
<td>3.77</td>
<td>5.98</td>
<td>2.65</td>
<td>6.02</td>
<td>3.47</td>
<td>5.87</td>
</tr>
<tr>
<td>9</td>
<td>Bland, VA</td>
<td>42.14</td>
<td>-1.16</td>
<td>-0.66</td>
<td>-0.16</td>
<td>-0.67</td>
<td>1.71</td>
<td>-0.65</td>
</tr>
<tr>
<td>10</td>
<td>Fairfax City, VA</td>
<td>41.91</td>
<td>3.94</td>
<td>5.74</td>
<td>3.63</td>
<td>6.57</td>
<td>3.95</td>
<td>6.56</td>
</tr>
<tr>
<td>11</td>
<td>Swain, NC</td>
<td>32.07</td>
<td>1.17</td>
<td>3.75</td>
<td>0.97</td>
<td>4.45</td>
<td>2.08</td>
<td>4.64</td>
</tr>
<tr>
<td>12</td>
<td>Charles City, VA</td>
<td>32.06</td>
<td>3.61</td>
<td>-0.69</td>
<td>4.36</td>
<td>-1.00</td>
<td>4.21</td>
<td>-1.00</td>
</tr>
<tr>
<td>13</td>
<td>Craig, VA</td>
<td>31.95</td>
<td>-1.16</td>
<td>0.00</td>
<td>0.15</td>
<td>-0.45</td>
<td>-1.05</td>
<td>0.90</td>
</tr>
<tr>
<td>14</td>
<td>Bath, VA</td>
<td>31.72</td>
<td>3.25</td>
<td>2.47</td>
<td>4.39</td>
<td>2.88</td>
<td>4.28</td>
<td>1.57</td>
</tr>
<tr>
<td>15</td>
<td>Lancaster, VA</td>
<td>27.92</td>
<td>0.63</td>
<td>2.92</td>
<td>0.60</td>
<td>2.76</td>
<td>0.61</td>
<td>2.29</td>
</tr>
</tbody>
</table>

Note: AER refers to tourism micro-entrepreneurship in terms of providing arts, entertainment, and recreational facilities; AF refers to tourism micro-entrepreneurship in terms of providing accommodation and food services.
There are 57 multivariate spatial outliers of tourism resources identified (Figure 8) and the top 15 spatial outliers are listed (Table 3). Spatial outliers might be due to high values of just one variable. For example, Carteret in North Carolina and Mathews in Virginia are due to high percentage of water area; Bland in Virginia is due to the existence of national parks; Charles City in Virginia and Meigs in Tennessee are due to a large number of historic places. Also, several variables can simultaneously contribute to spatial outliers. For example, Hyde in North Carolina is a spatial outlier due to the existence of national parks, high percentage of water area, and a large number of museums; Stewart in Georgia is due to the existence of state parks, and a very large number of historic places.

Figure 8. Multivariate spatial outliers of tourism resources based on the study area
Table 3. The Top 15 Tourism Resources Multivariate Spatial Outliers Identified

<table>
<thead>
<tr>
<th>Rank</th>
<th>County</th>
<th>Distance</th>
<th>National park</th>
<th>State park</th>
<th>Water area</th>
<th>Museum</th>
<th>Historic place</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stewart, GA</td>
<td>78.95</td>
<td>-0.38</td>
<td>5.59</td>
<td>-0.34</td>
<td>2.57</td>
<td>7.44</td>
</tr>
<tr>
<td>2</td>
<td>Craig, VA</td>
<td>74.45</td>
<td>7.67</td>
<td>3.06</td>
<td>-0.40</td>
<td>1.20</td>
<td>0.48</td>
</tr>
<tr>
<td>3</td>
<td>Carteret, NC</td>
<td>73.63</td>
<td>0.25</td>
<td>0.07</td>
<td>5.31</td>
<td>-0.13</td>
<td>-0.57</td>
</tr>
<tr>
<td>4</td>
<td>Highland, VA</td>
<td>71.23</td>
<td>8.62</td>
<td>-0.48</td>
<td>-0.42</td>
<td>-0.73</td>
<td>3.08</td>
</tr>
<tr>
<td>5</td>
<td>Hyde, NC</td>
<td>64.09</td>
<td>3.22</td>
<td>-0.48</td>
<td>4.82</td>
<td>6.14</td>
<td>2.27</td>
</tr>
<tr>
<td>6</td>
<td>Glascock, GA</td>
<td>57.13</td>
<td>-0.38</td>
<td>5.48</td>
<td>-0.39</td>
<td>5.75</td>
<td>-0.36</td>
</tr>
<tr>
<td>7</td>
<td>Pickett, TN</td>
<td>57.07</td>
<td>3.74</td>
<td>6.76</td>
<td>0.18</td>
<td>3.20</td>
<td>0.15</td>
</tr>
<tr>
<td>8</td>
<td>Pickett, TN</td>
<td>57.07</td>
<td>3.74</td>
<td>6.76</td>
<td>0.18</td>
<td>3.20</td>
<td>0.15</td>
</tr>
<tr>
<td>9</td>
<td>Charles City, VA</td>
<td>54.81</td>
<td>-0.38</td>
<td>-0.48</td>
<td>0.53</td>
<td>-0.73</td>
<td>6.31</td>
</tr>
<tr>
<td>10</td>
<td>Lexington, VA</td>
<td>51.70</td>
<td>-0.38</td>
<td>-0.48</td>
<td>-0.32</td>
<td>6.36</td>
<td>3.05</td>
</tr>
<tr>
<td>11</td>
<td>Clay, GA</td>
<td>47.51</td>
<td>-0.38</td>
<td>5.29</td>
<td>0.49</td>
<td>5.54</td>
<td>2.59</td>
</tr>
<tr>
<td>12</td>
<td>Mathews, VA</td>
<td>46.52</td>
<td>-0.38</td>
<td>1.57</td>
<td>5.64</td>
<td>1.50</td>
<td>1.35</td>
</tr>
<tr>
<td>13</td>
<td>Meigs, TN</td>
<td>44.88</td>
<td>-0.38</td>
<td>-0.48</td>
<td>0.49</td>
<td>0.12</td>
<td>5.29</td>
</tr>
<tr>
<td>14</td>
<td>Taliaferro, GA</td>
<td>39.99</td>
<td>-0.38</td>
<td>-0.48</td>
<td>-0.40</td>
<td>5.08</td>
<td>6.72</td>
</tr>
<tr>
<td>15</td>
<td>Bland, VA</td>
<td>39.16</td>
<td>5.75</td>
<td>-0.48</td>
<td>-0.41</td>
<td>-0.73</td>
<td>-0.42</td>
</tr>
</tbody>
</table>

Of the 54 identified tourism micro-entrepreneurship spatial outliers, 25 are identified to be also spatial outliers of tourism resources (Figure 9). This is what this study is concerned about. It can be asserted the existence of spatial outliers of tourism micro-entrepreneurship is to a large extent due to the difference in tourism resources from their neighbors. When contrasting the top 15 tourism micro-entrepreneurship spatial outliers with the top 15 tourism resource spatial outliers (Table 2 and 3), some instances are worth noting. Bland and Craig in Virginia are tourism resource spatial outliers due to the existence of national or state parks, while they are also spatial outliers with relatively low level of tourism micro-entrepreneurship. The explanation might be that the existence of national parks can inhibit the growth of micro tourism businesses in the same county when spurring the growth of them in the neighboring counties. Alternatively, the level of tourism micro-entrepreneurship in their neighboring counties is even lower.
On the other hand, there are 29 spatial outliers not associated with tourism resources, which might be due to other factors. Spatial outliers of economic condition variables might give some clue of whether spatial outliers of tourism micro-entrepreneurship are associated with economic conditions as one of the other factors. Totally, 43 multivariate spatial outliers of economic conditions are identified (Figure 10). The top 15 spatial outliers are listed (Table 4). Some spatial outliers might be due to high per capita income, including Williamson in Tennessee and James City in Virginia. Some spatial outliers might be due to high poverty rate, including Harrisonburg in Virginia, Echols in Georgia. Some outliers might be due to
high Gini index including Randolph in Georgia, and Fredericksburg and Richmond City in Virginia. More spatial outliers are due to high values of two variables of interest, including Allendale in South Carolina, Clarke in Georgia, and Galax in Virginia with high poverty rate and Gini index, and Fulton in Georgia with high per capita income and Gini index. Some outliers do not have high value in any of the three variables of interest, including Beaufort in South Carolina, Lee in Georgia, and Williamsburg and Charlottesville in Virginia. They might be different from their neighbors due to the difference in the values.

Figure 10. Multivariate spatial outliers of economic conditions based on the study area
Table 4. The Top 15 Economic Conditions Multivariate Spatial Outliers Identified

<table>
<thead>
<tr>
<th>Rank</th>
<th>County</th>
<th>Distance</th>
<th>per capita income</th>
<th>Poverty rate</th>
<th>Gini index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Williamson, TN</td>
<td>29.42</td>
<td>3.33</td>
<td>-1.93</td>
<td>0.05</td>
</tr>
<tr>
<td>2</td>
<td>Williamsburg, VA</td>
<td>25.00</td>
<td>0.20</td>
<td>-0.16</td>
<td>0.71</td>
</tr>
<tr>
<td>3</td>
<td>Fredericksburg, VA</td>
<td>24.70</td>
<td>1.06</td>
<td>0.01</td>
<td>2.16</td>
</tr>
<tr>
<td>4</td>
<td>Harrisonburg, VA</td>
<td>23.40</td>
<td>-0.83</td>
<td>2.38</td>
<td>1.17</td>
</tr>
<tr>
<td>5</td>
<td>Echols, GA</td>
<td>21.74</td>
<td>-1.27</td>
<td>2.28</td>
<td>-1.57</td>
</tr>
<tr>
<td>6</td>
<td>Galax, VA</td>
<td>18.13</td>
<td>-0.35</td>
<td>2.31</td>
<td>2.52</td>
</tr>
<tr>
<td>7</td>
<td>Beaufort, SC</td>
<td>17.80</td>
<td>1.88</td>
<td>-1.1</td>
<td>0.84</td>
</tr>
<tr>
<td>8</td>
<td>Randolph, GA</td>
<td>17.61</td>
<td>-0.68</td>
<td>1.64</td>
<td>3.24</td>
</tr>
<tr>
<td>9</td>
<td>Fulton, GA</td>
<td>16.85</td>
<td>2.65</td>
<td>-0.35</td>
<td>2.44</td>
</tr>
<tr>
<td>10</td>
<td>Allendale, SC</td>
<td>16.85</td>
<td>-1.27</td>
<td>3.90</td>
<td>3.89</td>
</tr>
<tr>
<td>11</td>
<td>Clarke, GA</td>
<td>16.10</td>
<td>-0.31</td>
<td>2.50</td>
<td>2.49</td>
</tr>
<tr>
<td>12</td>
<td>Charlottesville, VA</td>
<td>15.78</td>
<td>0.50</td>
<td>1.50</td>
<td>1.78</td>
</tr>
<tr>
<td>13</td>
<td>Lee, GA</td>
<td>15.73</td>
<td>0.38</td>
<td>-1.46</td>
<td>-1.33</td>
</tr>
<tr>
<td>14</td>
<td>James City, VA</td>
<td>15.35</td>
<td>2.81</td>
<td>-1.65</td>
<td>-0.67</td>
</tr>
<tr>
<td>15</td>
<td>Richmond City, VA</td>
<td>15.24</td>
<td>0.75</td>
<td>1.22</td>
<td>2.55</td>
</tr>
</tbody>
</table>

Of the 54 identified tourism micro-entrepreneurship spatial outliers, 13 are identified to be also spatial outliers of economic conditions (Figure 11). Therefore, spatial outliers of tourism micro-entrepreneurship do not appear to have much to do with the difference in economic conditions.

Of the 57 identified tourism resource spatial outliers, 15 are found to be also spatial outliers of economic conditions (Figure 12). Spatial outliers of tourism resources, similar to those of tourism micro-entrepreneurship, do not have much to do with the difference in economic conditions. However, some of the 15 spatial outliers identified are target counties where tourism has greater likelihood of being successfully developed, including Avery in North Carolina, Chattahoochee, Clay, and Quitman in Georgia, Beaufort in South Carolina and Rappahannock in Virginia, since these counties have yet to be spatial outliers of tourism micro-entrepreneurship.
Figure 11. Global spatial outliers of tourism micro-entrepreneurship and economic conditions

Figure 12. Global spatial outliers of tourism resources and economic conditions
The distribution of spatial outliers across the states enables a detailed understanding of the spatial outliers (Table 5). Although similar number of spatial outliers of tourism micro-entrepreneurship and tourism resources are identified for the study areas, they are not proportionate to each other in each state. In Virginia, the ratio of tourism micro-entrepreneurship spatial outliers to tourism resource spatial outliers is 23:28, while in Tennessee, the ratio is 9:2. The same is true of the contrast between tourism micro-entrepreneurship and economic condition spatial outliers. In North Carolina, Tennessee and Virginia, the ratio is 8:3, 9:4, and 23:17 respectively, while in Georgia, the ratio is 12:17 which is smaller than 1. The proportion of spatial outliers of tourism micro-entrepreneurship that might be associated with the difference in tourism resources is different across the states. In North Carolina, and Virginia, more than half of the tourism micro-entrepreneurship spatial outliers seem to be associated with tourism resources, while in South Carolina and Tennessee, the associations appear to be very weak. Although generally the association of tourism micro-entrepreneurship outliers with economic condition variables is weak, there is difference across the states. In Virginia, nearly 1/3 of the tourism micro-entrepreneurship spatial outliers are associated with the difference in economic conditions, while in North Carolina the ratio is 1/8 and in Georgia the ratio is 1/6 even if there are 17 spatial outliers of economic status are identified in this state. The association of economic conditions with tourism resources shows similar patterns across the states.
Table 5. Summary of Global Multivariate Spatial Outliers

<table>
<thead>
<tr>
<th>State</th>
<th>Tourism micro-entrepreneurship</th>
<th>Tourism resource</th>
<th>Economic condition</th>
<th>Tourism micro-entrepreneurship and tourism resource</th>
<th>Tourism micro-entrepreneurship and economic condition</th>
<th>Tourism resource and economic condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Carolina</td>
<td>8</td>
<td>11</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Georgia</td>
<td>12</td>
<td>13</td>
<td>17</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>South Carolina</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Tennessee</td>
<td>9</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Virginia</td>
<td>23</td>
<td>28</td>
<td>17</td>
<td>14</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>57</td>
<td>43</td>
<td>25</td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>

Implications

A single spatial outlier of tourism micro-entrepreneurship can play as a role model for its neighbors. Especially when it does not have relatively high level of tourism resources compared with its neighbors. Why it is a spatial outlier while its neighbors are not when they have similar level of tourism resources is worthy of concern. A different mechanism might be behind the process that makes it a spatial outlier. The reasons can be various, and worth further consideration. For example, the number of spatial outliers of tourism micro-entrepreneurship that are not spatial outliers of tourism resources is 3, 7, 2, 8 and 9 in North Carolina, Georgia, South Carolina, Tennessee, and Virginia respectively. These spatial outliers can give impetus to their neighbors for investigating the reasons why they have different level of tourism micro-entrepreneurship. Accordingly, the neighbors can make efforts in adjusting their policy focus to spur the growth of tourism micro-entrepreneurship for local economic development. Actually, the spatial outliers of tourism micro-entrepreneurship with spatial concentration of tourism activities can help facilitate the growth of tourism micro-entrepreneurship in their neighbors through the effect of externalities (Romer, 1986; Feldman and Audretch, 1999; Paci and Usai, 1999).
On the other hand, the number of spatial outliers of tourism resources that have yet to be spatial outliers of tourism micro-entrepreneurship is 7, 8, 3, 1, and 15 in North Carolina, Georgia, South Carolina, Tennessee, and Virginia, respectively. These spatial outliers are the counties that have greater potential of utilizing tourism for local economic development, while the local and relevant regional government should examine what inhibit the growth of tourism micro-entrepreneurship among various possible factors such as high taxation (Pirttila and Tuomala, 2004), shortage of basic entrepreneurial skills (Allen and Lachapelle, 2012), weak local market (Golodner, 2001; Cooney and Shanks, 2010), overly high start-up capital as opposed to the current economic situations of the local people (Lepp, 2007), inadequate infrastructure (Fairbairn, 2005; Wilkes, 2005), and inefficient regulatory environment (Ateljevic and Doorene, 2007; Amadi and Abdullah, 2012) and make efforts in creating favorable conditions for tourism micro-entrepreneurs such as business advice, training and availability of financial capital (Kevane, 2001; Kaplan, 2004; Breitenecker, 2010).

The multiple spatial outliers identified can help regional or state government adjust policy focus and distribute resources more reasonably (Matsumoto, 2008; Sole-Olle, 2013). For instance, according to the high association of tourism micro-entrepreneurship spatial outliers with tourism resource spatial outliers in North Carolina and Virginia, it is relatively easier for the state governments to channel resources by measures such as enhancing infrastructure and facilities, implementing tax credits, and ensuring the improvement of quality of life to those spatial outliers of tourism resources without relatively high level of
tourism micro-entrepreneurship in order to nurture tourism micro-entrepreneurship there, as suggested by Wong (1998).

Among the counties as both economic condition and tourism resource spatial outliers, Dare in NC, Jenkins in GA, Pickett in TN, and Bath, Fredericksburg, Galax, Lexington, Richmond, and Williamsburg in VA are also spatial outliers of tourism micro-entrepreneurship which indicates tourism has been relatively developed in these counties. In the remaining counties including Avery in NC, Chattahoochee, Clay, and Quitman in GA, Beaufort in SC, and Rappahannock in VA, tourism has yet to be developed. These counties as central places of economy should draw attention of the related governments and policy since they are where tourism has the greater likelihood of being successfully developed based on central place theory (Daniels, 2007). Avery County in North Carolina is a regional central place with relatively high level of tourism resources, but its neighbor Mitchell County is a spatial outlier of tourism micro-entrepreneurship, which corroborate the fact that non-central places can be also successful in developing tourism activities due to unique natural resources (Wang, 1999). Therefore, Avery County has the favorable conditions for tourism development and can also learn the experiences in nurturing tourism micro-entrepreneurship from its neighbor. Rappahannock County in Virginia has no neighbors as tourism micro-entrepreneurship spatial outliers but its tourism development is promising since of the 7 spatial outliers of tourism resources and economic conditions in Virginia, 6 are also spatial outliers of tourism micro-entrepreneurship. Spatial outliers of economic conditions along the coast are generally spatial outliers of tourism micro-entrepreneurship, therefore, Beaufort in
South Carolina as a regional central place with relatively high level of tourism resources have
greater likelihood of nurturing more tourism micro-entrepreneurs. Chattahoochee, Quitman,
and Clay in Georgia are regional central places that are either adjacent or close to each other
with relatively high level of tourism resources in the area. Regional tourism cooperation
should be strengthened in order to nurture more tourism micro-entrepreneurs.

Conclusion

The purpose of this study is to identify spatial outliers of tourism micro-entrepreneurship, tourism resources, and economic conditions, examine the association between them and explore implications for utilization of tourism micro-entrepreneurship for local development across the study area. The major findings include 54 counties as spatial outliers of tourism micro-entrepreneurship, 57 counties as spatial outliers of tourism resources, 43 counties as spatial outliers of economic conditions, 25 counties as spatial outliers of both tourism micro-entrepreneurship and tourism resources, 13 counties as spatial outliers of both tourism micro-entrepreneurship and economic conditions, and 15 counties as spatial outliers of both tourism resources and economic conditions.

Economic activities such as tourism micro-entrepreneurship might cluster together in the particular locations occupied by central places such as cities or other urban places (King, 1984). The result is that spatial outliers of economic conditions as central places might have high level of tourism micro-entrepreneurship even if the level of their tourism resources is not as high as their neighbors. Therefore, the findings can remind local county governments surrounding the central place counties with relatively high level of tourism micro-
entrepreneurship that opportunities and challenges coexist. Externalities from central places can bring forward their tourism development, while agglomeration effect might attenuate the level of tourism micro-entrepreneurship. Accordingly, one of the future research activities can be to conduct case studies based on spatial outliers identified that compare externalities and agglomeration effect in order to help facilitate the formulation of tourism development strategies. As yet, this study have identified some potential case study areas such as Bath in Virginia (central place) and its neighbors including Highland (spatial outlier of tourism micro-entrepreneurship) and Alleghany (spatial outlier of tourism resources), Putnam in Georgia (central place) and its neighbors including Morgan (spatial outlier of tourism micro-entrepreneurship) and Hancock (spatial outlier of tourism resources), Dare (central place) in North Carolina and its neighbors including Tyrrell and Hyde (spatial outliers of tourism micro-entrepreneurship).

References


CHAPTER 5: CONCLUSIONS

This study uses three interconnected but distinct analyses to identify the interaction of tourism micro-entrepreneurship with economic development and poverty reduction across the study area. The first analysis is to identify the areas composed of several counties where tourism micro-entrepreneurship has the potential for promoting local economic development, the second analysis is to identify the factors that might lead to tourism micro-entrepreneurship and the linear relationship of tourism micro-entrepreneurship with development across different areas, and the third analysis is to identify the points, i.e. counties, where high level of tourism micro-entrepreneurship has been associated with resources and economic conditions.

Theoretical implications

Across the study area, tourism micro-entrepreneurial clusters identified coexisted with clustering of resources, formal sector or human capital, which indicates the existence of clusters is accompanied by the existence of some conditions which form components of competitive advantage as Porter’s diamond framework of cluster theory indicates. For a tourism micro-entrepreneurial cluster, natural and cultural resources can be viewed as one of the factor conditions, the formal tourism sector is one of the related and supporting conditions and human capital can be one of the components shaping the context for business existence and rivalry. Different components of competitive advantage identified for a tourism micro-entrepreneurial cluster can help explain why a cluster did not exist in some areas with high level of some components such as abundant tourism resources.
The determinants of tourism micro-entrepreneurship and the role tourism micro-entrepreneurship plays in helping improve human development identified vary across the study area. This again reflects the nature of spatial heterogeneity. Determinants identified for an area do not necessarily take effect in other areas. Therefore, in identifying determinants of tourism micro-entrepreneurship, spatial heterogeneity should always be what to focus on.

The spatial outliers of economic conditions can be considered as central places. Since economic activities such as tourism micro-entrepreneurship might cluster in the particular locations occupied by central places such as cities or other urban places, spatial outliers of economic conditions as central places might have high level of tourism micro-entrepreneurship even if the level of their tourism resources is not as high as their neighbors. Externalities from central places can bring forward their tourism development, while agglomeration effect might attenuate the level of tourism micro-entrepreneurship. The spatial outlier analysis helps examine whether tourism micro-entrepreneurship tends to cluster in central places, and whether some central places have the potential to promote tourism micro-entrepreneurship in the surrounding areas in order for production reduction.

**Methodological implications**

The integrated approach by combining examination of G statistics and k-means cluster analysis in identifying tourism clusters and their components of competitive advantages can be used to identify other business clusters and the corresponding components of competitive advantages. The identification of different determinants of tourism micro-entrepreneurship using geographically weighted regression approach indicates geographically weighted
regression approach can be used in other research studies to identify specific areas with both the specific facilitating and restricting factors of tourism micro-entrepreneurship.

Multivariate spatial outlier detection methods used for identify hotspots of tourism micro-entrepreneurship, tourism resources and economic conditions can be applied for identifying hotspots of tourism micro-entrepreneurship and its potential factors in other areas whether they are regions covering several states, states, or smaller administrative units.

**Implications for future research**

The major findings from the analyses and some related future research are as follows:

*Analysis 1:*

Across the study area, there were tourism micro-entrepreneurial clusters that were generally located in Virginia and North Carolina. These clusters coexisted with clusters of resources, formal sector or human capital, which can be considered as some components of competitive advantage for clustering of micro tourism businesses.

That tourism micro-entrepreneurial clusters did not appear in the states other than Virginia and North Carolina might be because of the existence of some restraining factors, such as low financial and human capital, and low demand, although there are clusters of resources in these states such as a state park cluster in central Tennessee, two historic place and museum clusters in southern Georgia, and high percentage of water areas on the coast of Georgia and South Carolina. Therefore, the future research might focus on identifying the restraining factors in order to enable utilization of tourism resources to go in the right direction.
**Analysis 2:**

The identified significant determinants of micro businesses that provide arts, entertainment, and recreation services (AER) identified include national park, museum, historic place, high school graduation rate, per capita income, and percent vacant housing while those of micro businesses that provide accommodation and food services (AF) identified include national park, museum, the formal tourism sector, and percent vacant housing. They vary in both degree and direction across the study area. Besides, the areas with significant spatial association of tourism micro-entrepreneurship with human development are identified.

However, some of the results from the literature are not mirrored by the findings. For example, the role of unemployment rate and self-employment rate appear to be non-significant both globally and locally; even GWR cannot identify some regularity in relationships between rural counties and tourism micro-entrepreneurship in any regions. Circumstances alter cases, so when the same methodologies and selected variables are used in other areas, determinants might be different. At different times, determinants and their effects might also be different. Therefore, using data in different years might result in different determinants of and effects on tourism micro-entrepreneurship. The future research can be conducting a comparative analysis of spatial heterogeneity between the study area and a comparison area, or exploring time series data to investigate the dynamics of spatial heterogeneity.
**Analysis 3:**

There were 54 counties identified as spatial outliers of tourism micro-entrepreneurship, 57 counties as spatial outliers of tourism resources, 43 counties as spatial outliers of economic conditions, 25 counties as spatial outliers of both tourism micro-entrepreneurship and tourism resources, 13 counties as spatial outliers of both tourism micro-entrepreneurship and economic conditions, and 15 counties as spatial outliers of both tourism resources and economic conditions.

The spatial outliers of economic conditions as central places might have high level of tourism micro-entrepreneurship even if the level of their tourism resources is not as high as their neighbors. Therefore, the findings can remind local county governments surrounding the central place counties with relatively high level of tourism micro-entrepreneurship that opportunities and challenges coexist. Externalities from central places can bring forward their tourism development, while agglomeration effect might attenuate the level of tourism micro-entrepreneurship. Accordingly, one of the future research activities can be to conduct case studies based on spatial outliers identified that compare externalities and agglomeration effect in order to help facilitate the formulation of tourism development strategies. As yet, this study have identified some potential case study areas such as Bath in Virginia (central place) and its neighbors including Highland (spatial outlier of tourism micro-entrepreneurship) and Alleghany (spatial outlier of tourism resources), Putnam in Georgia (central place) and its neighbors including Morgan (spatial outlier of tourism micro-
entrepreneurship) and Hancock (spatial outlier of tourism resources), Dare (central place) in North Carolina and its neighbors including Tyrrell and Hyde (spatial outliers of tourism micro-entrepreneurship).