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Tourist-activated networks: implications for Dynamic Bundling and EN Route Recommendations

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Abstract

This article discusses tourist-activated networks as a concept to inform technological applications supporting dynamic bundling and en route recommendations. Empirical data were collected from travelers who visited a regional destination in the US and then analyzed with respect to its network stmcture. The results indicate that the tourist-activated network for the destination is rather sparse and that there are clearly differences in core and peripheral nodes. The findings illustrate the stmcture of a tourist-activated network and provide implications for technology design and tourism marketing.

Keywords

bundling, dynamic, implications, recommendations, networks, route, activated, tourist, en

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TOURIST-ACTIVATED NETWORKS: IMPLICATIONS FOR DYNAMIC BUNDLING AND EN ROUTE RECOMMENDATIONS

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This article discusses tourist-activated networks as a concept to inform technological applications supporting dynamic bundling and en route recommendations. Empirical data were collected from travelers who visited a regional destination in the US and then analyzed with respect to its network structure. The results indicate that the tourist-activated network for the destination is rather sparse and that there are clearly differences in core and peripheral nodes. The findings illustrate the structure of a tourist-activated network and provide implications for technology design and tourism marketing.

Key words: Tourist-activated networks; Network analysis; Dynamic packaging; On-the-move traveler; Destination management organizations

Introduction

Tourists' experiences within a destination are the result of the interaction of the traveler with the service infrastructure and destination environment. Previous studies have identified travel decisions as complex processes with final choices being interrelated (Dellaert, Ettema, & Lindh, 1998). As such, the tourist consumption system as proposed by Woodside and Dubelaar (2002) describes a complex and dynamic pattern of tourists' activities that exist within the context of attractions and accommodations, the transportation network, as well as other tourists. It is argued that understanding tourists' travel path through this system is essential to developing a coherent destination management strategy. Furthermore, it is argued that information technology (IT), particularly mobile technology and the increasing availability of free wireless Internet, enables tourists to easily retrieve and share information throughout the travel experience. Using mobile technology to provide travelers with recommendations regarding additional places to visit at the destination can significantly influence actual behaviors and disperse visitation patterns by leading tourists to lesser known attractions

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(Kramer, Modsching, ten Hagen, & Gretzel, 2007). Mobile technology, therefore, allows destination marketing organizations (DMOs) to support dynamic bundling of tourist services to enhance visitors' experiences while en route.

This article reports on a study that examined the movement of tourists through a destination. The underlying network is identified and its structure (i.e., core, periphery, and places immediately adjacent to the core) is discussed. The results of this analysis are then interpreted within the context of mobile computing and the development of systems that can be used to integrate offerings of local firms in support of on-the-move travelers.

Tourism Destination Systems: A Network Perspective

Gretzel (2011) and Gretzel, Hwang, and Fesenmaier (in press) stress the need for understanding the behavioral foundations of travel to inform intelligent system design. For mobile technology to support dynamic packaging and en route recommendations, this requires insights into the bundling of places, attractions and/or activities that forms the structural skeleton of the travel experience.

Fesenmaier and his colleagues (Hwang & Fesenmaier, 2003; Hwang, Gretzel, & Fesenmaier, 2006; Jeng & Fesenmaier, 1998; Kim & Fesenmaier, 1990; Lue, Crompton, & Fesenmaier, 1993) have argued that travel can be conceptualized as a series of experiences that occur in specific patterns depending on the spatial organization of the attractions and the nature of the travel party (i.e., needs, motivations, etc.). It was found in these studies that travel is largely multidestination/multiactivity whereby a trip represents a bundle of activities/attractions/places that meet the specific needs (i.e., add value to the experience) of the traveler. In addition, this research indicates that the bundling of activities/destinations/attractions enables travelers to manage the perceived risk/cost of the trip.

More recently, Woodside and Dubelaar (2002) developed a conceptualized understanding of tourism systems, arguing that tourists' actions can describe the relationship between places/activities/experiences. Further, Hwang et al. (2006) and Shih (2006) argued that travel patterns can be understood as networks. Indeed, Hwang et al. (2006) and Shih (2006) conducted studies to assess the structural properties of travel within and between different destinations. Specifically, Hwang, et al. (2006) examined multidestination travel in the US and Shih (2006) focused on travel in Taiwan. In both studies the authors found that travel patterns exhibit specific network properties and that these structures provide substantial insight into the relationship between a traveler and the system that supports travel experiences.

Ritchie and Crouch (2003) argue that tourism destination management organizations represent several components of the tourism system that, together, contribute to create a "seamless" experience for the tourist. This research, along with emerging literature in collaborative destination marketing, suggests that strongly networked tourism organizations are very effective in cocreating tourism products and services (e.g., Palmer & Bejou, 1995) and in participating in a variety of Internet-based marketing activities (Wang & Xiang, 2007). Indeed, Gretzel, Fesenmaier, Formica, and O'Leary (2006) and Zach, Xiang, and Gretzel (2010) concluded that it is essential for DMSs to use IT in order to enhance cooperation between organizations, businesses, and governmental institutions so that value-added, innovative tourism products can be created.

IT and On-the-Move Tourist Information Search

The increasing importance of IT has changed the way tourism organizations manage and operate (Poon, 1993). Indeed, the Internet has become the most important channel with which tourism organizations can deliver information to existing and potential visitors (Gretzel & Fesenmaier, 2005; Wang & Fesenmaier, 2006). Specifically, the Internet has become the primary medium with which tourists use to search for information in the preconsumption stage and to share and reexperience their trip in the postconsumption stage (Gretzel et al., 2006). Gretzel et al. (2006), however, argue that whereas the Internet in the pre- and postconsumption phase is accessed mostly through the home computer, mobile technologies enable tourists to connect with friends and make short-term decisions while traveling en route (consumption stage). Indeed, a recent study by the Pew Foundation

(2011) found that 84% of adults in the US owned cell phones and 35% owned smartphones. About half of the cell phone owners have apps of some kind on their phone. The study report further describes mobile devices as now standard pathways to connect to the Internet. This development together with the increasing availability of free wireless Internet enables tourism organizations to increasingly provide information for tourists en route.

Brown and Chalmers (2003) conducted an ethnographic study to understand how tourists experience places and to provide suggestions for the development of IT that supports the tourist experience at a destination. Other scholars have examined traveler behavior with the goal of developing specific systems; for example, Schmidt-Belz, Laamanen, Poslad,and Zipf (2003) discussed the behavioral foundations for the development of CRUMPET; Schwinger, Grün, Pröll Retschitzegger, and Schauerhuber (2005), Malaka and Zipf (2000), and Kramer et al. (2007) focused on strategies for, and the impact of, mobile tourist guides; and Modsching, Kramer, ten Hagen and Gretzel (2008) examined the use of GPS to track visitors while traveling to/through a city.

Through their choices tourists create dynamic relationships between organizations providing tourism-related products. These relations can be conceptualized as "tourist-activated networks" where tourists "activate" the relationships by choosing a combination of attractions, services, etc. Following from Hwang et al. (2006), Becken and Gnoth (2004) and Cardoso and Lange (2007), it is argued that the notion of tourist-activated networks provides for a powerful and practical relational metaphor that is well understood by tourism organizations in building innovative partnerships to support the dynamic construction of bundles of products (i.e., experiences) based on travel behavior. Mobile IT enables DMOs to learn about tourists' bundling of experiences and to simultaneously support tourists in dynamically building their en route experience. It is clear that IT can be used to effectively meet the needs of visitors to a destination in a number of ways. Yet, dynamic packaging seems to be currently restricted to pretrip stages. Examples of dynamic packaging provided by online travel agencies are discussed by Cardodo and Lange (2007). This article argues that a better understanding of tourist-activated networks at destinations is needed to spur innovations in dynamic packaging for en route decision making.

Research Method

Based on the travel behavior, mobile computing, and destination management literatures, it is posited that the network structure of travel through an area can be used to develop systems that support the dynamic bundling of tourist products. Thus, the goal of this study was to identify the network structure of travel within Northern Indiana (USA) with the aim to make recommendations toward the development of IT systems that may be used to support traveler experiences in the area. The research framework is described in the following paragraphs.

Sampling and Data Collection

Visitors were intercepted at one of nine visitor centers located throughout the area (see Fig. 1) in the fall of 2005 and the summer of 2006. Those who agreed to participate in the research were sent a follow-up survey a month after their trip. In total**,** 2,177 visitors were contacted. Of those who received a survey (bad addresses excluded), 49% (1,009 respondents) completed the survey. As part of the survey, respondents were asked to describe in detail their trip to the region.

Measures and Data Analysis

The questionnaire invited respondents to list up to seven places they visited before and after (for a total of 14 places visited) they stopped at the visitor center. This information on the spatial movement of tourists was used to develop a symmetric matrix representing the spatial network of all the places visited by the tourists. SPSS 15 and UCINet 6.0 were used to analyze this dataset. It is important to note that the results are conditioned by the fact that all respondents stopped at the visitor center sometime during their trip to/through the area.

Research Results

Descriptive statistics were first calculated to describe the visitation behavior of tourists to the

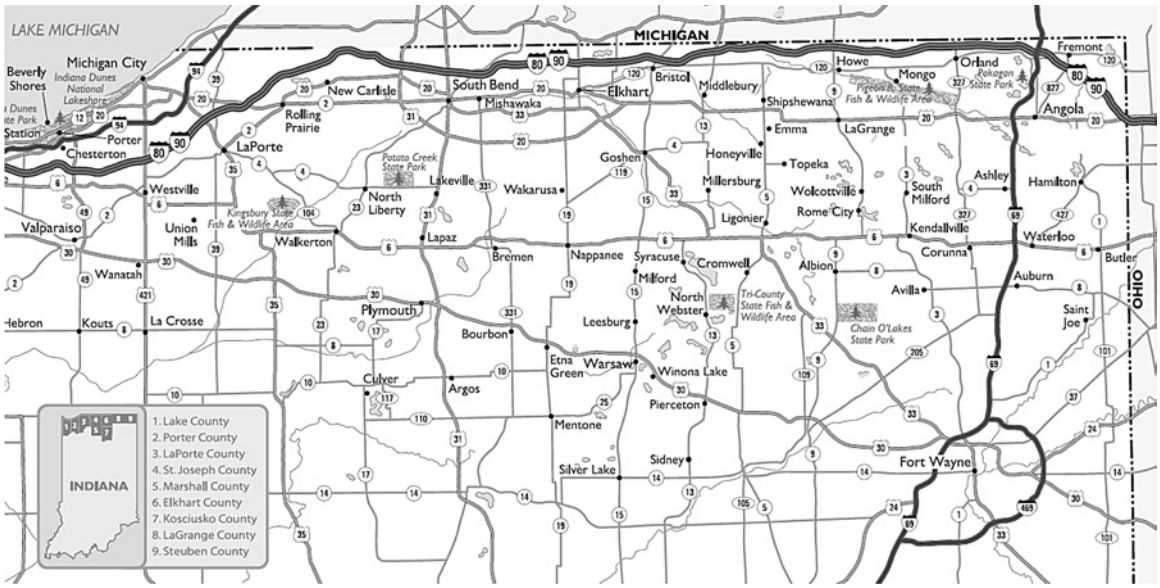

Figure 1. Map of Northern Indiana.

region. Next, characteristics of the places visited by tourists in Northern Indiana were assessed. Last, network analysis was employed to identify the network structure of visitor travel through the area.

Tourists' Visitation Behavior

It was found that the Northern Indiana visitors identified 320 different places at which they stopped, including museums, hotels, restaurants, parks, and shopping areas. As can be seen in Figure 2, the number of places visited sharply declines whereby essentially every tourist visited at least one place beyond the visitor center; two thirds visited two additional places and one third of the travelers visited four other places; only 7.6% of the tourists visited seven places additional to the visitor center.

To better understand the relationship between multidestination travel behavior and experience patterns we identified the level of satisfaction for

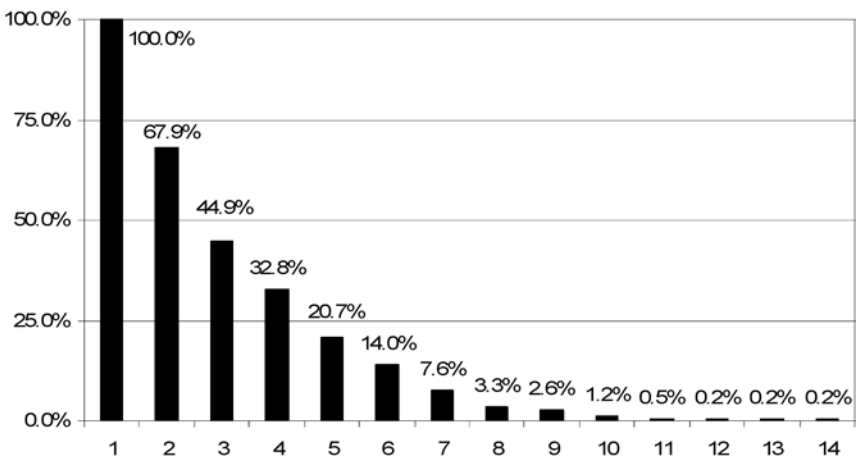

Figure 2. Number of places visited additional to the visitor center by tourists in Northern Indiana.

each of the stops throughout the travel. Visitors that made shorter (two to three total stops) and longer trips (8–11 total stops) indicated lowest satisfaction scores for the last or second to last stop on their trip through Northern Indiana. The highest satisfaction scores for short trip visitors were with the second to last stop. Longer trip visitors indicated highest satisfaction scores rather early (first to fourth stop) and again also displayed a peak just before the end of the trip. Of medium length trips (four to seven total stops) mean satisfaction was lowest for the second place visited and in most cases had the highest satisfaction score shortly thereafter or closer towards the end of the trip (see Table 1). This suggests that there might be an ideal number of places to be visited during a trip.

Table 2 displays visitors planning to stop at any of the places visited on the trip through Northern Indiana. The first one to two stops for most trip lengths (except for six total stops) were found to be the stops most planned ahead to visit. Lowest levels of planning a place ahead were consistently found towards the end of the trip (except for seven total stops). Overall, visitors with the shortest trip length (two stops) showed the lowest preplanning for stopping at places visited. These particular findings suggest that there is quite a bit of flexibility in travel behavior and that two-stop respondents were mostly just passing through the area. This conforms with March and Woodside's (2005) general argument that unplanned behavior is prominent in the travel context, and that, consequently, travelers are open to suggestions once they have consumed their initially planned activities/destinations.

Northern Indiana Tourist Places

The most popular places visited are listed in Table 3. Also shown in the table is the ranking of the popularity of places visited at the beginning and at the end of the visit to Northern Indiana. It can be seen that the first four most visited places are the top four at the start and the end of visits to the area (though in a different order). Several places that ranked high as start or end places for travel through Northern Indiana were not among the top 10 most visited places. Some of the top 10 visited places such as Nappanee, on the other hand, are not ranked among the top 10 start or end places, indicating that the visitors bundled these places as "drive through" destinations while visiting other places in the area. Satisfaction evaluation for the top 10 start and end

Table 1
Mean Satisfaction for Places Visited in Northern Indiana

	Number of Places Visited						
Place Sequence	2	3	4	5	6	7	8–11
1	**4.25**	4.14	**4.29**	3.97	4.05	4.15	4.26
2	*4.20*	**4.20**	*4.13*	*3.89*	*4.00*	*3.92*	4.18
3		*4.30*	4.22	**4.19**	4.15	4.05	4.20
4			4.15	4.17	4.21	*3.92*	4.27
5				3.97	**4.28**	**4.40**	4.17
6					*4.00*	4.04	4.19
7						4.04	4.12
8							4.00
9							**4.33**
10							3.89
11							*3.67*
Mean satisfaction	4.14	4.12	4.20	4.04	4.12	4.07	4.19
N for last place	85	73	40	38	23	24	30

Notes: Due to low *N* for 8–11 stops these responses were collapsed and 12 and 15 were deleted as *N* = 1. No travelers indicated 13 or 14 stops on their trip. Satisfaction was measured on a 5-point Likert scale for each place stopped on the trip (1 = not at all and 5 = extremely satisfied). Bold type indicated the highest satisfaction score in trip sequence, and italic type indicates lowest satisfaction score in trip sequence.

Table 2
Percentage of Travelers Who Planned a Stop at Each Place During Sequence

Place Sequence	Number of Places Visited						
	2	3	4	5	6	7	8–11
1	**39%**	58%	**64%**	**59%**	50%	55%	**70%**
2	*34%*	**61%**	53%	54%	50%	**67%**	57%
3		*40%*	44%	57%	**57%**	65%	60%
4			*30%*	**59%**	52%	32%	59%
5				*38%*	54%	50%	50%
6					*38%*	*30%*	45%
7						31%	41%
8							*31%*
9							33%
10							33%
11							67%
Mean planning	37%	53%	48%	53%	50%	48%	48%
N for last place	85	73	40	38	23	24	30

Notes: Due to low *N* for 8–11 stops these responses were collapsed and 12 and 15 were deleted as *N* = 1. Planning was a yes/no question for each place stopped on the trip. Bold type indicates highest planning in trip sequence, and italic type indicates lowest planning in trip sequence.

places in Northern Indiana reveals that for all but three places satisfaction was higher when the place as first rather than last in the visitation sequence.

Table 4 shows the "long tail" effect of the places visited. As can be seen, nearly two thirds of the places have been visited only once, representing only 13.7% of all visitations in Northern Indiana. This contrasts sharply with those places visited eight times and more in that they account for less than 10.0% of the places visited, but generate more than two thirds of all the visitations. This finding is consistent with Zipf's power law whereby a small number of core places is responsible for most of the visitation (Barabási & Albert, 1999).

Table 3
Top Visited Places in Northern Indiana

Top Places in Northern Indiana	Visitation Ranking	Top 10 Start Place Ranking	Top 10 End Place Ranking	Satisfaction When First Place	Satisfaction When Last Place
Visitor center	1	1	1	4.37	3.86
Shipshewana	2	3	2	4.22	4.08
Notre Dame	3	4	3	4.37	4.06
Indiana Dunes	4	2	4	4.37	4.06
Nappanee	5	n/a	n/a	4.33	3.75
Elkhart	6	6	n/a	3.43	**5.00**
Light House mall	7	n/a	5	4.25	3.73
Amish Acres	8	5	10	4.25	3.33
Shipshewana Flea Market	9	8	n/a	3.67	**4.00**
Goshen	10	n/a	n/a	4.33	3.75
Amish Country	12	n/a	7	4.67	4.50
Restaurant	14	n/a	6	3.00	**4.50**
Studebaker Museum	15	9	n/a	4.80	4.00
Gas station	16	7	8	3.67	**3.75**
RV Museum	19	n/a	9	4.50	3.20
Pokagon State Park	24	10	n/a	4.50	4.00

Note for satisfaction: 5-point Likert scale with 1 = not at all and 5 = extremely satisfied. Bold type indicates higher satisfaction when the place was the last rather than the first stop.

Table 4
Visitation Pattern

Total Number of Times a Place Was Mentioned	Percent of Places	Percent of Total Visitation
Once	65.9	13.7
Twice	11.8	4.9
Three times	5.2	3.2
Four times	2.3	1.9
Five times	1.7	1.9
Six times	2.0	2.5
Seven times	1.2	1.6
Eight times and more often	9.9	70.3
Total	100.0	100.0

Figure 3 presents the overall network of the 320 places visited in Northern Indiana. The figure shows that the visitor center is in the middle of the network (again, it is important to note that this finding is an artifact of the sampling methodology) and that there are a small number of core attractions that are highly connected with other places in the network. Last, the outer rim of the network identifies those places that have been visited only once.

Characteristics of the Tourist Network in Northern Indiana

A core/periphery analysis of the network data was conducted to identify the core places of the Northern Indiana tourism network. A continuous approach was applied and resulted in eight core places (see Table 5). As proposed by Borgatti and Everett (1999), coreness measures can be accepted as a good measure of fit, indicating that the place can clearly be distinguished from the other places. A measure of fit of 0.74 for the Northern Indiana tourism network can be considered as good.

As indicated previously, the visitor center was visited by every visitor to Northern Indiana. The other core places, however, were visited by a maximum of 23.8 % of the visitors. It can be seen in Table 5 that the top three core places to the network have been a start or an end place for a trip for about 25% of the visitors. Also shown is the mean number of places visited by tourists that visited one of the core places. Interestingly, Nappanee had the highest number of places and simultaneously has a low percent rating of being a start (8.8%) or an end point (11.8%) compared to the other core places.

The core network and places adjunct to them are graphically represented in Figure 4. As can be seen, there are strong relationships between the eight core places. However, there is no direct linkage between all of the core places. That is, it can be seen that many of the core places are the only connection points for many of the pendants surrounding the core network. The Light House mall, for example, is connected only with Indiana Dunes and the visitor center. This indicates that the density of the network is extremely low; indeed, the overall

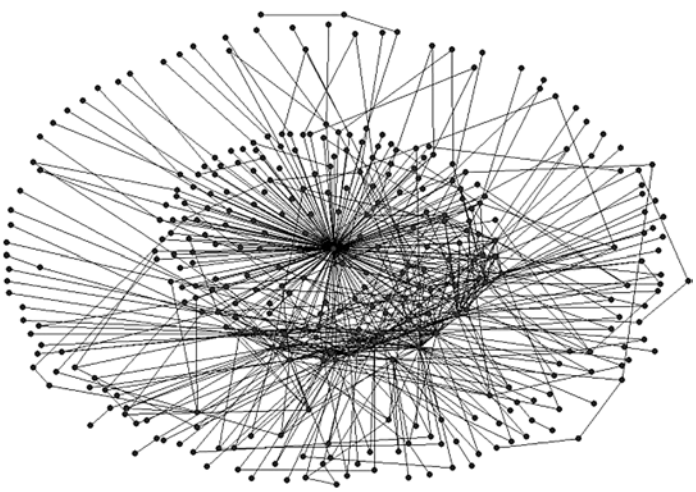

Figure 3. The overall network of places visited in Northern Indiana.

Table 5
Core Place Pattern

Core Places in Northern Indiana	Coreness	Percent of Visits to Core Place	Percent of Core Place Visits as Trip Start	Percent of Core Place Visits as Trip End	Mean Number of Places Visited by Tourists to Core Place
Visitor center	0.648	100.0	42.2	28.0	4.0
Shipshewana	0.348	23.8	21.0	27.0	5.0
Notre Dame	0.289	14.7	30.6	27.4	4.6
Indiana Dunes	0.251	14.0	35.6	25.4	4.9
Elkhart	0.204	7.6	25.0	9.4	5.8
Light house mall	0.188	7.6	12.5	34.4	4.6
Nappanee	0.174	8.1	8.8	11.8	6.6
Amish Country	0.165	5.9	16.0	32.0	5.0

network of 320 places includes just 1.0% of all possible linkages within the network. This shows visitors' boundless choice in bundling any of the experiences visitors seek to encounter when en route.

Conclusions and Implications

The results of this study indicate that travel through Northern Indiana is highly structured in that it is served through a small number of key attractions/communities; these core places function as important hubs routing travelers throughout the destination. It was also found that the visitors to the area "bundled" together a number of different experiences as they navigated through the area. Furthermore, none of the core places (except the visitor center) are attractions for tourists only. Next, a large majority of the places were mentioned only once or twice, implying a high diversity in tourist-activated networks for the destination. Last, the results also indicate that short- and long-trip visitors continue to add additional places to their travel

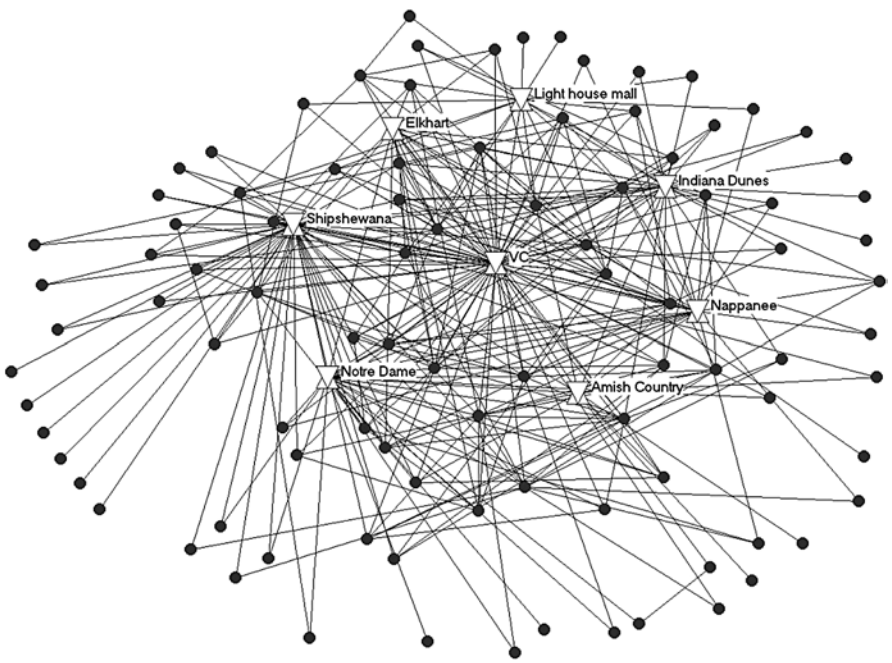

Figure 4. Core network with adjunct places.

route until satisfaction with a place drops to the lowest satisfaction level for places visited. Respondents also indicated that stops during these short or long trips were not likely planned, with the least rate of planning happening for the last stop. Medium length trips involve similar levels of lack of planning (especially for the last two to three places visited); however, it appears that travelers still continue and that the last place visited is not rated lowest in satisfaction because the activity/destination overload threshold was not yet reached.

Overall, the results indicate that travelers are open to suggestions and that they actually need help in choosing places that will increase their overall satisfaction with a trip. It is argued here that the network structure provides a strong and practical basis for dynamically bundling products that create value for tourists and the destination. Incorporating knowledge about visitors' combination of en route experiences enables DMOs to develop knowledge-based recommender systems with tailored choices for subsequent experiences (Schmeing, Cardoso, & Fernandes, 2006). In the case of Northern Indiana, recommendation systems might suggest smaller, less known places along the route that the travelers are currently following. Or, given the fact that a visitor has started out at a core attraction, the system might suggest a unique itinerary comprised of a series of attractions, restaurants, and rest areas that are seemingly unrelated but follow a more interesting path through the area. Following the notion of tourist-activated networks, tourist firms "activated" through the recommendation system can be informed to include the new bundles in their products/services offered. Last, learning that most destination visitors end their visit on a "low note" suggests that bundles need to be packaged to end on a "high note." Integrating more information at destination places, via various mobile applications or QR codes, enables destination businesses to leave a better impression. Including diversity in types of places recommended might help as well. However, the findings also suggest that the number of recommendations should be limited to avoid negative experience patterns caused by overload.

It is critically important to recognize that information on tourists' travel paths alone is not sufficient for truly personalized recommendations. Thus, further research should focus on the integration of spatial movements with personality and preference-based recommendation systems in order to better enhance the tourist experience while enabling tourism firms to develop innovative partnerships. In addition, studies are needed to examine the extent to which tourist firms can actually use IT to better support the development of dynamic bundling systems as well as other barriers to the development of dynamic packaging systems.

Biographical Notes

Florian Zach is an Assistant Professor in the School of Tourism and Hospitality Management and Assistant Director of the National Laboratory for Tourism & *e*Commerce, Temple University. His main research interests include innovation and collaboration between service providers, in particular to disseminate innovation in an effort to create sustainable and competitive destinations.

Ulrike Gretzel is Associate Professor of Marketing at the University of Wollongong and Director of the Laboratory for Intelligent Systems in Tourism, Wollongong, Australia. She received her Ph.D. in Communications from the University of Illinois. Her research focuses on the design, adoption, and use of intelligent systems in tourism and the role of technologies in mediating tourism experiences.

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