Planting the Seed: Innovation Diffusion of Craft Breweries in Florida

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Abstract

Though the craft brewing industry has witnessed significant growth in the last two decades, Florida saw a delay in craft brewery development, from very few breweries in the 1990s to an exponential increase in the mid-2010s. Though geographers have examined consumers' interests in beer, none have questioned why growth is uneven in Florida, and, moreover, what role economics, identity, and politics play in the establishment of craft breweries. This study sought to understand why Florida lagged behind most of the U.S. in craft brewery expansion. We hypothesized that the unique features of the craft brewing industry (strong interpersonal connections, economic strategies, geography, politics, and identity) created both a means and hindrance to diffusion. Using qualitative and quantitative methodologies, this exploratory study concentrated on 87 microbreweries operating from 2013 until early 2016. Informal, unstructured and/or semi-structured interviews were conducted with 26 craft brewery employees, and participant observations were collected at 14 beer industry-focused events. We used diffusion analysis to understand the spread of craft breweries, considering the role of external and internal influences on permeation. Results indicate that Florida craft brewing follows a unique pattern of distribution contrary to most models, as craft brewers rely on internal sources of influence. The social aspect of brewing is the predominant influence of diffusion. As craft brewing is social, it is noted that the initial pause in growth stems from possible risk reluctance by early adopters. Despite internal influence growth, external influences may have created barriers. Florida's legal restrictions limited expansion for craft breweries due to distribution boundaries. Craft breweries saw an exponential increase following the lessening of beer-related laws. Future research is needed to determine if this phenomenon is true across other regions of the United States.

Introduction

Craft breweries are generally small setups focusing on production of unique styles or flavors of beer (Bastian et al. 1999; Alonso et al. 2017). In the last two decades, the craft brewing industry has witnessed significant growth in numerous countries (Brewers Association 2015a). Growth has been no less so significant in the United States, yet this progression has had very uneven geographic expansion, as numerous authors have noted (c.f. Elzinga et al. 2015; McLaughlin et al. 2014; Reid and Gatrell 2015). Florida also had notable expansion in the volume of craft beer produced, growing by almost ten times, with brewery numbers jumping to 143 by 2015 (VinePair 2015). As a state of high migration increases, Florida has witnessed a net population gain of 84% from 2010 to 2012, with noteworthy growth in foreign-born populations, (Gibson 2014; Watson 2016) and a significant impact from the tourism industry, producing $51.14 billion in 2012 according to Florida TaxWatch (2013). However, there has been a lag in breweries built in Florida, with relatively few craft breweries existing in the 1990s to exponential growth in the mid-2010s (Baginski and Bell 2011). Yet, the question arises of just why craft brewing took off relatively slowly in Florida, and far behind other states. In 2014, the state ranked 43rd in breweries per capita; however, the economic impact of the craft brewery in the state was $2.056 million, placing Florida 8th in the nation (Craft Brewers Association 2014). In 2011, Baginski and Bell noted that the Southern region ranks among the lowest in total craft breweries. In 2015, Florida appeared in the top fifth of states on *total* craft breweries, but, as noted above, ranks 43rd in breweries per capita. Some as yet unidentified

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factors must play a role in the differences between total numbers and economic impact.

Geographers have expounded on the consumers' love of beer: why people drink, what they drink, and where. These researchers have examined the rise of craft beer and breweries from the perspective of neolocalism, or a return to an "authentic" local product (c.f. Flack 1997; Schnell and Reese 2003). In addition, much of the research on craft breweries' distribution examines the role of population size and characteristics (c.f. Elzinga et al. 2015; Reid and Gatrell 2015; McLaughlin et al. 2014). Despite these studies, little attention has been given to innovation diffusion among craft brewers.

Background

Innovation diffusion. Diffusion of Innovation (DOI) Theory, originally conceived by E.M. Rogers in 1962, is one of the fundamental social science theories. It explains how, over time, an idea or product gains momentum and diffuses (or spreads) through a community. The ultimate result of the diffusion is that people, as part of a social network, adopt a new idea, behavior, or product. When people accept the new idea, product, etc., they change their behavior, doing something different than they did before. The key to adoption, then, is the perception that the new idea, product, etc. is innovative. It is through the peoples' perception that diffusion is possible (LaMorte 2019).

When an innovation, such as craft brewing, is introduced into a geographic area, three discernible segments of acceptance follow, irrespective of the size of the region. Stage One is the spatial dissemination phase, which is typified by adoptions of that innovation by apparently haphazard geographic patterns of adopters, with the preponderance situated near the diffusion center, but many at major distances away. Stage Two is the spatial diffusion process phase, which involves a continuing spread of adoptions outward from the vicinity of the diffusing center but is also characterized by a significant "neighborhood effect"; the adoption of a new innovation by neighbors of the original Innovator. Stage Three, the maximum penetration phase, happens as holes are filled by the rest of the adopting population and the diffusion process is concluded (Allaway et al. 2003).

The innovation of ideas is spread through different means across the landscape, as either a contagious (cascade or "snowball" effect) or in a hierarchical fashion. In economic terms, we might think of innovation as part of a process, in which considerable change is introduced to an industry, where new thoughts and behaviors are first introduced, shared among like-minded individuals, then these ideas are acted upon and reproduced. This diffusion of *ideas* is what is important for innovation to occur in the business sector, rather than merely the creation of, for example, new plants or equipment, or new leadership (Robertson 1967).

With the introduction of an innovation, the question then becomes who is the most likely to adopt and share this idea. Adoption of a new idea, behavior, or product (i.e., "innovation") does not happen instantaneously in a social network; rather it is a *process* whereby some people are more likely to accept the innovation than others. Researchers found that people who adopt an innovation early have different characteristics than people who adopt an innovation later (LaMorte 2019). Rogers (1995) describes five categories of Innovators in terms of their acceptance of new innovations (Fig. 1). Innovators, the first stage of diffusion, include people of high social status, financial stability, and those people willing to take a risk. Early adopters also have high social status and advanced education. They use judicious espousal of innovations to maintain a central position in communications. Early majority adopters take up innovations considerably after Innovators and early adopters, although they still maintain higher social status and contact with early adopters. Later majority adopters' approach new innovations with more caution and skepticism than previous adopters, and may have little social status and lack in opinion leadership. Laggards tend to stick to traditions and resist change (Rogers 1995).

Numerous authors have contributed to the theory of innovation diffusion as well as S curve theory (c.f. Schumpeter 1939; Fisher and Pry 1971; Hatten and Piccol 1973). One of the first of these studies was done by Ryan and Gross (1943). The authors studied the diffusion of hybrid corn in Iowa and noted that the adoption rates of new hybrid corn species among Iowa farmers initially was slow but increased rapidly over a short span of time. They went on to examine the role of internal and external influences on the spread of the innovation and found that the use of the new hybrid corn by neighbors had the most influence on the eventual adoption of the innovation by the farmers. Internal influence, in this case, mattered more than external influences. However, the authors uncovered that each channel—internal and external—served different functions. Mass communication, such as the radio, functioned as the basis of preliminary information, while interpersonal networks functioned as the influence over the farmers' decisions to adopt. Ryan and Gross also found that the rate of adoption of hybrid seed corn followed an S-shaped curve, shown in Fig. 2. This S curve reflects the innovation decision process (or rate of acceptance), in that an innovation is created, shared, reached maximum saturation, and then fell out of favor as a new idea arises. The S curve can refer to both adopters of an innovation, or to the innovation itself.

Models of diffusion. Considering models of innovation diffusion, then, one must include the influence of both

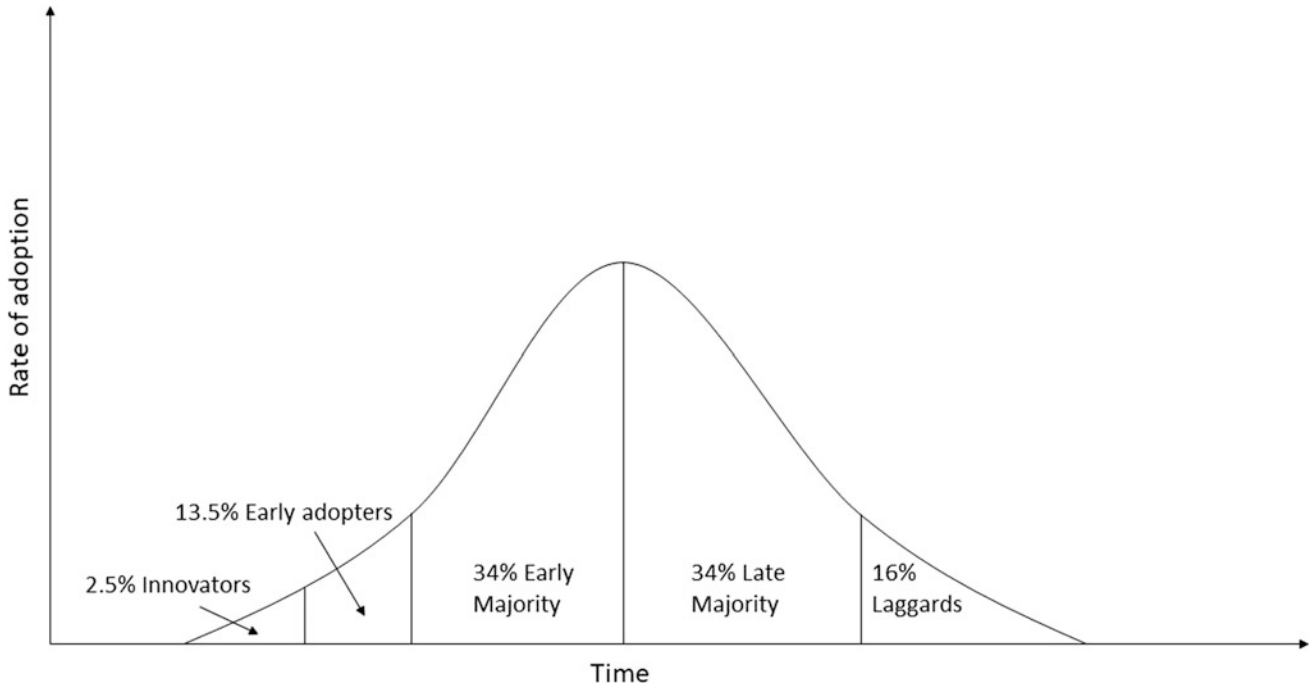

Fig. 1 Adapted from Rogers (1995) categories of innovation diffusion

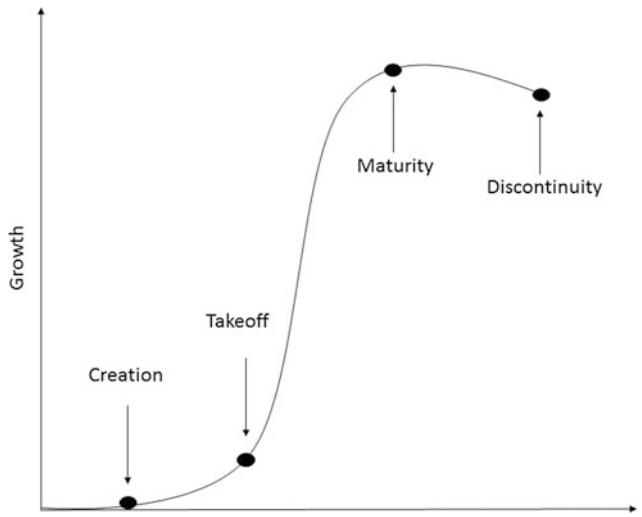

Fig. 2 S curve of innovation (adapted from Heijer 2010)

external influence (outside the personal network of the adopter) and internal influence (inside the personal network of the adopter). External influence can include multiple sources, such as social media, television, newspapers, or advertising. Internal influence is the influence of friends, neighbors, business partners, or even competitors. Mixed influence models of diffusion consider the influence of both external sources (such as advertising) and internal sources (such as word of mouth) to spread the innovation on the landscape (Mahajan and Peterson 1985). Previous research indicated that persuasive individuals (for example, the Early Adopters of Rogers' model) are more influenced by external sources, which they then convey to less-influential individuals (Thompson 1967).

Crucial in understanding how new products and technologies are diffused in the market is the Bass Model (Bass 1969). The Bass Model predicts whether an adopter of an idea is an Innovator or an imitator depending on the timing of adoption, which in turn depends on the Innovators' flexibility and influence. The model has been widely used in product sales' forecasting, and as of 2004 was one of the top ten most frequently cited papers in the history of *Management Science* (Hopp 2004). Research has found that most often the distribution of the Bass Model is exponential, although it may also have logarithmic distribution. Subsequent research revealed that the Bass Model dovetails very well with Rogers' (1995) diffusion theory, thus the model can be used to predict the adoption category shown in Fig. 1 (Mahajan et al. 1995).

Numerous authors have suggested the importance of originality and uniqueness, especially in production and types of beers, aiming for a niche market representing a small (and growing), yet specialized consumer segment (Bastian et al. 1999). Thus, it is not surprising that craft breweries' volume share of the market has been consistently increasing (Brewers Association 2015b). While craft breweries have surged in economic importance, exploration of innovation in this sector is scarce. The existing literature on this topic has focused primarily on qualitative surveys

(Alonso et al. 2017). As such, this study explores how craft brewing is adopted as an innovation by the brewers themselves, divorced from the consumer end. Using the Bass Model and Rogers' model of innovation diffusion, we seek to understand the growth of the craft brewing industry in Florida, as a preliminary case study.

Methodology

This exploratory study concentrated on microbreweries and brewpubs in Florida, which were members of the Florida Brewers Guild (FBG) as of December 2015. The FBG is open to any Florida craft brewery, and functions as both a social and political connector for craft brewers in the state. The FBG operates as a nonprofit trade association, focused on assisting craft brewers throughout the state of Florida with legal representation and educating the public about the brewing business in Florida (Florida Brewers Guild 2016).

The study population for this research included 87 different microbreweries and brewpubs in the state of Florida that were members of the FBG from 2013 to early 2016, out of a total of 143 craft breweries in existence at that time (see Appendix). We used a combination of qualitative and quantitative data collection methodologies, in early 2013 to early 2016. The qualitative portion included fieldwork doing informal, unstructured, and/or semi-structured interviews, as well as participant observation (Bernard 2011). We conducted 26 interviews with brewmasters, brewers, and employees of breweries, as well as participated in 14 festivals and industry-focused beer events (see Appendix for list). We asked these participants questions about their identity, connections to other brewers and their surroundings, as well as information about any potential barriers to entry, such as politics or economic concerns.

Data Analysis Methodologies

Diffusion Analysis. One of the basic questions of this study examined the spread of craft breweries across Florida in a seemingly uneven spatial pattern. We used several models of innovation diffusion to consider this disparity. These diffusion models predict the number of adopters that will exist in the system at a given point in time. The equation used for the mixed influence model is

$$\frac{\mathrm{d}N(t)}{\mathrm{d}t} = g(t)(m - N(t))$$

In this case, $\frac{dN(t)}{d(t)}$ is the rate of diffusion, $N(t)$ is the cumulative number of adopters of the innovation at a given point in time, m is the ultimate number of adopters, and $g(t)$ is the change agent, or the coefficient rate of diffusion. In a mixed influence model, $g(t)$ is equal to $p + qN(t)$. The equation then becomes

$$\frac{\mathrm{d}N(t)}{\mathrm{d}(t)} = \left(p + \frac{q}{m}N(t)\right)(m - N(t))$$

where $N(t)$ equals the cumulative number of adopters at time t, m is the ultimate number of adopters, p is the coefficient of innovation, and q is the coefficient of imitation (Mahajan and Peterson 1985; Kijek and Kijek 2010). The value of p and q used in this study are the generalizations described by Mahajan et al. (1995), with p value of 0.03 and q value of 0.038. For the value of m, the ultimate number of adopters, this study uses data from a study done by Taylor et al. in 2014 on craft brewing in Florida, which predicted the maximum number of craft breweries in Florida as 550, based on the number of breweries per capita in other states.

We also considered the role of *only* internal influence. This examined the impact of only brewers' communications with each other and without the influence of media. This is valid because preliminary research indicated that craft brewers often have no advertising other than social media, festival attendance, and word of mouth. The background analysis also revealed that brewers become connected to the network (i.e., become a brewer) by first attending homebrewing clubs. Thus, internal influence on craft brewers may be more significant than external influence of mass or social media.

For the internal influence model, the equation becomes

$$\frac{\mathrm{d}N(t)}{\mathrm{d}(t)} = \left(p + \frac{q}{m}N(t)\right)(m - N(t))$$

where the p value is 0.

We used each of these models to see which type of growth (linear, logarithmic, exponential, or polynomial) has the best fit. We used the R-squared (R^2) value to determine the reliability of the trendline. A trendline is most reliable when its R-squared value is at or near 1 (Yamane 1973). A polynomial trendline is a curved line that is used when data fluctuates, for example, for analyzing gains and losses. An exponential trendline suggests that either growth or loss values rise or fall at increasingly higher rate. Thus, either type of trendline might model changes in the dataset.

In order to develop these models, we took information on the foundings (when the brewery opened) of craft breweries in Florida and the foundings of the craft breweries belonging to the FBG, in order to develop a time series of brewery creations throughout the state of Florida. For this part of the analysis, we considered both the FBG and all craft breweries, to see how the model changed depending on inclusion/exclusion of breweries outside the guild. We gathered information on brewery foundings from the

qualitative research, from Walen (2014) and DeNote (2015), as well as from the brewery websites and Facebook pages. One aspect that needed to be specifically addressed was the exact start date of the brewery founding. Some breweries considered their founding date as the day on which they applied for their federal license, others reported their founding date as the day they opened the doors of their taprooms, and still others report the founding date as the day they began brewing beer. For this study, we used the date of founding that the brewers themselves accepted as their founding date.

We also utilized the innovation diffusion analysis theory proposed by Rogers (1995) by giving each brewery an adopter category based on the time of the brewery opening. We assumed 550 total craft breweries in the state of Florida as the maximum, then used the categories by Rogers to separate the breweries into the Innovator categories. The influence models were compared to the Innovator category of the brewery as well as examined in the context of the region in which it was located.

We then entered GIS-based information of brewer location, brewery foundings and the dates of the foundings. Using ArcMap, we constructed a density map illustrating the frequency of brewery occurrence in a given city location using the Point Density tool in ArcMap. This tool calculates the density of a point in a given neighborhood. We used major cities in Florida and estimated that the city boundaries would extend 20 miles from the center. Each item's value is used to determine how many times that point counts. For example, if an item's value is 3, then that point counts 3 times in the density analysis.

Results

Spatial distribution. Understanding the disparity in spatial distribution of craft breweries in Florida and what that means in terms of the craft brewers' connections to one another revealed notable patterns. Of the 87 breweries included in the guild, 69 of those are microbreweries, with 36% in the Central/South region (see Fig. 3). By taking the estimated number of total craft breweries in Florida, 550, and using the percentages of Rogers' adopter categories, there should be 13 Innovators. As of the end of 2015, Florida had still not reached the Early/Late Majority Stages described by Rogers (1995). Thus, all of the breweries studied through 2015, regardless of type, are either Innovators or Early Adopters. Between 1996 and 2009, only 13 craft breweries existed in Florida. These thirteen breweries are considered Innovators (representing 2.5% of 550 total predicted craft breweries), and five of these were brewpubs, or 38% of the Innovator category. Of the 74 Early Adopters (representing 13.5% of the 550 total predicted craft breweries), 70 of these were microbreweries.

Considering spatial expansion, each region is well represented by the Innovators. There was one Innovator in the North (Panhandle) region, four Innovators in the Northeast region, six Innovators in the Central/South region, and two Innovators in the South region (Table 1).

In terms of where the craft breweries appeared, Fig. 4 shows the distribution of craft breweries in the state were most likely to occur in major cities, including the Tampa Bay area, Orlando, Fort Lauderdale, and Jacksonville. As of 2015, density of breweries was indeed concentrated in major city areas. This is in line with previous research, which suggested that metropolitan areas are most attractive for craft breweries.

Figure 4 illustrates where growth occurred and where it did not, and the effective date of founding as well as the type of brewery established, and where. Most of the development is concentrated in coastal areas such as the First Coast (Jacksonville), the Gold Coast (Miami area) and the Gulf Coast (Tampa Bay area) and in the big tourist spot, Orlando. There is little growth initially in areas such as Tallahassee, the state capital; Pensacola; or St. Augustine. Figures 5, 6 and 7 demonstrate the uneven expansion of the breweries across Florida hierarchically.

When examining the diffusion of breweries into Florida, it is evident that entry was slow between the 1990s to the early 2000s. Dunedin Brewery (brewpub) opened in 1996 in Dunedin, Florida (in the Tampa Bay area), making it the first craft brewpub to join the guild. Florida Beer (microbrewery) began in 1997 in Titusville, and the Doble family founded Tampa Bay Brewing Company (brewpub) that same year in the Tampa Bay Region. Other brewpubs and microbreweries followed suit, albeit slowly. The distance was also considerable between some of these breweries, such as Brewzzi (brewpub) in Boca Raton, Florida and the next brewery founded, McGuire's Irish Pub (brewpub) in North Florida. 650 miles lie between these two breweries.

Growth remained slow between 2003 and 2011, with breweries beginning to "fill in" throughout the state. Brewery startups from that time increased to only 23 (Fig. 6). Again, these new breweries were concentrated in larger cities. It is during this time that the microbrewery began to gain in popularity in the state.

From 2011 to the end of 2015, Florida witnessed a virtual explosion of growth (Fig. 7). The number of craft breweries in the guild nearly quadrupled in that time. After overcoming what appeared as an initial resistance to the adoption of the

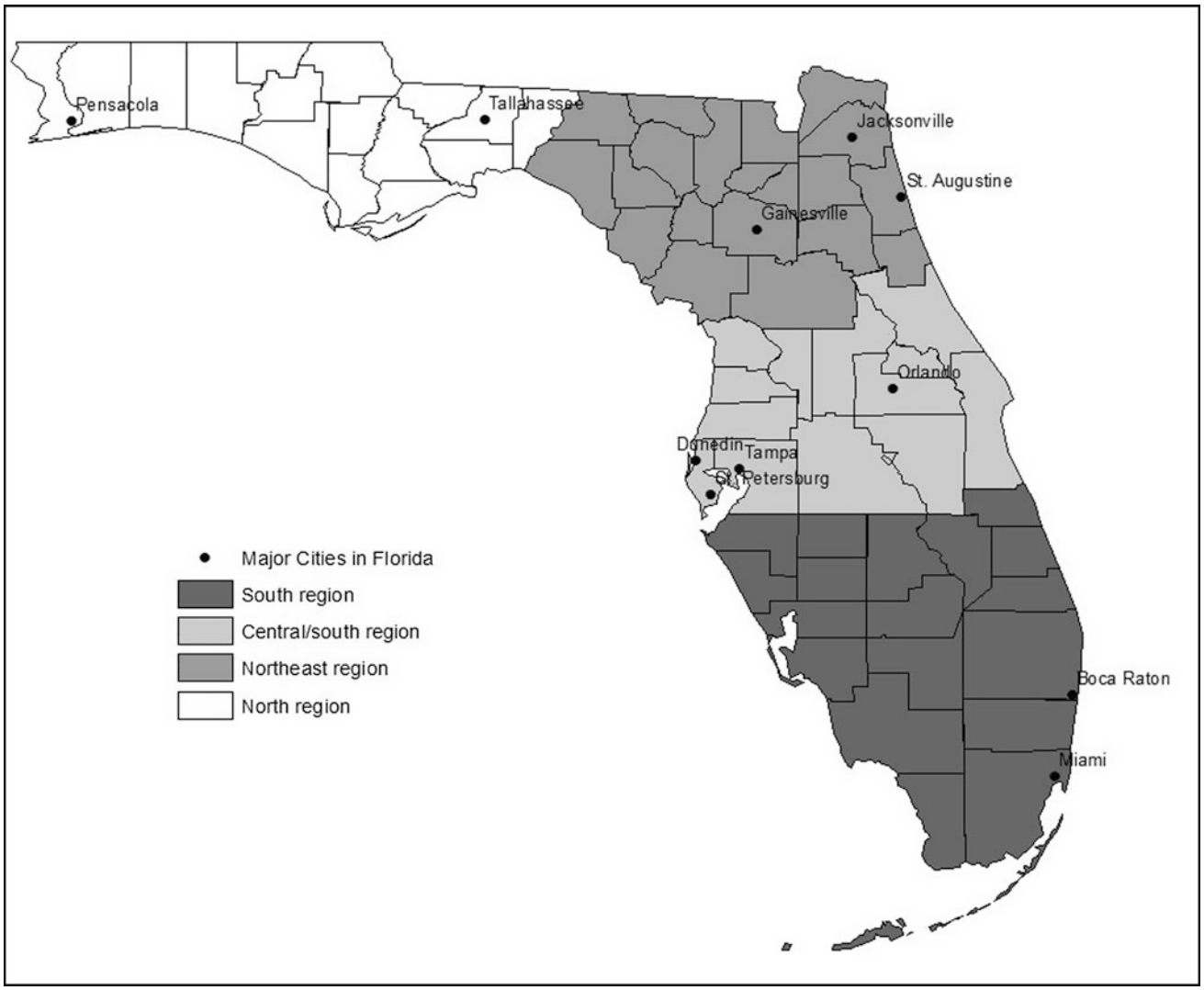

Fig. 3 Regions and key cities of Florida

Table 1 Distribution of craft breweries per region, with adopter categories (adapted from Rogers 1995)

Region	# of microbreweries	# of contract brewers	# of brewpubs	# of regional brewers	# of Innovators	# of early adopters
North	4	0	2	0	1	5
Northeast	11	1	4	0	4	12
Central/south	37	2	4	1	6	38
South	18	1	2	0	2	19

innovation (craft brewing), growth occurred rapidly throughout the state. By 2015, Florida had a vastly expanded craft brewing landscape.

By comparing these figures, diffusion in the state of Florida *did* follow a hierarchical diffusion pattern. In 1996, there was a single FBG member in existence in Tampa. By 2003, craft breweries expanded to other major Florida cities, including the Miami/Boca Raton area, the Tampa Bay area, Orlando, and Jacksonville. By 2011, there was continued expansion via contagious diffusion and the neighborhood effect. Growth continued in larger cities, but by that point, expansion had spread outward from the initial innovation center (the bigger cities) into mid-sized areas of Florida such as Gainesville and the Fort Myers/Naples area. By the end of

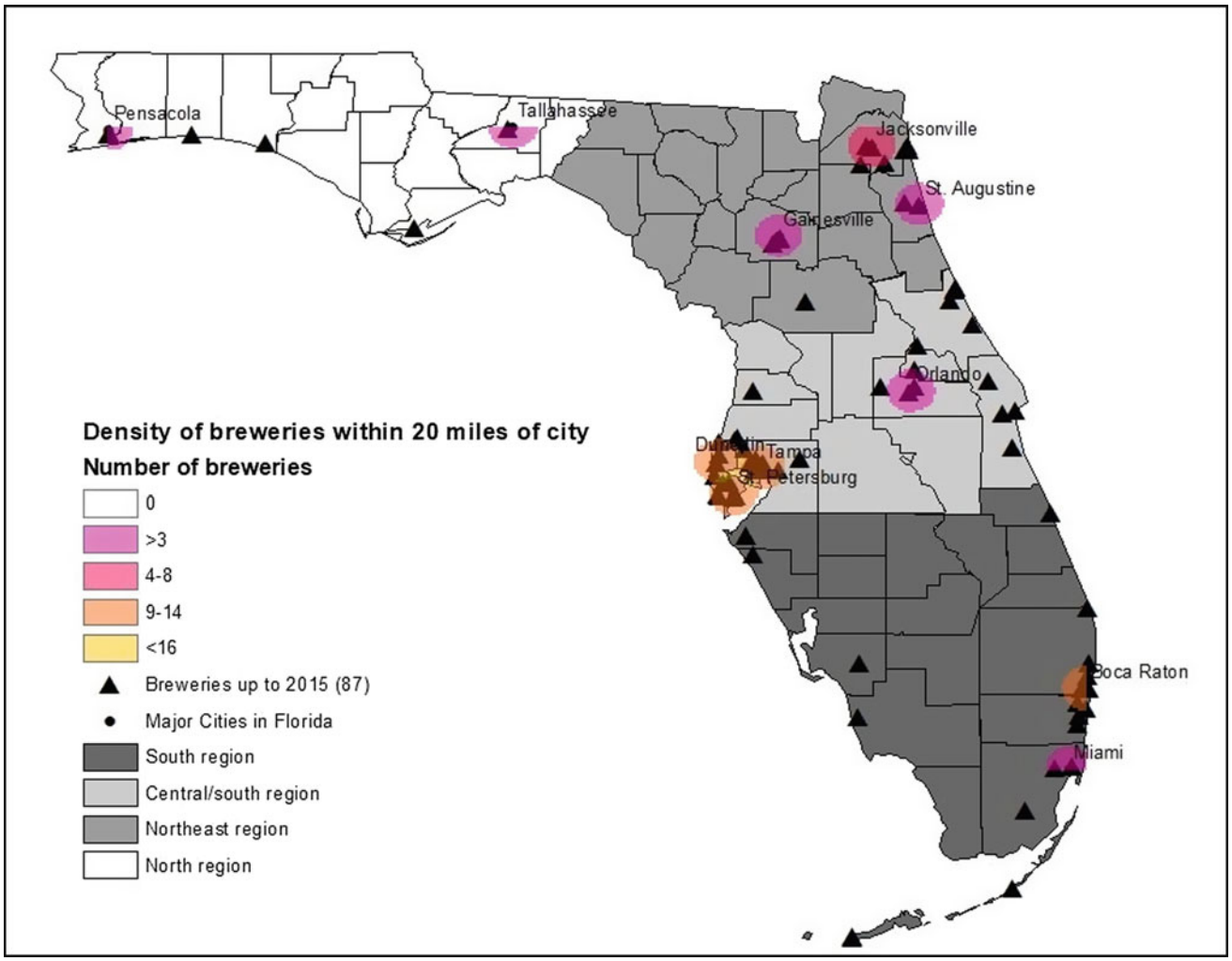

Fig. 4 Density of Florida craft breweries

2015, craft breweries had expanded even further throughout the state (Fig. 7).

Diffusion Models. Figure 8 represents the reality (versus a model) of growth in Florida of number of craft breweries founded in Florida (that participated in the Florida Brewers Guild) from 1996 to 2015. This growth was nearly flat until 2011. However, after 2011, craft brewery foundings doubled, then nearly quadrupled by the year 2015. An exponential trendline fitted to the graph had an R^2 value of 0.9078, while the R^2 for the polynomial trendline is 0.8984. In this case, the exponential growth trendline represents the best match model (the R^2 value is closest to 1). If one compares this graph to the S curve mentioned above (see Fig. 2), growth also appears to adhere to that pattern.

Figure 9 shows the mixed influence model of brewery diffusion. The R^2 for the polynomial trendline is 0.9103, while the R^2 for the exponential trendline is 0.7659. In the mixed influence model, predicted growth starts out higher than what actually occurred. In 1996 (time period 1), there was a single FBG brewery founding. The mixed influence model predicts 17 brewery foundings for this time period. Notably, in 2011 (time period 16), the model comes close to predicting reality. The model predicts 24 brewery foundings; in reality, 23 breweries were founded at this time. After 2011, actual growth expands more rapidly than the mixed influence model predicted. The polynomial growth curves fit well with the mixed influence model; however, actual growth of Florida breweries fits better with exponential growth trends, which gives rise to the sharp change seen in Fig. 8. Thus, the mixed influence model might not be a good representation of the observed growth rate of Florida craft breweries.

Figure 10 shows the graph of the internal influence innovation diffusion model. The internal influence model

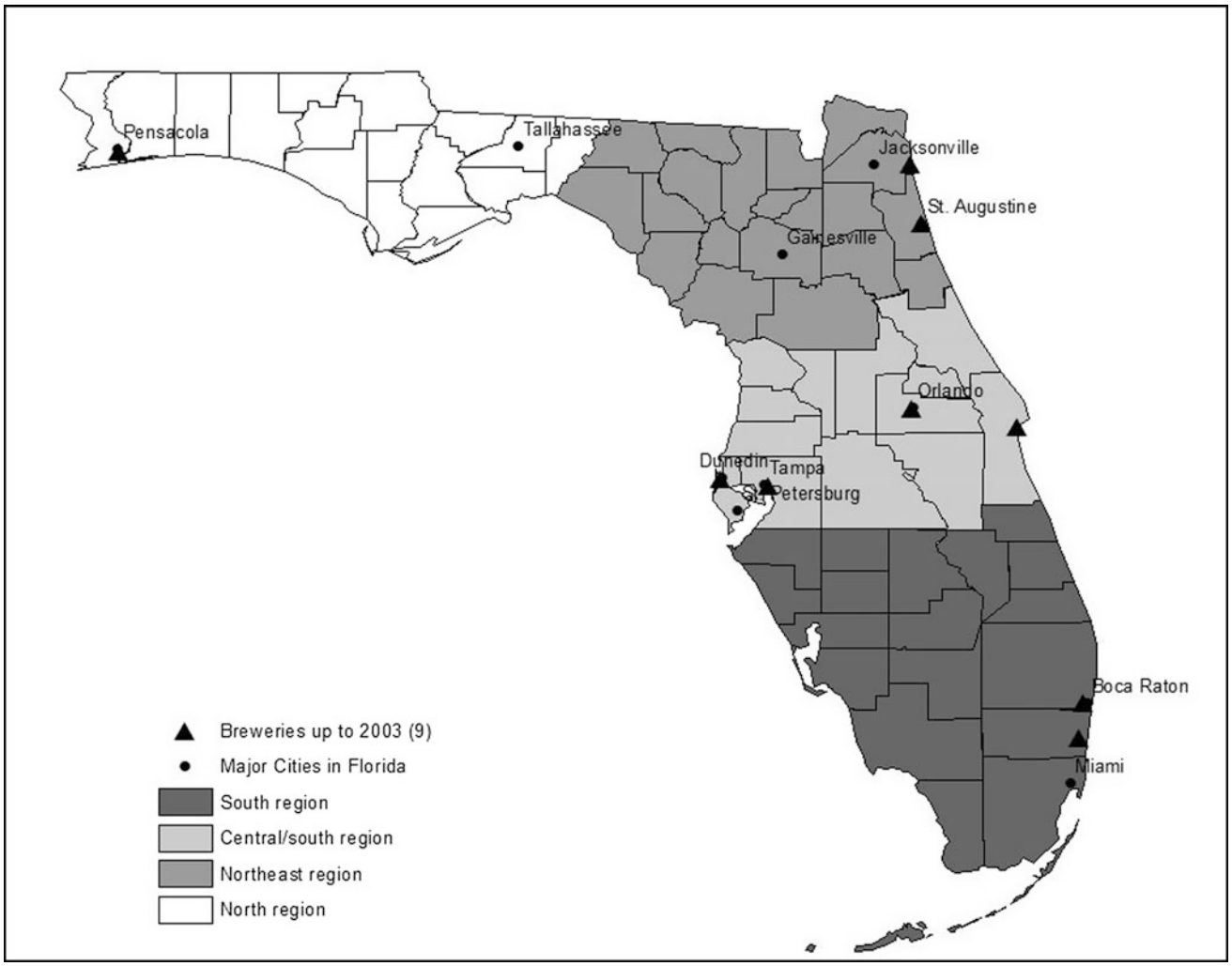

Fig. 5 Craft breweries in the state of Florida up to 2003

appears to more accurately predict the initial spread of craft breweries with slow growth. However, actual craft brewery growth expanded with much more exponential growth than the internal influence model predicts. The R^2 value of the polynomial trendline is 0.9065, where the exponential trendline's R^2 value is 0.9086, which is not significantly different from one another. In an internal influence model, there is some force acting internally on the individuals in the system that drives them to adopt an innovation. In this model, much as in reality, growth was initially slow and rapidly accelerated in the number of adopters.

In looking at the three results together, neither the mixed influence nor the internal influence models capture the rapid growth rate that *occurred* in the Florida craft beer scene through 2015 (Fig. 8). Figure 11 compares the three graphs, and considers both an exponential trendline and a polynomial trendline for the observed FBG growth rate vs the models. While the polynomial trendline provides a good fit, with an R^2 of 0.8978, the exponential growth line still gives a better fit, with an R^2 of 0.9053. The polynomial line still provides the best fit for both the mixed influence and internal influence models.

Florida does include numerous other breweries that were not part of the FBG during the study period. Diffusion of an innovation, such as the idea of craft brewing, would not per se be limited by inclusion in the Guild; rather, continued ideas and new innovations might pass along through Innovators in a geographic space. Figure 12 shows the actual growth rate of all craft breweries in the state of Florida, versus the internal influence model and the mixed influence model. The observed growth rate of all Florida craft breweries again appears to have an exponential growth rate. The R^2 for the exponential trendline is 0.9325, indicating once more a sharp increase. The mixed influence model again is a

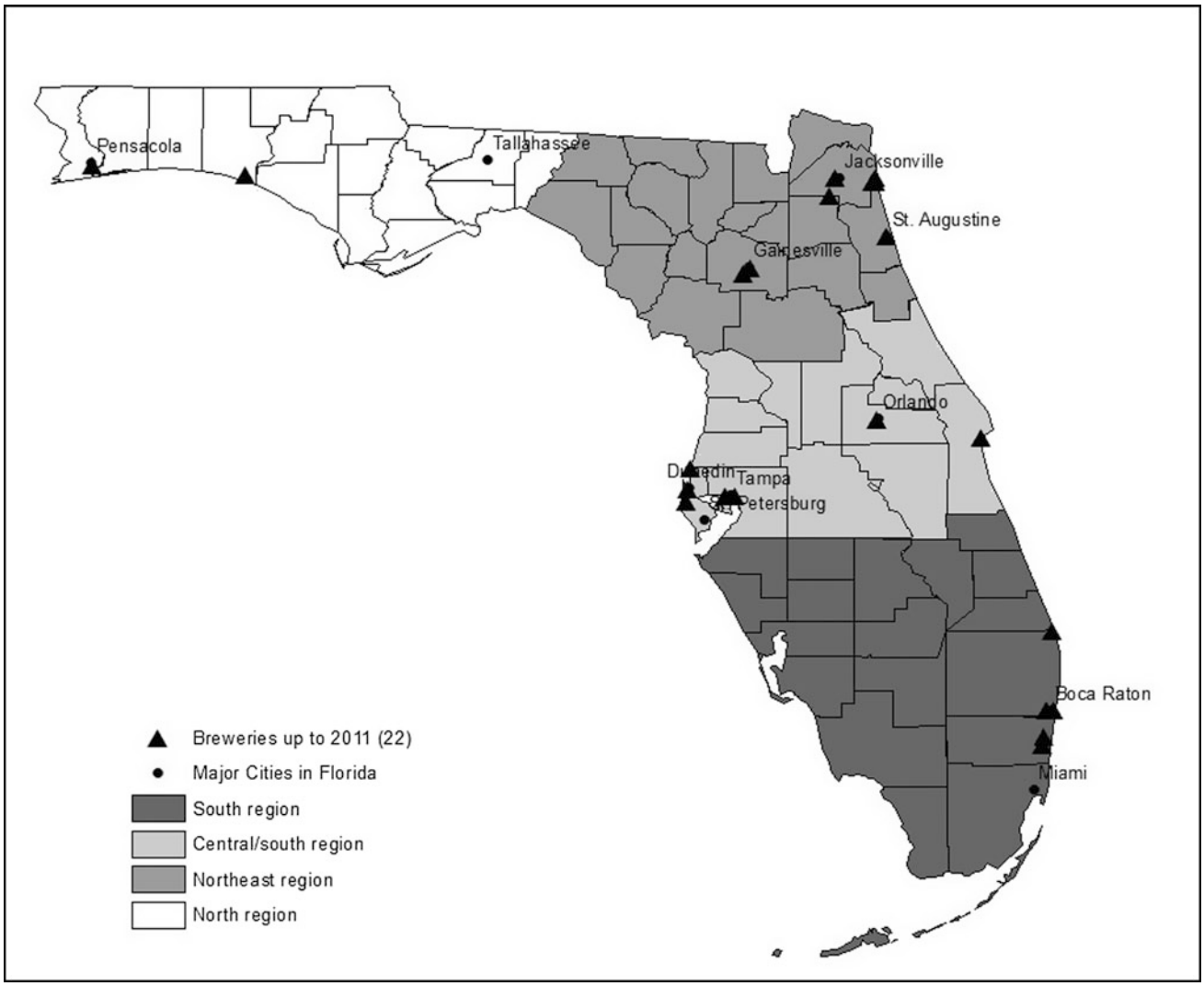

Fig. 6 Craft breweries in the state of Florida up to 2011

more gradual rate of change, with the R^2 for the exponential trendline of 0.8438. The internal influence model fits better for the exponential growth curve seen with all of the Florida craft breweries included, with an R^2 of 0.9273. With all of the craft breweries included in the increase rate, the super-exponential expansion is even more apparent (Fig. 9). The numbers of craft brewery foundings sharply increased relative to either of the models. In addition, as Fig. 12 illustrates, the growth trends to the right, with little to no growth, to then a rapid upward trend.

Qualitative data. Interviews with FBG brewers revealed interesting patterns about identity, economics, and political concerns of Florida craft brewers. Of the 26 interviewees, a few commonalities emerged (Table 2). See Appendix for the list of brewers/breweries interviewed.

There are a series of archetypes that fit the background of the Florida craft brewer: the scientist, the artist (often a chef), and the business person. For example, Darwin's Brewery themes their space around food and their tagline states, "Chef inspired". Matt from Darwin's Brewery mentioned that they even work with the local restaurant Indigenous to create chef inspired creations.

Often these categories overlapped and repeated throughout the investigation. These archetypes hold true even for individuals who the researcher only observed rather than interviewed. Many of the interviewees commented on these facts. For example, Todd of Tampa Bay Brewing Company commented that "…Brewers…we are chemists, chefs, mechanics…why? Because we love beer!" Ron of Veterans United mused that he had met science driven brewers, like

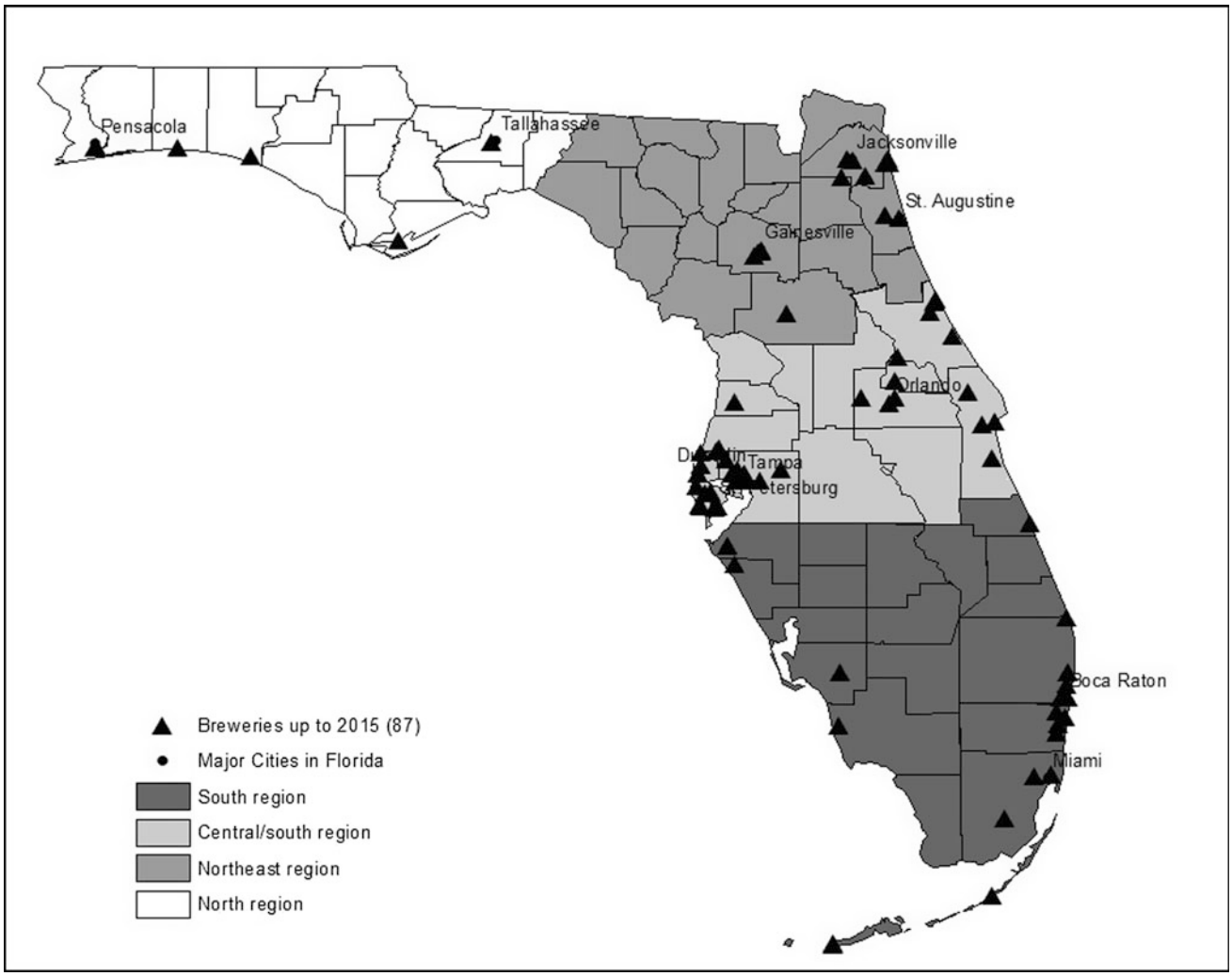

Fig. 7 Craft breweries in the state of Florida up to 2015

himself, and artistic brewers. His head brewer, James had "…artistic flair…so we balance each other out."

In this sample, respondents tended to be males in their late 20s to mid-50s. There were a few female respondents, and as such worth noting. Of the females, four were part of a husband and wife team that created the brewery. Many of the brewers mentioned their wives and how instrumental they were in starting the brewery. Several of the brewers shared a similar story of a home brew system given to them as a gift from their wife that propelled them into the craft brewing world.

Of the people interviewed, 69% of the interviewees indicated they had a college degree of some kind. Craft brewers appeared aware of the role of identity in their community, as a driver of economic upturn as well as gentrification. Yet perhaps this educational background made them less uncomfortable than they might have been otherwise; they acknowledged that they held these innovative roles in changing cityscapes and the economy around them, and had notable thoughts on why craft beer has proven so pervasive in the American cultural landscape.

By far, the most often talked about point in the interview process involved the concepts of community and collaboration. This included the intra-brewery collaborations, and the connections with the larger community around the brewery. These community members did not even need to necessarily love beer; rather just understand the role the craft brewery can play in aiding the community, such as with Community Redevelopment Agencies (CRA).

In terms of frequency of mention, during the interviews, brewers mentioned the word or concept of "community" the most of any other term. 100% of brewers mentioned the

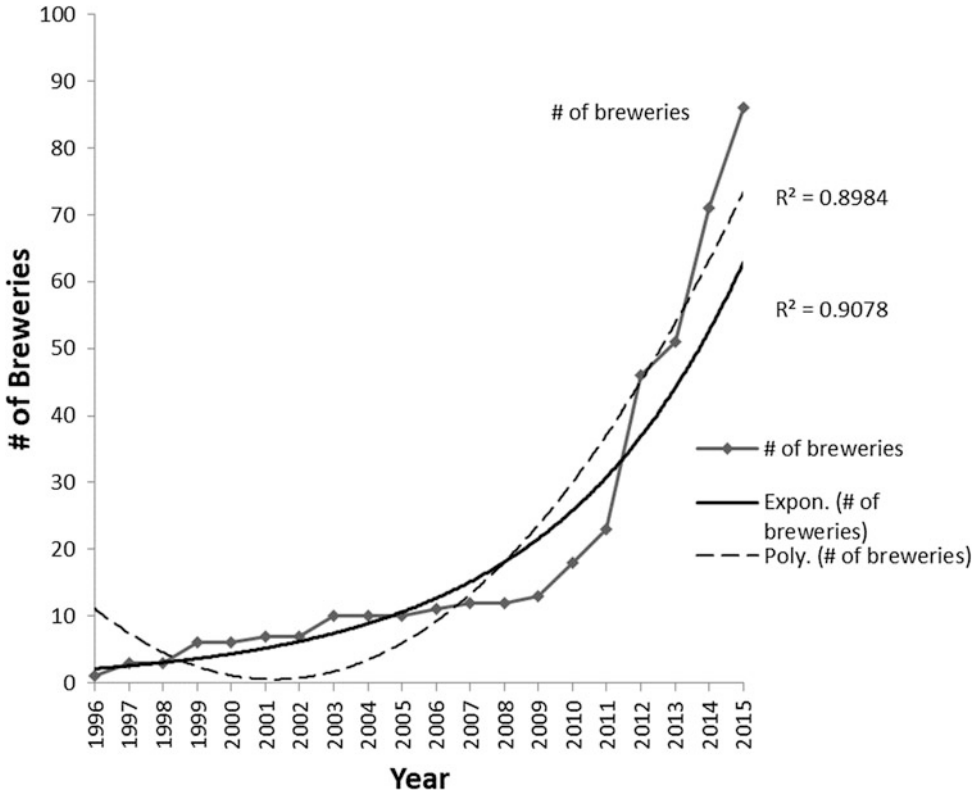

Fig. 8 The growth rate of Florida craft breweries that are also members of the Florida Brewers Guild, comparing exponential and polynomial trends

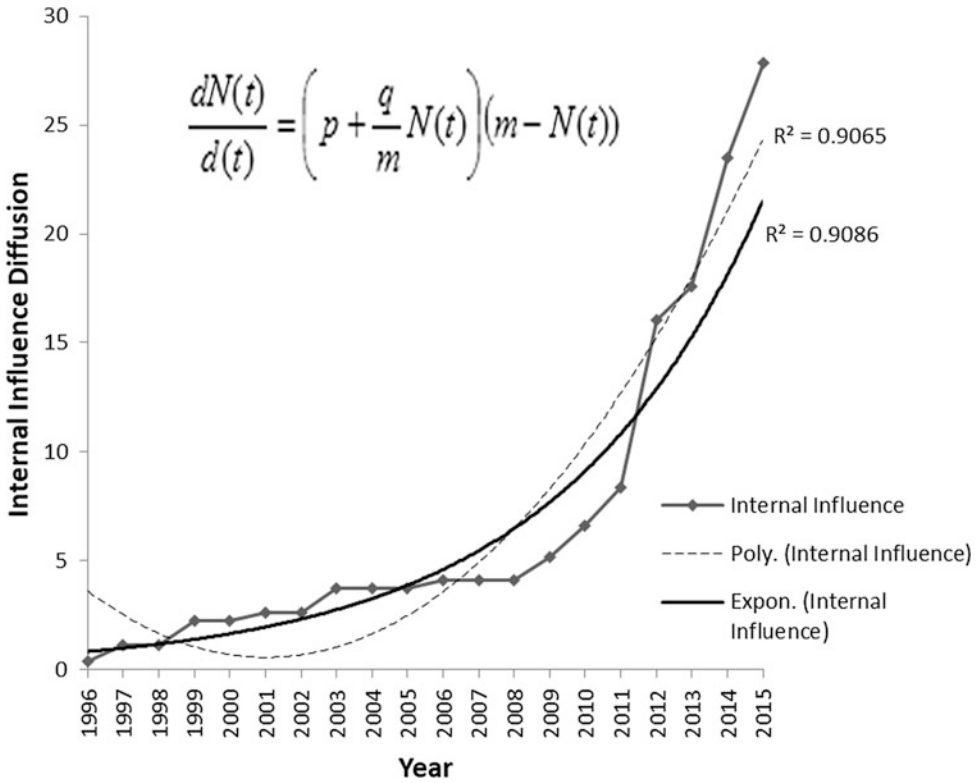

Fig. 9 Graph of the mixed influence model of innovation diffusion (equation shown)

Table 2 Frequency of Interviewee responses

Categories	Attributes	Frequency of response
Identity		
- Gender	• Interviewee's identifiable gender	85% male 15% female
- Background	• Homebrewer	65%
	• Chef	15%
	• Engineer (worked in this field prior to starting brewery)	35%
	• Microbiology (specific to beer production)	7%
	• Training in Germany	15%
	• Apprenticeships (formal or informal)	23%
	• College degree (of any type)	69%
Collaboration	• With other brewers	62%
Community	• Mention of the word or concept of community	100%
	• Collaboration with community	65%
Politics	• State level (growler size fight and taproom issue)	31% (answers dependent on date of founding-some after passing of new laws, see discussion)
	• Zoning/licenses from city/county	54%
Place	• From the area	37%
	• Attended school	52%
	• Other	11%

"craft beer community." This included customers, both local and nonlocal, supporters of the business, and other breweries. When the brewers mentioned community, often it involved invocation of place. Leigh from 3 Daughters said "The geography of beer is very comparable to wine in the 80s. We had 4 wines, and it went to 40–50 wines. We really started spreading our wings…. We want to be a great regional brewery, and leaders in the community."

When asked about barriers, Florida's laws were frequently mentioned, as were zoning issues. Results are mixed about whether breweries have city or county support. In many cases, the city or county business development or CRA's aided the craft brewers, only to have zoning boards or permitting boards hold up the process. Some cities and counties offer much assistance and guidance to the breweries. For example, the City of Oakland Park worked with Funky Buddha to create a Culinary Arts district. John of Funky Buddha stated that this project

> …was years in the making. The redevelopment assistant was looking to create a thriving downtown. They had a hard time attracting someone…they needed to bring in someone who can sustain themselves. K.C. (the owner of Funky) met with the RMA at a meeting in D.C. They decided on a location that night!

In addition, the presence of other brewers greatly aids the process. This is twofold: the other, more established brewers clear the way for newer brewers to enter the area, and aid the newer brewers in terms of legal or political issues surrounding the process. For example, Matt of Pinellas Ale Works (PAW) offered that "…Other breweries were free with their information…. always offering to help when they can. In fact, the already established breweries' reception was the more the merrier!" Matt stated that in general, the city and county were overall "…Positive. People have to do their job, so we just have to follow the rules and be patient."

In many places, breweries face political and legal bumps in the road on the way to establishment. For example, Tito of Biscayne Bay Brewing shared that the City of Doral was "difficult…there are not many other craft breweries here… they asked us to put fire sprinklers under the tanks! This makes it a long process, but we can't fight it." He also shared, however, that "…A lot is happening in Doral…we came in at the right time." Ron of Veterans United shared that Jacksonville "is the fastest growing area for craft beer, but the city is not necessarily supportive. One group is: Visit Jacksonville. They understand tourism, but the government is stuck in the 1970s and 1980s." He stated though,

"Jacksonville and the state…it's a lot like wine. Attitudes take a while to change." Julie of Pair O' Dice said, "Cities don't understand breweries…they equate them to a restaurant." 26° Yonathan also expressed this same frustration when choosing a space in Fort Lauderdale, that the city wanted them to attach food to the brewery. Food, it seems, makes beer a safer risk.

To establish themselves, and in order to navigate the tricky process of city, county, and federal permitting, licensure, and zoning issues, brewers join the Florida Brewers Guild (FBG). When asked about why they chose to join the Guild, overwhelmingly brewers stated they joined because they wanted legal representation and help. Devon of 7venth Sun served on the board of the FBG, and noted a study done by the Economics department at the University of Florida, created specifically to explore the economic and political issues facing FBG members (Taylor et al. 2014). She stated that the Guild helped to "centrally unify brewers. It gives us a stronger and louder voice. We can get more specific…about government regulations." This was an opinion shared by most, for example, Reimy of Brewzzi stated that "…the Florida Brewers Guild helps us have a voice in legislation." The Guild also provides resources for new brewers as Christine from Marker 48 shared, "They have tons of resources, and can help you meet other brewers…it's a way to connect."

Discussion

Craft brewing in Florida follows a different sort of diffusion than the traditional models of internal influence or mixed influence explain (Figs. 9, 10, 11 and 12). These models suggest that either only internal sources of influence matter to the diffusion of an innovation, or that a combination of external influences and internal influences affect adoption rates, respectively.

Rogers (1995) diffusion analysis study assumes that Innovators/Early Adopters in a system do so because of the influence of external sources such as television or social media (external influence). However, interviews with Florida craft breweries suggest that internal influences such as homebrewing clubs had more influence on the spread of craft breweries than any type of advertising. Homebrewing clubs, or any propagator of innovation, represent channels by which information moves on the landscape. Innovation diffusion depends on the passing along of information to new, potential adopters of that innovation. Once the actors in the system adopt the new innovation, in what way do they remain cohesive?

Craft brewing is different than technological innovations, for example, because craft brewing is inherently a more social act than adopting a new computer technology. Although one might adopt the practice of craft brewing, new

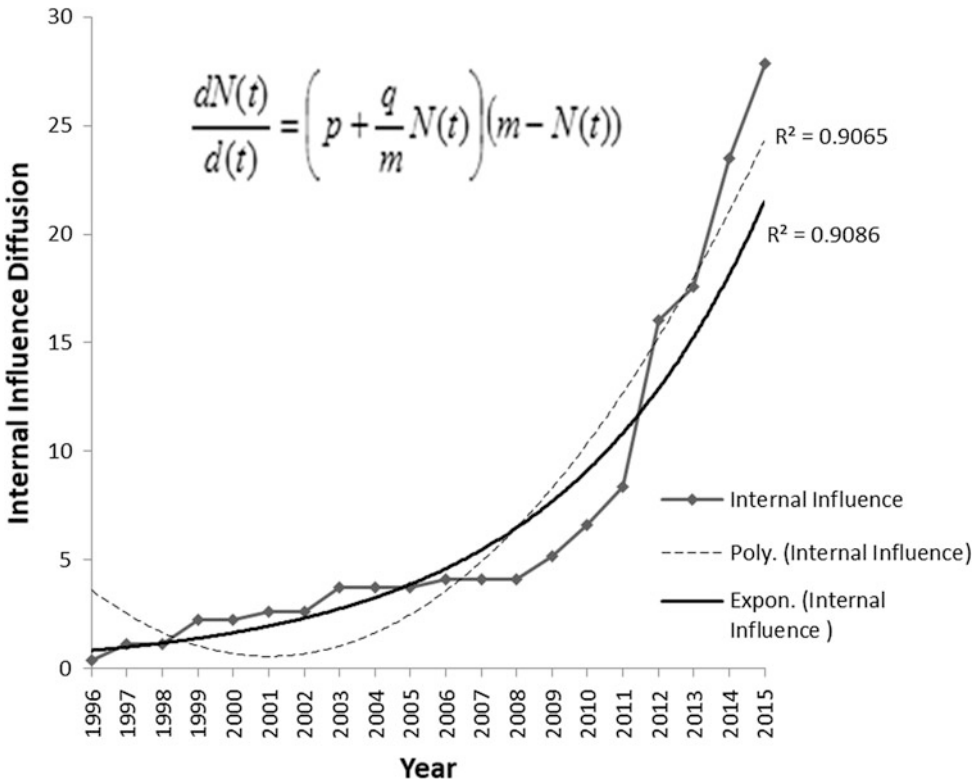

Fig. 10 Graph of the internal influence model of innovation diffusion (equation shown)

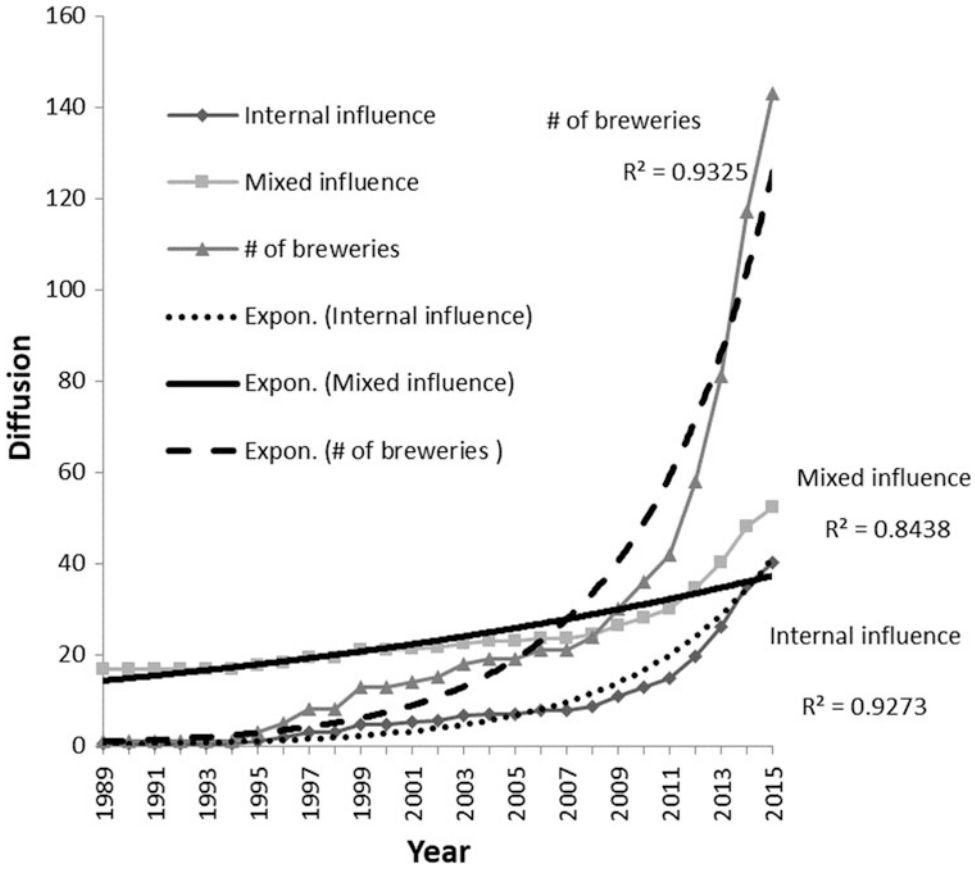

Fig. 11 Graph comparing the innovation diffusion models and the reality of growth of FBG breweries

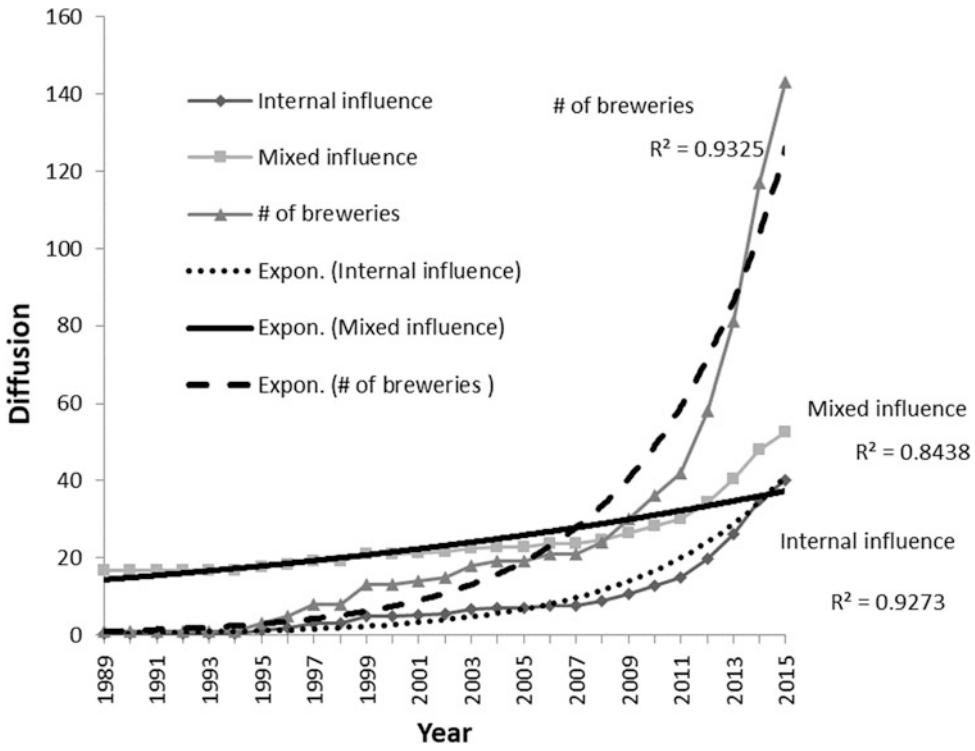

Fig. 12 Graph comparing observed FL brewery foundings to innovation models, with the exponential trendline shown

styles, techniques, ingredients, and methods continually change. Unlike most diffusion studies focused on marketing a new product, craft brewing does not per se involve purchasing new items, but instead needs a source of novelty, or the interjection of new ideas into the system. In addition, barriers to entry, as well as other hindrances to entry, such as licensing and permissions from federal and local officials, may prohibit adopters from fully embracing craft brewing, which in this case means actually opening a craft brewery.

Comparing the actual growth rates of craft breweries to Rogers' (1995) model of innovation adopters, this initial lag may reflect reluctance on the part of the adopters to take a risk, a lack of exposure to the Innovators, or the need to learn new skills and/or gain social acceptance for the innovation before the innovation adoption will accelerate. It is also possible that other factors, such as economic or political barriers, prevent adopters from fully accepting the innovation.

Florida craft brewery expansion is driven by a process that involves learning from others, which is often slow to expand, but once adoption occurs, may accelerate at a fast pace (Young 2009). It is also probable that this process is a combination of complex factors which are not immediately apparent from the diffusion models. With knowledge gleaned from interviews and observations of craft brewers in Florida, the external model or even the mixed influence model makes less sense than the internal influence model, that it is needed for social acceptance and learning that led to the initial lag in craft brewing expansion. External influence gives knowledge of the craft brewing industry, such as a festival or from a brewer's website. However, advertising for craft brewers on any platform is rare, other than social media, which is free. Word of mouth, more than advertising or mass media, helped spread craft brewing across Florida's landscape.

The diffusion of craft brewing resembles that of the classic hybrid corn diffusion model done by Ryan and Gross (1943). This adoption by direct observation led to an initial slow growth followed by rapid expansion. The hybrid corn model suggests that innovation requires a few adopters to make a risky decision to adopt a new process, who then serve as models for the people in the social system around them to first learn from, and then to make a rational choice to adopt the practice. "People will want to see how it works for others over a period of time before trying it themselves. These are variously known as social learning models or social learning models based on direct observation" (Young 2009, p. 1900). In the Florida craft brewing movement, some of the same forces acted on the adoption of craft brewing as an innovation. Rather than observing risk in the adoption of the process, craft brewing inherently involves a learning curve. This may indicate the strength of internal influence and social learning (i.e., learning by imitation). Thus, the expansion of the Florida craft brewing tradition fits with the hybrid corn model, an initial exposure to the innovation, followed by an observation and learning period, and then rapid adoption.

The study of craft brewers in Florida revealed that although the early innovation process involved perhaps experimentation on one's own, eventually the individual would either join a homebrewing club, visit homebrew shops, or volunteer to work at a brewery as an informal apprentice in order to eventually found their own brewery. For example, observation at beer festivals demonstrated this transition from homebrewer to business owner. Many brewers begin brewing as homebrewers, and then compete at homebrewing competitions, which often occur simultaneously with festivals celebrating craft beer. Most brewers do not begin alone; rather, they participate in these festivals/competitions, and then attract the attention of other brewers and investors. Larger, influential brewers try the homebrewers' beers, offer advice, critique, or even jobs/apprenticeships at the more established breweries. Festivals offer both verbal, and nonverbal visual clues as to who is important in the network, what elements of place attachment get shared, and the ways to go from homebrewer to established brewery. Even if brewers had some exposure to the concept of craft brewing, often they need and desire additional training to make marketable products. Additionally, the process of craft brewing involves time, patience, and physical labor. Personal choice, as well as a desire to connect with others in general, may have influenced the decision to connect with other like-minded individuals. Festivals act as points of contagion and as points of reinforcement and encouragement. Homebrewers brew in their kitchen or garage, participate in homebrew competitions at a festival, then get the attention of larger brewers and/or the community, and from here "get the brewery bug," i.e., the desire to open their own physical brewery. Larger brewers often help, offering encouragement and guidance, especially those in closer geographic proximity.

External influences of a region may create barriers to the diffusion of craft brewers in Florida, which might also explain why there was a long lag in craft brewery expansion. Florida did have legal restrictions that prevented distribution of beers of different sizes. These bottle size laws in Florida, as well as the three-tier distribution laws, limited growth for Florida breweries, and brewers "had to scratch and claw for every gain they made (DeNote 2014, p. 11)." Because Florida has a three-tier system, beer cannot be sold directly

Table 3 Innovator qualities (adapted from Rogers 1995)

Innovator category (Rogers 1995)	Qualities
Innovators	High status; financial stability; risk taker
Early adopter	High social status, advanced education; maintain central position in communications
Early majority	Take up innovations considerably after Innovators and early adopters still maintain higher social status and contact with early adopters
Late majority	Approach new innovations with more caution and skepticism than previous adopters may have little social status and lack in opinion leadership
Laggards	Tend to stick to traditions and resist change

from the producer to the consumer. In this case, even another craft brewer is considered a consumer. In addition, for decades, packaged beer in Florida came in just three sizes—12 oz, 16 oz. or 32 oz. However, the law changed in 2001, with an unintentional result: it permitted beer to be sold in any container up to a quart, or a gallon or more—but not in between (Scherberger 2012). The introduction of Lee's law changed that picture to an extent, which removed the restrictions of container size. However, the three-tier system remains in place (Table 3).

With some of the external restrictions removed, innovation had more ability to spread throughout Florida. Recall the five categories of Innovators:

When looking at the qualities of the Innovators and Early Adopters, the diffusion pattern makes more sense. Early Adopters tend to have the maximum amount of estimation leadership, as well as using the astute implementation of innovation to sustain dominant communication (Rogers 1995). Innovators may take risks and have financial solvency, but Early Adopters have the power of sway over ideas and diffusion. When influential breweries enter the landscape, they dominate the network, i.e., Cigar City. Cigar City might represent an individual/brewery that sparked other brewers to follow suit and begin a craft brewing business. This seems to be partially due to Cigar City's strong effect on other brewers. 23% of respondents said that they participated in an apprenticeship. Participants most often stated that this apprenticeship was with Cigar City or with someone who had previously worked at Cigar City.

In Florida, the earliest Innovators are people who came from a brewing tradition, with some dependence on food production. The first two brewpubs established themselves geographically in places of potential, on opposite sides of Tampa Bay. The initial Innovators of craft brewing in Florida were most likely brewpubs, such as Dunedin Brewery, which reflects a strong connection to Scotland, and Tampa Bay Brewing Company, whose founders, the Doble family, had run a pub in England prior to settling in Tampa. Indeed, Dunedin is the sister city to Stirling in Scotland. This also included McGuire's Pub in Pensacola, and A1A Ale Works in Jacksonville. Brewpubs might reasonably be seen as having more financial stability (another business to fall back on if brewing fails) as well as high status (connections elsewhere).

However, what the Florida beer scene seemed to need was a brewery that had a central position in communicating with other breweries. These were more likely to be microbreweries than a brewpub, but Florida had few microbreweries until 2003. A long lag occurred between the founding of Florida Beer Company (the earliest microbrewery) in 1997, to the founding of Orlando Brewing in 2003. During this time, homebrewers began forming clubs to participate in social learning, thereby diffusing ideas. But risk-taking was necessary to leap from homebrewing to starting a microbrewery. While Rogers (1995) describes the earliest Innovators as risk-takers, with connections to scientific sources and financial stability, these earliest Innovators in Florida emerged slowly. It was not until roughly 2009 when Florida experienced the end of the Innovator period (thirteen craft brewers). Brewpubs by nature have only on-site production with no off-site sales, thus while these brewpubs represented the desire of brewers for craft products to gain further attention across such a large landscape, brewers needed a way to distribute. As Joey Redner shared in DeNote's (2014) book, the early days of Florida craft brewing centered on brewpubs, which, while good, could not distribute off-site. Consequently, the Florida beer scene needed microbreweries. Possibly what occurred when influential brewers such as Cigar City entered the scene is what Robertson (1967) called the two-step model. Inherent in Rogers' schema is that Innovators are outside social norms, representing just 2.5% of the total. Rogers' inferences suggest that Innovators are peripheral members of the community, at least at first. Communication with other brewers, though, can reduce risk,

especially if one begins in a social club or as an apprentice. With the introduction of socially integrated persons who are in a more advantageous situation than others to engage in communications and to innovate, these ideas are more likely to circulate.

Conclusion

From initial observations of craft brewery gains in Florida, we noted that Florida's growth rates moved in a very uneven fashion, from a period of stagnation to rapid expansion. With this observation in mind, we examined why this might be the case and what, if any, barriers might exist in the growth of craft breweries in the state to cause such an uneven diffusion. We hypothesized that the unique features of the craft brewing industry, that of strong interpersonal connections, economic strategies of participation and collaboration, as well as the geography of politics and identity, served as both the means and a hindrance to that diffusion. We further posited that it was the ability of the craft brewer to not only take a risk, but also to exert influence over others, that helped move the craft brewing tradition throughout the state.

Future research. This research represents only one state in the United States, and consequently may not apply to other regions. While intriguing, this is preliminary data only, and further research is necessary to add substance to the conclusions. As of the conclusion of this work, there was little to no data about innovation diffusion and the craft brewing industry, thus this is a question that should be explored in the future. Size of the brewery (in volume of beer produced or in sales) was not necessarily factored into this study, and forthcoming work is needed where this variable is considered. The types of craft brewery (microbrewery, brewpub, contract brewer, or regional craft brewer) were included in the study, but future work might run the diffusion models on each type individually instead of including all types together.

The authors also made use of certain assumptions which, with further investigation, may not hold true. For example, the value of p (innovation coefficient) and q (imitation coefficient) used in this study are generalizations described by Mahajan et al. (1995), with p value of 0.03 and q value of 0.038. However, in most cases, diffusion-based models will develop their own number for the value of p and q. For the value of m, the ultimate number of adopters, this study assumed the ultimate number of craft breweries (which includes all categories of craft breweries) in Florida as 550, based on the number of breweries per capita in other states. More work is necessary to validate these numbers.

Appendix

List of Florida Brewers Guild Members as of the end of 2015

Name	Type	Date of founding	Adopter category (per Rogers 1995)	Interviewed?
Region 1: North (Panhandle)				
McGuire's Irish Pub	Brewpub	2003.04	Innovator	No
Pensacola Bay	Microbrewery	2010.11	Early adopter	No
Grayton Beer Co	Microbrewery	2011.05	Early adopter	No
Props Craft	Brewpub	2012.05	Early adopter	No
Proof brewing	Microbrewery	2014.05	Early adopter	No
Oyster city	Microbrewery	2014.08	Early adopter	No
Region 2: Northeast				
Ragtime Tavern	Brewpub	1993.06	Innovator	No
A1A Ale Works	Brewpub	1999.01	Innovator	No
Orange Blossom	Contract	2003.01	Innovator	No
Swamp Head	Microbrewery	2009.12	Innovator	No
Pinglehead	Brewpub	2010.03	Early adopter	No
Engine 15	Microbrewery	2010.07	Early adopter	No
Intuition Ale Works	Microbrewery	2010.11	Early adopter	No
Alligator Brewing	Microbrewery	2011.4	Early adopter	No
Green Room	Microbrewery	2011.8	Early adopter	No
First Magnitude	Microbrewery	2012.03	Early adopter	No
Aardwolf Brewery	Microbrewery	2013.03	Early adopter	No
Veterans United	Microbrewery	2014.08	Early adopter	**Yes**
Infinite Brewing	Microbrewery	2015.03	Early adopter	No
Zeta Brewing	Brewpub	2015.04	Early adopter	No
Central 28	Microbrewery	2015.07	Early adopter	No
Ancient City	Microbrewery	2015.08	Early adopter	No
Region 3: Central/South				
Dunedin	Brewpub	1996.10	Innovator	Yes
Florida Beer	Microbrewery	1997.01	Innovator	Yes
Tampa Bay Brewing Co	Brewpub	1997.02	Innovator	Yes
Orlando Brewing	Microbrewery	2003.05	Innovator	Yes
Saint Somewhere	Microbrewery	2006.11	Innovator	No
Cigar City	Regional Craft	2009.01	Innovator	Yes
Barley Mow	Microbrewery	2011.11	Early adopter	No
7venth Sun brewing	Microbrewery	2012.01	Early adopter	Yes
Darwin's on 4th	Microbrewery	2012.01	Early adopter	Yes
Southern Brewing	Microbrewery	2012.05	Early adopter	No
Two Henrys	Microbrewery	2012.05	Early adopter	No
Three Palms	Microbrewery	2012.07	Early adopter	No

(continued)

Name	Type	Date of founding	Adopter category (per Rogers 1995)	Interviewed?
Florida Avenue	Microbrewery	2012.07	Early adopter	No
Hourglass Brewing	Brewpub	2012.08	Early adopter	No
Rapp Brewing	Microbrewery	2012.09	Early adopter	Yes
Big Storm	Microbrewery	2012.01	Early adopter	No
Green Bench	Microbrewery	2013.09	Early adopter	No
Intracoastal Brewing	Microbrewery	2013.09	Early adopter	No
Bugnutty	Microbrewery	2013.09	Early adopter	No
Ormond Brewing	Microbrewery	2013.09	Early adopter	No
Brew Bus	Contract	2013.10	Early adopter	Yes
Pair O' Dice	Microbrewery	2013.10	Early adopter	Yes
R Bar	Brewpub	2013.10	Early adopter	No
Wild Rover	Microbrewery	2013.11	Early adopter	No
3 Daughters Brewing	Microbrewery	2013.12	Early adopter	Yes
Motorworks	Microbrewery	2014.01	Early adopter	Yes
Tomoka Brewery	Microbrewery	2014.01	Early adopter	No
New Smyrna Beach Brewing	Microbrewery	2014.01	Early adopter	No
J Dub's	Microbrewery	2014.02	Early adopter	No
Six Ten	Microbrewery	2014.02	Early adopter	No
St. Pete Brewing	Microbrewery	2014.04	Early adopter	No
Redlight Redlight	Microbrewery	2014.04	Early adopter	No
Daytona Beach	Microbrewery	2014.06	Early adopter	No
Orchid Island	Microbrewery	2014.08	Early adopter	No
Coppertail	Microbrewery	2014.09	Early adopter	No
Escape Brewing	Microbrewery	2014.09	Early adopter	No
Stilt House	Microbrewery	2014.10	Early adopter	No
Angry Chair	Microbrewery	2014.11	Early adopter	No
Playalinda	Microbrewery	2014.11	Early adopter	No
Mad Beach	Microbrewery	2014.12	Early adopter	**Yes**
Crooked Can	Microbrewery	2015.03	Early adopter	No
Carrollwood	Contract	2015.06	Early adopter	No
Marker 48	Microbrewery	2015.11	Early adopter	**Yes**
Pinellas Ale Works	Microbrewery	2016.01	Early adopter	**Yes**
Region 4: South				
Native Brewing	Contract	1999.01	Innovator	No
Brewzzi	Brewpub	2001.05	Innovator	Yes
Funky Buddha	Microbrewery	2010.02	Early adopter	Yes
Tequesta	Microbrewery	2011.10	Early adopter	Yes
Due South	Microbrewery	2012.05	Early adopter	Yes
Naples Beach	Microbrewery	2012.11	Early adopter	No
Ft. Myers Brewing	Microbrewery	2013.02	Early adopter	No
Wynwood	Microbrewery	2013.09	Early adopter	**Yes**
Barrel of Monks	Microbrewery	2013.11	Early adopter	No
Saltwater	Microbrewery	2013.12	Early adopter	No
Bone Island	Microbrewery	2014.01	Early adopter	No
Biscayne Bay	Microbrewery	2014.09	Early adopter	**Yes**
Florida Keys	Microbrewery	2015.01	Early adopter	No
J. Wakefield	Microbrewery	2015.01	Early adopter	No
Miami Brewing	Microbrewery	2015.01	Early adopter	Yes
Copperpoint	Microbrewery	2015.05	Early adopter	Yes
Concrete Beach	Microbrewery	2015.05	Early adopter	No
Bangin' Banjo	Microbrewery	2015.09	Early adopter	No
Waterfront Brewery	Brewpub	2015.09	Early adopter	No
Accomplice	Microbrewery	2015.11	Early adopter	Yes
26°	Microbrewery	2015.9	Early adopter	Yes

(continued)

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