Exploring Terroir Specialty, Tourist Food and Tourism Development Based on GIS Mapping

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Abstract-- This research aims to use GIS mapping to locate a set of points of locations of pineapple dining industry including bakeries, restaurants and vendors distributed within a terroir region, explore the relationship between terroir specialty and tourism development to respond to the concept of industry cluster. As well-known pineapple cultivation region in Taiwan, this terroir region translates local agricultural product to tourist food, and demonstrates increasing tourist drawing by a pineapple dining industry cluster and marketing networks. This research shows the spatial cluster of a pineapple dining industry based on point density analysis, buffer analysis and overlay analysis to identify a tourism flourishing region. Instead of focusing on innovation atmosphere, knowledge intensive or technology transfer, this research explores the importance of terroir specialty for what makes this region having the advantages of dining industry cluster. To identify the characteristic of terroir specialty, this research evokes the implications of tourist food associated with its geographical origin and creativeness to establish a flourishing new tourist region on the dimension of tourism development.

Index Term- pineapple, terroir specialty, tourist food, flourishing new tourist region, GIS mapping

I. INTRODUCTION
Although in some cases tourism harms local agricultural production due to attract land and labor away from the agrarian sector, creating linkages between tourism and agricultural activity holds great importance for tourism development (Torres, 2003). Several researchers also have observed the phenomenon of the linkage between agriculture and tourism was weak based on the analysis of food supply chains of hotel service sectors (Momsen, 1998; Telfer & Wall, 1996; Torres, 2002; Berno, 2011; Rogerson, 2012; Everett & Slocum, 2013; Pillay & Rogerson, 2013). Due to the poor agricultural potential of land, when tourism industry relies on imported food, tourism takes land, labor, and capital away from agriculture; tourism replaces agriculture as the dominant economic activity (Belisle, 1983). However, the development of tourism itself does not trigger the decline of agricultural sector, and the demise of agriculture can be attributed largely to the emergence of tourism as a viable alternative to a chronically unstable agricultural sector (Telfer & Wall, 1996:637).

When tourists are seeking authentic and unique experiences and the consumption of local food or beverages brings the tourists closer to the host culture, food and beverages can be an input as well as a tourist attraction. Food and beverages have long been regarded as important components of tourist experiences, often feature in tourism promotion at destinations as well as contributing to tourist attraction such as festivals. The importance of special interest in food and beverages rates as a travel motivation, which
ranges from high interest to a destination with the primary motive to visit a specific restaurant or winery to accidental discovery (Plummer, Telfer, Hashimoto & Summers, 2005). Tourism development stimulates local agriculture production and local agriculture production promotes tourism development. Food supply chain of high level accommodation establishments is articulated mainly through the linkage that incorporates the area’s groups of agrarian producers, and the linkage between agriculture and tourism as a whole is the barrier to strengthen pro-poor linkage between accommodation establishments and local agriculture production (Pillay & Rogerson, 2013).

A concept of food tourism as a mean of extending tourist season is proposed to demonstrate that food tourism has a role in securing the ‘triple bottom line’ of economic, social and environmental sustainability. Food tourism in sustaining cultural heritage and promote destination’s visibility can be clarified in relation to tourist typology where summer visitors display motivations and behaviors reflective of the traditional psychocentric or recreational tourists. Example for a significantly larger proportion of peak season visitors opt for accommodation in caravan parks and camping sites and tend not to visit frequent more special restaurants and food outlets. Food tourism offers a destination a longer, more sustainable, less intensive season in which to sell its local produces (Everett & Aitchison, 2008). The significance of tourist food has developed to be as a subject of tourism by focusing tourism motivations on experiencing local distinctive food or culinary and the related products, as well as their relationships of destination choice and satisfaction (Hall & Sharples, 2003; Cohen & Avieli, 2004; Kivela & Crotts, 2009; Kim & Ellis, 2015; Musso & Francioni, 2015). More recently, food tourism research trend has experienced a shift from the management to the cultural perspective by emphasis on cultural exploration and learning from food tourism experience, and the highlight that food tourism is not only the consumption of food itself but also the experience of its cultural artefact, capable of allowing knowledge gain and cultural exploration for tourists through a relatively simple tasting activity for providing a medium for the expression of local culture and identity (Kim & Ellis, 2015).

Hall & Sharples (2003) termed “food tourism” referring to visitation to primary and secondary food producers, food festivals, restaurants and specific locations for which food tasting and experiencing the attributes of food production region is the primary motivating factor. Accordingly, food tourism is a manifestation of defining the identity of a place through tasting local food, and in some cases for the local food consumption spaces such as restaurants and cafes even become areas of culture performance, rather than simply areas of physical consumption. Consequently, these spaces can become places whereby locals rehearsal and perform their cultural identity, and reaffirm ‘national lessons’, revealing the important places of food in identity (Stein, 2008:106; Sims, 2009).

The term of “terroir” when uses in agro-viticultural surveys at the plot scale, demonstrates significant differences for grape varieties, rootstocks and soil management practices as a territory in which different degrees of variability of diverse environmental factors. The terroir-related agro-viticultural researches have primarily focused on the relationships between environmental factors related to vines and the quality of grapes and wines in order to assess the potential of vineyard quality and the indigenous knowledge within specifically defined areas about soils of terroir units. The farmers’ classifications of soils base on terroir show good correlation with soil chemical and physical analyses and agronomic performance (Goulet & Morlat, 2011). Terroir is a spatial, ecological and cultural concept that links the actors with special agricultural practices (traditional knowledge and cultivating technology), and the environment factors translated as “terrain, soil, land, ground, or earth” related to food and wine. Terroir conveys geographical origin, culture identity and agriculture products, and is a place-based name framed as...
sources of resistance against the homogenizing effects of placeless food production. In recent years, developing countries have increasingly begun focusing on terroir as a tool to foster rural development and local traditions (Bowen & Zapata, 2009).

“Terroir”, which is a place with distinctive geographical and cultural characteristics that reflects the local environment as well as human interactions to it, is often associated with the specific agricultural products. The concept of terroir often as evidence of the emergence of a new rural development paradigm is known more familiarly as labels of origin from long occupation of the same area, and represents the interplay of human ingenuity and embeddedness with the natural givens of place (Barham, 2003). Lee, Wall & Kovacs (2015) compared two study areas—Stratford and Muskoka, both at a similar distance from metropolitan Toronto, strongly seasonal in both their agricultural products and tourism, to illustrate how agriculture links with tourism. Stratford with possessing more productive farmland has a much stronger agricultural resource base than Muskoka, while Muskoka has longer history for tourism development based on the forested-lakes complex. Although neither of Stratford and Muskoka has the reputation to claim status as a “terroir” in the absence of a specific place branding strategy, both have successfully developed culinary tourism by the linkage of agriculture and tourism.

Although some researches have examined the conception of terroir by using it as an analysis unit for comparing chemical composition of vintage products in different viticultural zones, a better meaning of terroir for social construct (Schlosser, Reynolds, King & Cliff, 2005; Bonfante, Basile, Langella, Manna & Terribile, 2011; Bowen & Zapata, 2009) by using GIS mapping to explore a terroir function is still a lack of research in clarification the relationship between terroir and tourism development. Thus, this research aims to define a terroir region, further to examine the role of terroir product on the tourism development by distinguishing a famous pineapple cultivation region in Taiwan. After methodology, the pineapple terroir region is described and the results are discussed. This research tends to understand the role of terroir on promoting local tourism development, and devotes to analyze the influencing factor observed within the pineapple terroir region on how to shape a tourism flourishing region.

II. PINEAPPLE TERROIR REGION AND INDUSTRY CLUSTER

Terroir, a French word of a territory name of strategies for advertising and marketing a place, has been related to variety of plants and typical food products based on a local scale. A viticultural terroir is related to a particular area with a distinct quality of grapes and their wines in France. During the last 30 years, terroir-related researches have mostly focused on the relationships between the quality of grapes or wines and a few environmental factors, and until 1990s GIS mapping way was used on the concept of terroir by focusing on the spatial analysis of diversity of viticultural environments from area to area (Vaudour, 2002). According to Vaudour’s (2002) definition, a terroir means a small area of land being considered for its quality or agricultural products, reveals characteristics of a cultivation space of an environmental complex (terrain, climates and soil properties) and place identity of a collective taste memory.

Pineapple is planted through a variety of modes of cultivation, from small-scale peasant production largely for subsistence, through medium-sized capitalized enterprises, to large-scale capital investment operated by global companies. Slightly acidic soil with pH range of 5.5 to 6.0 is considered optimum for pineapple cultivation. The soil should be well drained and light in texture. Heavy clay soil is not suitable. Pineapple can grow in sandy, alluvial or laterite soil. Harvested pineapples can be shipped to cannery. In 1960s, the export of canned sliced pineapples as a popular commodity on the world market was once the third biggest dollar-earner in Taiwan. Taiwan Pineapple Corporation was
the famous manufacturer and exporter of canned pineapples. However, the prosperity was ephemeral because some other local canny producers used green and inferior quality fruits for canning with the inevitable result of damaging the reputation of Taiwan pineapple as a whole on the world market, thus since 1980s pineapple production in Taiwan is mainly for domestic consumption.

There are five pineapple cultivation regions for subsistence small-scale cultivation in Taiwan, but only the pineapple cultivation region in the hilly area of Nantou City turns to be a famous pineapple terroir region because of the complex of terrain, climates and soil properties. The pineapple in Nantou City is consumed fresh, cooked, juiced, or preserved in a wide variety of cuisines, including that crushed pineapple is used for jam, vinegar, enzyme and ice cream; juice of fresh pineapple is served as a beverage; chunks of pineapple is preserved as a conserve; pineapple jam is filled to pineapple cake as an ingredient. As a pineapple terroir region, there are plentiful pineapples to serve as dishes for dining industry in Fushan District, Fengming District, Fengshan District, Yongxing District of Nantou City, and thus pineapple bakeries, restaurants and vendors are establishing for promoting tourism especially since 2010 after the transportation improvement of Route 139.

In order to realize how many pineapple bakeries, restaurants and vendors (pineapple dining industry) clustering in this study area, the researchers visited the holders of pineapple bakeries and restaurants along Route 139 and used GPS to position the vendors’ location for collecting the data of spatial distribution of pineapple dining industry. Proximately total 50 pineapple bakeries, restaurants and vendors in this study area are positioned. GIS mapping is used to analyze the clustering location of pineapple dining industry including of pineapple bakeries, restaurants and vendors. With point density analysis, buffer analysis and overlay analysis, this research aims to distinguish the significant relevance between dining industry cluster of pineapple bakeries, restaurants and vendors and flourishing tourism. Furthermore, a mixture of in-depth interview and field observation are used to explore the linking chains between pineapple dining industry cluster and local tourism development. In this research the related data is collected through 20 in-depth interviews carried out at the plot scale to realize local pineapple farmers how to shape a sphere of terroir, the indigenous knowledge and the know-how of pineapple cultivation. To clarify the terroir pineapple as a tourist resource, place identity of a collective taste memory, the level of perception of know-how in terms of timing of the growth cycle and the potential for terroir pineapple, and demonstrating the characteristics of environmental complex (terrain, climates and soil properties) are essential.

He & Gebhardt (2012) explore the spatial clustering of creative industries by locating the sites of creative industry parks and visualize the core area of creative industries clustering in Shanghai based on GIS point density analysis. To illustrate the spatial clustering location of pineapple dining industry in this terroir region, this research also used GIS point density analysis to locate a set of points for the total 50 pineapple bakeries, restaurants and vendors based on GIS mapping. Point density surface is suitable for defining a clustering core or concentration zone of a set of points. The calculated method of point density analysis is based on estimating the quantity of points per cell on each neighborhood of a defined searching radius. This research using point density analysis explores the cell point density of a set of points of pineapple bakeries, restaurants and vendors locations to demonstrate the spatial clustering trend of pineapple dining industry by defining the most concentrated zone, namely to distinguish the significant tourism flourishing region. By illustrating GIS overlay analysis on DTM terrain raster, the transport raster, and the settlement raster of this pineapple region and on the point density analysis of the pineapple cake bakeries, restaurants and vendors, the relationship between a terroir region and a new flourishing tourist region can be specified.
Several researches explore the neighborhood of industry cluster and cluster effects by using GIS point density analysis, buffer analysis and overlay analysis (Hsueh & Tseng, 2013a; Hsueh, 2013b; Hsueh & Chen, 2015). To analyze the cluster effects of pineapple dining industry, this research also combined of related layers to process buffer analysis to define the significant clustering zone of pineapple bakeries, restaurants and vendors in this terroir region. This research take a famous pineapple bakery (Sunny Hill) (Figure 1) as the buffering center for buffer analysis because the high degree extent of point density analysis is located on the proximity of Sunny Hill, which is the first bakery promoting terroir pineapple cake (Figure 2) as a tourist food in this region. Several famous pineapple bakeries, restaurants and vendors clustering in this pineapple terroir region are based on the geographical proximity of pineapple materials. Sunny Hill is the first indigenous pineapple imitator in 2008, and then Muhuang Mountain in 2009, Shimmer Forest in 2010, Sky of Star and Moon in 2010, Mountain Kadoya in 2012, Hao Wang Pineapple Culture (Hau Wang Jiao) in 2012, Woodpecker Hill in 2013, General House in 2013, Munich in 2013, Qi Li Xiang 1 in 2013, Gu Yue Zhuang in 2014, Kuei-Hua Sweet in 2014, Qi Li Xiang 2 in 2015. Four main factors determine the quality of terroir pineapple cuisines: environmental conditions of production, diverse selection, cooking management, and making practice. Making practice, the main factor to determine the quality of pineapple cuisine according to the indigenous knowledge about the filling of actual pineapple instead of white gourd, turns terroir pineapples into tourist foods, promotes local tourism development in this terroir region. The industry cluster of pineapple bakeries, restaurants and vendors with strong ties stimulated the formation of new flourishing tourist region based on tourist foods related to creative pineapple cuisines. Shimmer Forest, which has several contract pineapple farms, is a famous bakery for making creative pineapple cakes embedded with a variety of flavors such as cranberry, litchi, longan or passion fruit (Figure 3, Figure 4).

Fig. 1. Travelers visit Sunny Hill for buying pineapple cakes

Fig. 2. Sunny Hill turns pineapple cake into popular tourist food
According to the point density analysis (searching radius 500 meter, cell value 40x40 meters), an obvious clustering area of pineapple bakeries, restaurants and vendors in the terroir region is identified (Figure 5). The area with the most high value of point density between 28.52056581–35.65070724 is located near to the neighborhood of Sunny Hill, and this indicates here is the significant clustering area of pineapple dining industry. To further clarify the extent of pineapple bakeries, restaurants and vendors clustering around Sunny Hill, buffer analysis is conducted to define 88% of 50 pineapple bakeries, restaurants and vendors within 3000 meters buffer neighborhood (Figure 6). Why the pineapple bakeries, restaurants and vendors cluster around the neighborhood of Sunny Hill? An analysis of industry cluster effects is further presented to answer this question.

A cluster is a geographically proximate group of interconnected firms and associated institutions in a particular location, linked by commonalities and complementarities. To identify the cluster effects of pineapple dining industry (pineapple bakeries, restaurants and vendors) in pineapple cultivation region, this research from three dimensions of vertical, horizontal and diagonal effects to clarify the related pineapple dining industry chains. The related pineapple dining industry chains includes the attributes of pineapple processing and cooking, complements to pineapple growing and pineapple cuisine (vertical cluster effect) such as pineapple farmers providing different types of materials for pineapple bakeries, restaurants and vendors to make innovative cuisines, pineapple dining associations (pineapple cooking and marketing groups) sharing indigenous knowledge and know-how of pineapple cuisines (horizontal cluster effect), and pineapple theme restaurants cooperate with leisure farmers, community development associations, hawk watching associations for promoting travel packages (diagonal cluster effect). Creating a stable marketing network of dining industry and tourism to generate external economies is the premise to market local terroir pineapples. The Pineapple Farmer Market near to Sunny Hill, establishing in 2008, cooperates with pineapple dining industry is famous for marketing terroir pineapples and pineapple related products (Figure 7). Sunny Hill is the most famous pineapple bakery in central Taiwan, and the pineapple cake from Sunny Hill indicates that the pineapple is cultivated in this terroir region with more local character. Sunny Hill is a brand, a kind of quality and a core of pineapple tourist drawing to tourists, so many restaurants and vendors cluster around the neighborhood of Sunny Hill.
Fig. 5. Point density analysis for the clustering of pineapple bakeries, restaurants and vendors

Fig. 6. Buffer analysis of pineapple bakeries, restaurants and vendors around Sunny Hill
The pineapple theme restaurants, dedicated to providing pineapple creative cuisines with terroir pineapples, have been established in recent years to brand the label of pineapple origin. A famous pineapple theme restaurant-General House has expand to encompass more products than pineapple bread, in step with the creative consideration of pineapple dishes such as firewood kiln pineapple pizza and grains of all kinds with pineapples to emphasize more strongly the tourist aspect of the tie of cuisine and terroir. Pineapple theme restaurants for obtaining tourist drawing are providing with great diversity of pineapple innovative cuisines, such as Gu Yue Zhuang’s pineapple plum steak dish, pineapple shrimp dish, pineapple wine, pineapple vinegar, pineapple juice and pineapple conserves shaping to different styles, Kuei-Hua Sweet’s creative pineapple bread for additional embedding in different fillings such as mango, osmanthus, cranberry or longan (Figure 8), Qi Li Xiang’s urn chicken with balsam pear and pickle pineapple (Figure 9). Actually, terroir pineapple has been remarkably successful in transforming to tourist food, more recently, in supporting the development of a myriad of related products. Indigenous pineapples provide support for a view of geographical indications as terroir for the emergence of a new system of innovative dishes that confirms unique values associated with local place. Hawk Watching Association and several local community associations organize themselves into an industry cluster network that cooperate with pineapple cake shops and themed restaurants to promote local tourism.
III. A TERROIR REGION ALSO A FLOURISHING NEW TOURIST REGION

Hermans (1981) demonstrates a positive relationship between tourism and agriculture on the Spanish coast, and indicates that tourism has been the motor of the development of agriculture in Cambrils (Hermans, 1981:471). Food tourism is supposed to regenerate food production regions becoming gastronomic tastescapes that draw on charming concepts of pursuing purity and escape. Symbiotic relationship of agriculture and tourism is demonstrated on the classification scheme developed by Bowen, Cox & Fox (1991) on the analysis of agricultural sector shaping leisure attractions on three main components: retail sales, tours, and other leisure activities. Socher & Tschurtschenthaler (1994) categorize agriculture as having two separate but linked supply dimensions for tourism-direct supply, which involves the sale of agricultural products to the industry, and indirect supply, which involves preservation and cultivation of the landscape which acts as tourism resource. Food diversity distinguished by tasting different local cuisines is becoming a significant pull factor on the marketing strategies. Traditional food production regions are opening their doors to visitors, negotiating a balance between the daily operation of their business and demand for new arenas of tourist consumption. When the food production regions are simultaneously the spaces of consumption, the transformation of agricultural activity space into destination zone is thus emerged (Everett, 2012).

Telfer (2001) indicates that the Niagara Region has become home to an emerging New World Wine Route by the competitive advantages of winery clusters by using nearest-neighbor analysis and schematic diagram. Increasing in scale for marketing is the horizontal cluster advantage of the wineries surrounding the heritage-shopping town of Niagara-on-the-Lake. The complementary to the wineries of close to 60 tourist shops, numerous accommodation establishments, a historic fort and a festival theater reveals the diagonal cluster advantage. At the Regional level, the entire Niagara Wine Route with over 50 wineries, which are connected to the major tourist attractions of Niagara Region. Label of origin is particularly useful for the embeddedness and convention for marketing terroir product. By insisting upon a strong link in production to the ecology and culture of terroir, a local product label in the natural process and context embeddedness of terroir is essential. Several destinations and festivals promote their terroir specialty to serve as the major tourist food.

One of the festivals in Nantou City linked to the celebration of terroir is the Pineapple Festival. In this terroir region, the cycle of peak tourism season and pineapple harvest time is synchronous which reveals the potential input of local terroir can promote local tourism by providing important pineapple-related souvenirs for tourists. The Farmer Market is established from 2008 to sell terroir pineapple, and due to the geographical proximity many vendors also cluster here along Route 139 nearby Sunny Hill. On the concept of terroir similar to the establishment of French pay, the demarcation of Nantou City terroir region has been done on the basis of regional climatic, topographical, and soil differences which is believed to result in the distinctive quality of pineapple cakes. The Route 139 in Nantou City is located within a pineapple terroir region has become the most famous pineapple trail in Taiwan. Overlay analysis is performed on the entire pineapple terroir region of Nantou City by combining with the raster of tourist spots and the raster of locations of pineapple dining industry based on the embedded clusters illustrating the importance of horizontal and vertical linkages in generating a competitive advantage through the context of industry cluster (Figure 10). Along this pineapple trail, a lot of pineapple bakeries, restaurants and vendors currently clustering here has translated this terroir region to a flourishing new tourist region by providing tourist foods related desserts or delicious dishes of local pineapples.
Terroir refers to an area or terrain, usually rather small, which can also designate a rural or provincial region that is considered to have a marked influence on its inhabitants believing in rooted terroir customs or idioms. Terroir products, in this interpretation, mean long occupation of the same area and represent the interplay of human ingenuity and practice with the native place. The historical terroir concept viewed terroir production is a complex dance with nature with the goal of translating the local ecology, displaying its quality to best advantage. However, the notion of terroir has been translated in recent years, and is refocusing discussions of how the old is made to new in the global process of world. Its interpretation today reflects the involvement of powerful social actors, such as farmer’s associations, on how to make the transition from terroir as a concept to the qualified organic food that becomes a label product (Barham, 2003).

Apparently, although there is a process of globalization, tourist foods create greater demands on special local foods and indigenous cuisine (Torres, 2002:285). Through employment, tourism provides the opportunity for direct and indirect linkages with the local agriculture, and economic benefits derived from tourism in destination have centered on increasing the number of tourists, increasing the tourists’ length of stay, and tourists’ expenditures. A complementary way to enhance the benefits of tourism is to expand the backward economic linkages by increasing the amount of local foods used in agriculture for its providing surplus food production available for sale (Telfer & Wall, 1996:635). The clustering of pineapple dining industry with strong ties stimulates tourism of this terroir region to be flourished. With the contract pineapple farmers concentrated in this region, the raw materials for making pineapple cakes are easy to offer for

Fig. 10. A traditional pineapple cultivation region is also a flourishing new tourist region
bakeries or restaurants. For pineapple processing industry, there are also a lot of related and supporting small firms co-located within this terroir region to take an advantage based on close working relationships, and the practices of how to make pineapple conserve, jam, vinegar, enzyme, juice and ice cream. Pineapple restaurant holders interact regularly with pineapple processing producers for deliberate pineapple processing technologies and learning about how to make high quality pineapple dishes.

VI. CONCLUSIONS
This research highlighted the cluster of pineapple dining industry belonging to a pineapple cultivation region adapt to some relevant tourist spots that occurred in recent years with regard to the tourism market. For pineapple farmers the main change has been the increased relevance of tourism development towards tourist spots which can offer a combination of local cultural practices related to cuisines, manufacturing and the landscape of pineapples. In this terroir region, pineapple dining industry is characterized by a distinguished creativeness, referring to take advantage of cluster effects that bring benefits with the establishment of the network of pineapple producing and marketing through tourism development. The implication for the clustering of pineapple dining industry in this terroir region is the pineapple farmers providing raw materials for the pineapple dining industry with original flavor and the pineapple dining industry promoting tourist drawing with the pineapple cuisines, dishes or desserts. In order to promote visibility of local tourism, the pineapple dining industry establishes additional alliance with other local service sectors such as accommodations, farmer organizations (e. g. farmer market) and research institutes (e.g. university) to.

The pineapple cultivated in Nantou County is a kind of terroir products in Taiwan. According to this research, we conclude that terroir specialty character not only must take into account factors typically concerning ecology such as terrain, climate conditions and associated with practices of human know-how but also focus on dimensions of tourism development. While there may be a clear specialty of historical product, the extent of current tourism development and the linkage with the terroir specialty actually play an important role. This research has made the significance that terroir specialty of label of origin increase an opportunity to promote a new form of tourist food in tourism marketing. Industry cluster perspective combined with the conception of terroir can inform analyses of tourism development and evolvement. Defining the characteristic of terroir specialty
allows us to further realize the multi-dimensions of tourism on a new flourishing tourist region as instances of what local terroir specialty has translated and labeled a tourist food, what creative cuisine based on local materials is how to be produced, marketed, and consumed.

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