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Network, knowledge and relationship impacts on innovation in tourism destinations

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HIGHLIGHTS

- Choice of innovation partners is associated primarily with current collaboration and knowledge sharing.
- Relational trust and network position only play a small role to in innovation partner choice.
- To select prominent innovation partners network position (betweenness centrality) is dominant.
- Spanning boundaries, collaboration and knowledge sharing are essential to support innovation implementation and application.

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ABSTRACT

We combine network structure and firm-level relationship measures to explore the association between innovative behavior, firm position within the network of a destination, and the knowledge and relational trust characteristics of a firm's innovation-oriented relationships. We find current collaboration, shared knowledge and trust are associated with innovative behavior with partner firms, but that betweenness centrality indicates which partners are the most prominent innovators in a population. That is, relationship-level characteristics facilitate innovation partnerships, but network structure characteristics identify the most successful innovative partners. To theory, our findings contribute to efforts in the tourism, innovation and network literature to evaluate the differential effects of knowledge stocks and flows on innovation. For practice, our results suggest that promoters of innovation within a destination should leverage brokerage positions to improve the in-flow of ideas while encouraging the firms that share knowledge and trust to collaborate to apply those ideas.

1. Introduction

Innovation is a critical factor in the success of destinations competing for tourists against other destinations and struggling to cope with ever-changing social and economic determinants of market demand (Hjalager, 2002; Weiermair, 2005; Weiermair, Peters, & Schuckert, 2007). Such innovation depends, in part, on the flow of knowledge through the formal and informal network ties that connect organizations within and between destinations (Beckenbach, Briegel, & Daskalakis, 2009; Haugland, Ness, Grønseth, & Aarstad, 2011; Shaw & Williams, 2009). But innovation also depends on the composition of the network, including firm-level factors such as the heterogeneity of knowledge across firms (Rodan & Galunic, 2004), leadership commitments to innovation and collaboration (Zach, 2013), and the quality of relationships between innovation partners. Tourism firm innovation has been associated with both firm-level factors (such as professionalism) and firms' involvement in networks within and beyond destinations (Sundbo, Orfila-Sintes, & Sørensen, 2007). For example, Denicolai, Cioccarelli, and Zucchella (2010) used cluster analysis to determine that the most dynamic and innovative firms within a destination were those that actively developed trusting relationships with other firms and leveraged the knowledge available across their informal networks. More recently, Aarstad, Ness, and Haugland (2015) showed that innovation strategy and uncertainty assessment are together associated with the creation of

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"shortcut" ties that enhance information flow and innovation. In this paper, we take up Scott, Cooper, and Baggio's (2008: 182) suggestion to apply network analysis to explore the "structural patterns and relationships" that affect innovation within destinations.

One challenge in employing network analysis to study innovation is the difficulty of teasing apart the relative importance of structural network elements that affect flows of knowledge from network composition, such as firm knowledge, that reflect stocks (Phelps, Heidl, & Wadhwa, 2012, p. 1151). If, for example, the diversity or redundancy of knowledge stocks have more impact on innovation, then managing the composition of a network would be more critical than managing the structure. If, on the other hand, the speed and nature of the flows were more important, then managing the structure of the network and other factors that affect flows would become more important to innovation performance. The disentangling of the effects of stocks and flows of knowledge on innovation within a network is complicated by the impact of dyadic characteristics such as trust on whether portions of firms' stocks of knowledge do in fact flow through structural connections to be combined with the other firms' stocks to generate innovation (Lane & Lubatkin, 1998; Larson, 1992). Just because a metaphorical pipe exists between two actors does not mean that specific types of knowledge will flow between them (Lin, 2001); there must be some shared interest and some governance of opportunism (Hamel, 1991; Woolthuis, Hillebrand, & Nooteboom, 2005). Opportunism is a particular challenge in regional clusters such as destinations in which firms compete while also cooperating in search of innovation (Gulati & Singh, 1998; Molina-Morales, Martínez-Fernández, & Torlò, 2011). In such settings, the actual flows of knowledge are affected at least in part by trust (Gulati & Nickerson, 2008), and there have been, for example, recent calls to explore the role of trust in the development of sustainable tourism destination strategies (Presenza & Cipollina, 2010, p. 28).

In this paper, we investigate whether the desirability of a firm as an innovation partner is associated with that firm's network position in the destination, the homogeneity of the knowledge stocks between innovation partners, current collaboration in day-to-day functions, and the role that relational trust plays in turning off or on the knowledge flows between partners. We find that a firm's choice of innovation partners is associated primarily with current collaboration and shared knowledge, and that relational trust and network position play a small but significant role. But when asking which firms are the most prominent innovative partners, then current collaboration and especially network position becomes dominant and relational characteristics such as shared knowledge and relational trust melt away.

Our findings contribute to ongoing efforts in the tourism and innovation literature to separate out and evaluate the differential effects of stocks and flows on innovation (Rodan & Galunic, 2004); reinforce the role of shared experience and shared knowledge as foundations for innovation (Cowan & Jonard, 2009a); raise questions about the relative importance of relational trust for innovation (Santoro & Saparito, 2006); and identify network structure as a critical determinant of access to innovation ideas (Ness, Aarstad, Haugland, & Grønseth, 2014; Sørensen, 2007). Finally, our results suggest that, when it comes to the practical problem of orchestrating innovation within destinations, trust does not matter nearly as much as providing access to new knowledge through the cultivation of boundary spanners and spreading those ideas through familiar partners.

In the next section, we situate this study within the literature on knowledge and innovation networks and articulate our hypotheses. We then introduce the settings, data, variables and methods. Our findings follow, and we conclude with a discussion of limitations and of the contributions of our findings to theory and practice.

2. Theoretical positioning: identifying the effects of knowledge stocks and flows on innovation in tourism destinations

In this section, we build on recent work that illustrates how the emphasis on network structure and flows (Borgatti & Halgin, 2011) has obscured the differential impact of the "qualitative nature of the relationships" that affect network-related outcomes (Phelps, 2010; Rodan & Galunic, 2004, p. 543). We focus on network structure (which affects potential flows of knowledge), content (which reflects stocks of knowledge), and relational components (which affect actual flows of knowledge) as we develop hypotheses about the impact of each factor on the choice of firms as innovation partners.

For the purposes of this paper, innovation is defined as "the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD, 2005, p. 46). Within tourism destinations, such innovation includes myriad changes in product, service and experience offers (Brooker & Joppe, 2014; Hjalager, 2010a), as well as improvements in marketing and relationship building (Ottenbacher & Gnoth, 2005).

Tourism destinations are ideal locales to evaluate innovation networks among firms for two reasons. First, organizations in tourism destinations are highly networked (Scott, Cooper, & Baggio, 2008), to the degree that destinations can be conceived of as "loosely articulated groups of independent suppliers linked together to deliver the overall product" (Scott et al., 2008, p. 171). Indeed, over the years, destinations have become increasingly networked in response to tourists' expectations of an overarching experience ("my week at the beach") rather than a series of discrete exchanges (breakfast one day, a beach excursion the next, dancing the next) (Ritchie & Crouch, 2003; Woodside & Dubelaar, 2002).

Second, as firms and other organizations in destinations co-create the meaning and image of the destination (Saraniemim & Kylänen, 2011), continual innovation is essential both when competing with other firms within the destination and when collaborating to compete with other destinations for highly mobile tourists (Hjalager, 2010b). In fact, collaborative networks have been shown to contribute to both firm and destination innovativeness (Denicolai et al., 2010; Novelli, Schmitz, & Spencer, 2006). That is, in tourism destinations, innovation and networks are at once intertwined and highly valued.

2.1. Network position, knowledge flows and innovation

Network scholars have long argued that an actor's *structural position* in a pattern of network ties is associated with innovation (Burt, 1992; Freeman, 1978-1979; Granovetter, 1973). Scholars have suggested variously that actors in the center of a network are, like spiders at the center of a web, able to collect and integrate ideas and resources and so generate innovation (Freeman, 1978-1979); that actors situated on the edge of structural holes are well positioned brokers that observe and combine insights from different groups into innovations (Burt, 2004); and that the most successful innovators benefit from a rich combination of indirect and direct ties, that is, of centrality and brokerage, that enhances both access to new ideas and the implementation of those ideas into practice (Paruchuri, 2010; Uzzi, 1996, 1997).

Empirical attempts to link network structure to innovation have produced mixed results, with Ahuja (2000) showing that structural holes *decreased* innovation and Hargadon and Sutton (1997) finding

that knowledge brokering across structural holes *increased* innovative success. Uzzi (1996, 1997) suggested a middle ground, demonstrating that the most successful, durable, and innovative small firms were those whose owners maintained an optimum combination of embedded and arms-length ties – that is, an optimum combination of centrality and brokerage advantages. Similarly, McFadyen, Semadeni, and Cannella (2008) reported that individuals that generate the most new knowledge are those with strong ties to and dense networks of knowledge partners who in turn maintain more sparse networks. Schilling and Phelps (2007) found that more innovative firms are those embedded in networks that feature both tight interconnections and broad reach. Within destinations, well-connected, central players – either influential private operators or public entities – may well facilitate innovation within the destination (Baggio & Cooper, 2010; Dredge, 2006; Vernon, Essex, Pinder, & Curry, 2005), but firms seem to rely on "loose local networks" to "sustain dynamism" and strong ties to non-local suppliers and brands to gain deep, specialist knowledge (Sundbo et al., 2007, p. 101).

Conceptually, there are at least two considerations when choosing innovation partners: The usefulness of collaborating to innovate and sheer the innovativeness of the potential partner. It is generally acknowledged that collaborating with others to develop innovation positively affects organizational success, both through the actual effects of the innovations (Batterink, Wubben, Klerkx, & Omta, 2010) and through feedback loops that strengthen an organization overall (Bonaccorsi & Lipparini, 1994). The positive effects of collaboration for innovation have been found for tourism businesses (von Friedrichs Grangsjö, 2003; Zach, 2012), including for small and medium sized firms within destinations (Denicolai et al., 2010; Tinsley & Lynch, 2001). Indeed, small firms have been shown to be particularly innovative when working together to develop complementary offerings both to meet the varying needs of particular tourists and to differentiate a specific destination (Novelli et al., 2006). That is, collaborating to innovate seems to increase both firm and destination success.

As useful as collaboration for innovation may be, not all innovation partners are created equal. Some firms in a tourism destination are sought after by others as innovation partners (Prats, Guia, & Molina, 2008). In-degree centrality is one way to indicate such prominence or prestige (Hanneman & Riddle, 2005; Wassermann & Faust, 1994, pp. 291–344) within a network. That is, high in-degree centrality within the network of innovation partners indicates that many firms innovate with the focal firm. We understand this as a vote about that firm's prominence – and presumably effectiveness – as an innovation partner.

We conclude that for regional tourism destinations with predominantly small firms, the choice of innovation partners will be influenced by the partners' connections to across the loose local network and to the wider world. Thus:

Hypothesis 1a. *Whether a firm occupies a brokerage position in a destination will be positively associated with the choice of that firm as an innovation partner.*

Further, because the spanning of structural holes is associated with access to new ideas:

Hypothesis 1b. *Whether a firm occupies a brokerage position in a destination will be positively associated with that firm's prominence as an innovation partner.*

2.2. Knowledge stock redundancy and innovation

There is a need to tease out the influence of knowledge stocks from knowledge flows: "Future research needs to untangle the influence of network position and structure on knowledge flows from the influence of the depth and diversity of network member knowledge stocks on knowledge flows and knowledge creation." (Phelps et al., 2012, p. 1143). The intuition is that the types, diversity and complementarity of available knowledge must be important inputs to the combinatorial process of innovation (Nelson & Winter 1985). Thus, while reaffirming that network structure is an important determinant of knowledge flows and innovation, Rodan and Galunic (2004) argued that access to heterogeneous knowledge has more impact on innovation performance than network structure. Similarly, there is some evidence that suggests that too much knowledge redundancy is *negatively* related to innovation in both product alliances (Rindfleisch & Moorman, 2001) and cultural tourism clusters – unless conscious search strategies lead firms to non-redundant knowledge (Martínez-Pérez, García-Villaverde, & Elche, 2015). Given both the importance of new knowledge to innovation and the general finding that knowledge redundancy reduces innovation, we expect that an innovation partner will be desirable because of the additional knowledge they bring, and:

Hypothesis 2a. *Knowledge redundancy will be **negatively** associated with the choice of a firm as an innovation partner.*

Further, to the extent that knowledge heterogeneity is associated with innovation performance:

Hypothesis 2b. *Knowledge redundancy will be **negatively** associated with a firm's prominence as an innovation partner.*

2.3. Trust and the incentive to innovate

The combination of the possibility of brokerage and knowledge heterogeneity creates the opportunity for innovation but may not be sufficient for innovation to actually occur. For knowledge to be combined to create innovation, there must be good reason: "Although alliances provide access to external knowledge, they do not guarantee its effective detection, transfer, and assimilation. These processes, and thus the odds of successful recombination, are influenced by the incentives partners have to cooperate and share knowledge with each other." (Hamel, 1991, p. 893). Clearly, the desire for profit and competitive advantage is a powerful motivator of innovation in tourism destinations, but only if the potential value of innovation is perceived to be greater than the investment in the innovation and the risk of any collaboration required for the innovation (Weiermair, 2005). Importantly, familiarity with a current collaboration partner reduces the cost of extending a current collaboration to a new context (Nooteboom, Berger, & Noorderhaven, 1997). Assuming that firms that work together do so because both find the collaboration advantageous, and also assuming that experience working together increases firms' ability to calculate the cost and benefit of extending their workaday collaboration to innovation, we suggest that:

Hypothesis 3a. *Current collaboration will be positively associated with the choice of a firm as an innovation partner.*

Further, to the extent that familiarity and effective collaboration reduce the risk of extending collaboration to a new context:

Hypothesis 3b. *Current collaboration will be positively associated with a firm's prominence as an innovation partner.*

However, other motivations beyond profit or advantage may be in play. Small firms have been shown collaborators for relational reasons as well as economic ones (Hill & Scott, 2015), and this may be especially true of small, "lifestyle" firms in tourist destinations

(Thomas, Shaw, & Page, 2011, pp. 965–966). Further, innovation seems to be enhanced when actors are connected by strong ties that facilitate rapid and multidimensional communication: "[S]trong ties that conduit a broad set of knowledge domains and link actors who enjoy working closely together are more likely to trigger creative ideas than ties that conduit a narrow set of knowledge domains and link socially distant actors." (Sosa, 2010, p. 16). At the firm level, the flow of knowledge between firms is shaped not only by the connections between the firms but also by the ways in which the ties are embedded within social relationships, thus shifting "the logic of opportunism to a logic of trustful cooperative behavior in a way that creates a new basis for knowledge transfer and learning across firm boundaries" (Uzzi & Lancaster, 2003, p. 384). More specifically, the private, tacit and contextual knowledge flows between firms that support innovation have been shown to be governed by social norms including relational trust (Saparito, Chen, & Sapienza, 2004). Relational trust is "the confident belief that a 'trustee' will act beneficially because the trustee cares about the trustor's welfare" (Saparito et al., 2004, p. 400). The existence of relational trust among actors in business settings facilitates the sharing of opportunity recognition and evaluation, as well as of technical and organizational knowledge, in ways that lead to competitor cooperation in destination networks (von Friedrichs Grängsjö & Gummesson, 2006); relational trust is an especially important component in participant-governed destination networks (Beaumont & Dredge, 2010). Thus, we expect that:

Hypothesis 4a. *Relational trust will be positively associated with the choice of a firm as an innovation partner.*

Further, to the extent relational trust facilitates effective collaboration, especially concerning risky endeavors, we propose that:

Hypothesis 4b. *Relational trust will be positively associated with a firm's prominence as an innovation partner.*

Finally, Fig. 1 summarizes the expected relationships between the choice of a firm as an innovation partner, the prominence of a firm as an innovation partner, and its structural position within the network of firms within a destination, the knowledge redundancy between possible innovation partners, current experience working with possible innovation partners, and the relational trust between possible innovation partners.

3. Method

This section describes the sites from which we drew the data, the survey instrument used, the data collected, measures used to operationalize the variables, and the analytic approach employed.

3.1. Small business tourist regions

We collected and combined data from four rural, regional, small-business-dominated tourism destinations in the United States: Cape May, NJ; the Eastern Shore of Virginia (Virginia counties on the DelMarVa Peninsula); Indiana Dunes (Porter County, IN); and Amish Country (Elkhart County, IN). In selecting these regions, we intentionally chose destinations that are characterized by small businesses. Small businesses as respondents increase the likelihood of reaching decision makers with direct responsibility for both networking and innovation (Paget, Dimanche, & Mounet, 2010) so that we could see how the firms fit into both network patterns at the firm level and characteristics of relationships at the interpersonal level. This approach helped us avoid the common problem of using network structure proxies for compositional elements (Phelps, 2010) and so allowed us to separate the influence of firm-specific relational characteristics from network structure.

Although some rural destinations (for example, many islands or ski resorts) are dominated by a few large, multinational firms (Britton, 1991), in many rural tourist destinations, small firms and influential individuals dominate (Saxena & Ilbery, 2008) and even increase the attractiveness of the destination (Alonso & Liu, 2012). The role of small firms in destinations is especially pronounced in regions trying to use the tourism market as a path to revive the local economy – though success depends on creating seamless tourism experiences across many types of firms, including tourism providers and those that provide ancillary products or services (Ateljevic, 2007; Davis & Morais, 2004). The regions we chose were of this sort: largely rural, without any dominant attraction or accommodation providers, and trying, with mixed degrees of success, to develop a coherent tourism strategy and image.

3.2. Survey instrument

With input from key destination stakeholders, we developed,

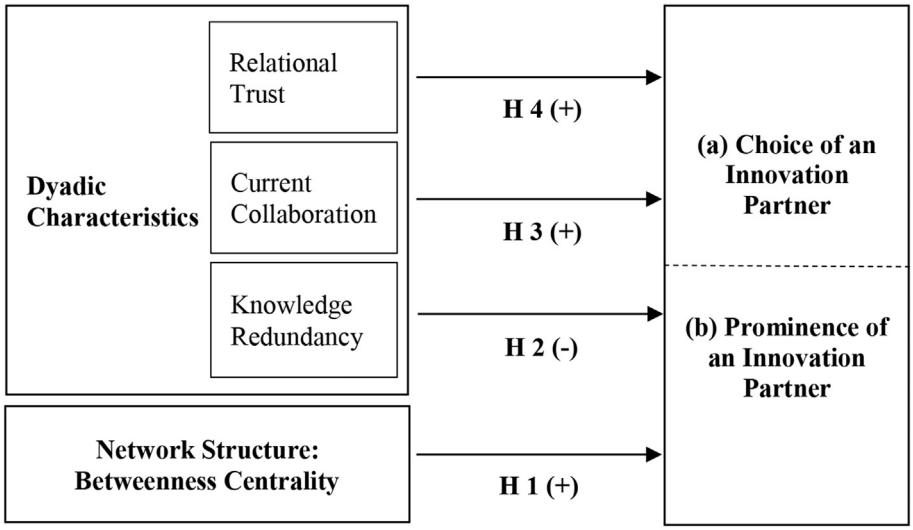

Fig. 1. Expected Relationships between Firm Centrality, Dyadic Factors and Innovation.

tested and distributed a web-based survey designed to collect both network data about structure and dyadic data about knowledge redundancy and relational trust. The instrument had three main parts: a network generator, questions about the quality of innovation relationships and questions about the firm itself. In the survey, we simplified the OECD definition and described innovation as the "development or implementation of new business ideas, including new services, products and/or significant improvements in existing services or products of any business/organization." We did not define "work with" explicitly, but we did emphasize that we were interested in "collaboration" and distinguished "work with" from "innovate with." Further, in pre-test interviews, respondents spoke about collaborative work-with relationships as a joint efforts – such as when a local horticultural society works with local businesses to plant flowers along a tourist trail, or when several businesses work together to market their region and firms as destinations for residents of a nearby urban area. For these reasons, we believe that "work with" captures a variety of types of relationships, most of which would be marked by cooperation, coordination and/or commitment.

In the first section, the questionnaire provided lists of firms from the destination and asked respondents to select those firms with which they work and those with which they innovate (innovation partners were not necessarily a subset of work partners.) Ideally, network studies should be based on population data, not sampled data (Wassermann & Faust, 1994, pp. 291–344), but with 300-to-500 companies per destination, asking owners to comment on their connections about every other firm proved impractical. Instead, we designed the survey so that respondents were presented a random selection of 75 firms to assess. (We showed batches of 75 firms because pre-tests showed that this was the largest number that firms that respondents could assess quickly and easily.) Once respondents chose their work or innovation partners or both from the initial list, they were offered the option to assess another batch of 75 firms – an option that many chose. Finally, respondents were given the option to write in both additional work and innovation partners, and many respondents took advantage of this option. Between the batches of 75 and the write-in options, we are confident that we collected information on the firms with which the respondents worked and innovated.

In the second section of the survey, respondents were asked to identify their most valuable innovation partner and then to answer questions about their relationship with this partner. By asking the respondents to characterize the qualities of the innovation partnership that they considered most valuable, we collected information about firm qualities associated with innovativeness, not specific innovations. We used previously tested scales to measure knowledge redundancy (Rindfleisch & Moorman, 2001) and relational trust (Saparito et al., 2004); pre-tests suggested the omission of one item from the original knowledge redundancy scale and two small revisions in language to capture the realities of small-scale, tourism-oriented firms. See Table 4, below, for the wording of the items used in each scale. In the third and final section, respondents were asked to provide basic information about their firm, industry and the like. These responses were used as controls.

3.3. Survey data

In each destination, we worked with local Chambers of Commerce and destination marketing organizations to assemble an email list of all businesses in each region; this was important as non-tourism businesses are often critical to the creation of the tourism experience (e.g. antique shops, gas stations etc.) (Ritchie & Crouch, 2003). After cleaning these lists, we sent email invitations to 1818 business owners. The invitation included a request to participate from a local luminary, such as the mayor, and a promise of a randomly awarded reward. After six reminders, 325 firms (17.9%) had completed the questionnaire and reported on connections to 1386 firms, thus allowing us to model network data for 76.2% of the firms on the original lists of destination firms. (See Aarstad et al., 2015 for a similar approach to approximating a complete network.)

Of the 1386 firms for which we collected network tie data, 1228 (88.6%) were identified as work partners and 540 (39.0% of the total) as innovation partners. The mean number of partners for each respondent was 12.1 work partners and 4.7 innovation partners. Of those identified as work partners, only 17.1% were also identified as innovation partners, and 38.5% of those identified as innovation partners were *not* mentioned as work partners. See Table 1 for a summary of the data collected concerning work and innovation partners.

Although the results of network analysis can only properly be said to apply to the actual network analyzed and not generalized to a larger population, the sub-group on which we collected data represented a large proportion of the possible population and so serves as a reasonable proxy for the entire population (Knoke & Yang, 2008).

We also collected relationship details on the innovation partner that respondents deemed most valuable. Respondents identified 183 most-valuable innovation relationships. After removing firms with missing data and a handful of outliers, we were left with complete data on 138 innovation partnerships representing 75.4% of the innovation relationships that the respondents' deemed most important.

To provide further assurance of the correspondence between the network studied and the actual network in the cluster, we conducted an attrition analysis (Table 2) that showed similar proportions of the categories of firms in the population and in the analysis set.

Table 3 provides a profile of the firms and organizations included in the analysis.

3.4. Measures

Dependent variables. We used two dependent variables: *Innovate with* and *Innovate Centrality*. *Innovate with* indicates whether a respondent innovates with another firm; it is a simple matrix measure of connection. *Innovate Centrality* is the in-degree centrality measure of a given firm.

Table 1
Overview of work-with and innovate-with ties data.

Total destination firms	1818
Number of firms rated	1386
Percentage of firms rated	76.2%
Identified partners	
Number of work partners	1228
Number of innovation partners	540
Work partners per respondent	
Minimum	1
Maximum	72
Mean	12.13
Standard Deviation	11.98
Innovation partners per respondent	
Minimum	1
Maximum	43
Mean	4.68
Standard Deviation	5.72
Partner overlap	
Work partners that are innovation partners	17.1%
Innovation partners that are *not* work partners	38.5%

Table 2
Attrition bias test.

Business Categories	% Population	% Analysis
Accommodation	*14.6*	*13.0*
Agriculture	0.5	1.4
Arts	*5.9*	*10.9*
Business services	13.8	10.9
Churches	0.2	0.7
Construction	3.5	3.6
Education	2.2	2.2
Entertainment/Attraction	*14.1*	*9.4*
Medical	2.7	1.4
NGO	2.0	1.4
Public administration	5.2	9.4
Publishing	1.2	1.4
Restaurant	*7.9*	*13.8*
Retail	*14.1*	*12.3*
Other	12.1	8.2

Notes: Includes destination marketing organization, chambers of commerce as well as local and regional governments.
Italicized business categories benefit the most from tourism.

Table 3
Respondent characteristics.

Annual Budget		Full-time Employees	
Up to $ 100,000	29.0%	None	10.9%
$ 100,001 - $ 250,000	22.5%	1 to 2	32.6%
$ 250,001 - $ 500,000	8.0%	3 to 5	17.4%
$ 500,001 - $ 750,000	5.1%	6 to 9	14.5%
$ 750,001 - $ 1,000,000	11.6%	10 to 19	10.9%
$ 1,000,001 - $ 2,000,000	10.1%	20 to 49	7.2%
$ 2,000,001 - $ 3,000,000	2.9%	50 to 99	3.6%
$ 3,000,001 - $ 5,000,000	2.9%	100 to 249	2.9%
$ 5,000,001 - $ 10,000,000	4.3%	250 and more	0.0%
$ 10,000,001 and more	3.6%		

Independent variables. For a network structure measure, we used the betweenness centrality of a firm's network position within the destination's work network. For relationship measures, we used the simple fact of working together and two previously developed scales, one to measure knowledge redundancy and one to measure relational trust between firms that innovate with one another.

Network position has been used to good effect in regression models that combine network position and other variables to explain performance (see, for example, Rossman, Esparza, & Bonacich, 2010). For our network structure variable, we used *Work Network Betweenness Centrality*. Betweenness centrality captures the degree to which an actor lies on paths that connect other actors (Hanneman & Riddle, 2005); a high score indicates that a firm an influential connector who bridges structural holes between clusters in a network (Burt, 2000). In knowledge and innovation networks, actors with high betweenness centrality scores are thought to serve as boundary spanners or even brokers of ideas (Burt, 2004).

For our firm-level variables, we used the respondents' mutual indications of a current work-with collaboration and their assessments of the degree of knowledge redundancy and relational trust that characterized their innovation partnerships. For *Current Collaboration*, we simply noted whether both firms indicated the other as work partners in the work-with network. For *Relational Trust*, we used the relational trust scale developed and validated by Saparito et al. (2004). For *Knowledge Redundancy*, we used the scale developed and validated by Rindfleisch and Moorman (2001). All items were measured on a 5-point Likert scale with anchors 1 = strongly disagree, 5 = strongly agree. The specific wording is listed in Table 4, along with the means, standard deviation and factor loadings of the items for each construct.

The construct measures for *Relational Trust* and *Knowledge Redundancy* proved acceptable. The confirmatory factor analysis model fit measures are well within the suggested limits: $\chi^2/df \leq 2.5$ (Muthén & Muthén, 2007), RMSEA $\leq$ 0.08 (Kline, 1998), SRMR $\leq$ 0.08 (Kline, 1998), TLI > 0.90 (Hair, Anderson, Tatham, & Black, 1995), and CFI $\geq$ 0.90 (Muthén & Muthén, 2007). Further, at 0.9 and 0.8 for *Relational Trust* and *Knowledge Redundancy*, respectively, the Cronbach alphas for the measures meet the recommended 0.8 threshold (Nunnally & Bernstein, 1994) (See Table 5). Finally, we tested the constructs' convergent and discriminant validity employing Fornell and Larcker's (1981) average variance extracted (AVE). As required, the AVE measures (bold in Table 5) are larger than both 0.5 and each construct's correlation (see Table 6).

Control variables. We included several controls to hold constant the effect of variables that might reasonably be associated with innovation in a network context. Because relative commitment to and visibility in the tourism cluster could affect the perception of a firm's role in innovation, we asked respondents to assess on a scale of one to seven whether they were a major player for tourism in their destination (1 = strongly disagree, 7 = strongly agree). Similarly, because perception can be reality, we asked whether firms thought of themselves (and presumably told others) as innovative. We included dummy variables for firm size both in terms of employees and budget. As some 51% of respondents have an annual budget that is less than or equal to $250,000 and about 45% of respondents employed two or fewer, we created small firm dummies using these cutoff values. Finally, dummies for the destinations were added to test whether variation between destinations might have an impact on the relationships studied.

Common method bias. Especially when the measures used are perceptual, there are always concerns about common method bias when collecting both dependent and independent variables using a single questionnaire collected at a single point in time (Chang, van Witteloostuijn, & Eden, 2010). While we did collect our data through a single survey, we reduced or avoided common method bias by separating the source of the independent variables from the source of our dependent variable (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The independent variables concerning relationship quality were self-reported impressions, but both the independent variable concerning work network structure and the dependent variables concerning choice of and prominence of a firm as an innovation partner reflect the aggregate response of all respondents from a destination. Further, the network measures were from different networks (the work and innovation networks). Finally, the measures of work-with and innovate-with were mutual and thus confirmed by two respondents. That is, while all the inputs came from one survey, the data used was distinct: self-reported assessments of knowledge redundancy and relational trust, a collective assessment of position derived from the work network, a collective assessment of innovativeness derived from the innovate network, and a mutual confirmation of current collaboration and innovate with partnerships.

3.5. Analysis

Because network variables are, by definition, interconnected, and because standard inferential statistical tools such as ordinary least squares (OLS) regression assumes that observations are independent of each other, we use multiple regression quadratic

Table 4
Confirmatory factor analysis.

Items	Mean	S.D.	Factor loading
Relational Trust [Saparito et al. (2004) *Cronbach* $\alpha = 0.89$]			
1) We could freely share concerns and problems and know that our collaboration partner would be interested in listening.	2.041	0.795	0.942
2) We could freely share concerns and problems and know that our collaboration partner would respond constructively.	2.058	0.773	0.948
3) We share common business values with our collaboration partner.	2.055	0.767	0.794
4) We feel that our collaboration partner would act in a fashion consistent with our wishes without prior discussion.	2.172	0.777	0.848
Knowledge Redundancy [Rindfleisch and Moorman (2001) *Cronbach* $\alpha = 0.85$]			
1) Our collaboration partner produces very similar products or services to ours.	3.093	1.078	0.681
2) Our collaboration partner has complementary new product or service development skills.	2.385	0.898	0.638
3) Our collaboration partners' personnel have the same type of knowledge as ours.	2.876	1.008	0.864

Note: All items were measured on a 5-point Likert scale (1 = Strongly Agree; 5 = Strongly Disagree).

Table 5
Measurement scale reliability.

Construct	Mean	S.D.	Cronbach α	Composite reliability	Inter-construct correlation & reliability	
					(1)	(2)
(1) Relational Trust [Saparito et al. (2004) *Cronbach* $\alpha = 0.89$]	2.082	0.711	0.925	0.91	**0.784**	
(2) Knowledge Redundancy [Rindfleisch and Moorman (2001) *Cronbach* $\alpha = 0.85$]	2.785	0.818	0.798	0.78	0.281	**0.539**

Notes: Bold diagonal numbers represent AVE.
CFI = 0.934, TLI = 0.914, RMSEA = 0.042, SRMR = 0.077, χ^2/df = 2.1.

Table 6
QAP correlation table.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Innovate With	1.000											
(2) Innovate Centrality	0.157**	1.000										
(3) Current Collaboration	0.433**	0.228**	1.000									
(4) Relational Trust[a]	0.454**	0.102**	0.244**	1.000								
(5) Knowledge Redundancy[a]	0.468**	0.109**	0.263**	0.567**	1.000							
(6) Work Network Betweenness Centrality	0.143**	0.638**	0.210**	0.104**	0.109**	1.000						
(7) Perceived Innovativeness[b]	−0.007	0.000	−0.015	−0.028**	−0.032**	0.000	1.000					
(8) Major Player[b]	0.002	0.000	−0.002	0.039**	0.038**	0.000	0.146**	1.000				
(9) Dummy employees	0.016	−0.039*	0.006	0.003	0.002	−0.039**	0.018	−0.074*	1.000			
(10) Dummy budget	0.028*	0.018	0.071**	0.030*	0.034**	−0.015	−0.13**	−0.030	−0.04*	1.000		
(11) Dummy Elkhart County	−0.007	0.000	−0.015	−0.028**	−0.032**	0.000	0.000*	0.000	0.000	0.000	1.000	
(12) Dummy Eastern Shore	0.091*	−0.075	0.131**	0.048**	0.049**	−0.119*	0.000	0.000**	0.022	−0.047**	−0.065**	1.000
(13) Dummy Porter County	0.028	0.018	0.071**	0.030*	0.034**	−0.015	0.000	0.000*	0.007	0.003	−0.13**	−0.030

*Note: N = 138; *p≤0.050, **p≤0.01; 5000 permutations.*
[a] 5-point Likert scale.
[b] 7-point Likert scale.

assignment procedure (MRQAP) to test our hypotheses. MRQAP has been shown to be superior to OLS regression, especially as the autocorrelation of errors increases due to, for example, various network patterns of connection (Krackhardt, 1988). Similarly, correlation was calculated using the quadratic assignment procedure QAP. QAP and MRQAP do not violate parametric assumptions associated with correlation and OLS regression. MRQAP produces the same kinds of parameter estimates with a randomization permutation technique to estimate standard errors and so test significance (Borgatti & Cross, 2003). MRQAP is particularly useful when working with betweenness centrality as it is dependent on the structure of the network (Gibbons & Olk, 2003).

Data for MRQAP has to be in an actor-by-actor format. As collected, only the *Current Collaboration* and *Innovate with* collaboration data were available in that format. The other variables, including *Innovate Centrality*, *Work Network Betweenness*, *Relational Trust*, *Knowledge Redundancy*, *Perceived Innovativeness*, *Major Player,* and the *dummies* for firm size and location, required transformation into measures with only one value per actor. To achieve this, we followed Krackhardt (1993) and calculated the similarity, or difference, matrix for such single column data. This was done first by normalizing the data (to facilitate comparison across destinations) and then by taking the normalized score of actor X and subtracting it from all the other actors, then from actor Y, and so on, thus creating an actor-by-actor matrix of differences (Lee, Cotte, & Noseworthy, 2010).

4. Results

We test the (a) hypotheses using as the dependent variable the simple choice of a partner with whom to innovate and the (b) hypotheses using as the dependent variable the in-degree centrality of any given innovation partner. To test these hypotheses we run UCINET 6. Table 6 reports the correlations between matrices for each variable and provides several observations. First,

there is no correlation between the control variables perceived innovativeness and major player with the dependent variables. Second, one each of the firm size dummy variables is are slightly significant with the dependent variables. Third, all independent variables are positively correlated with the dependent variables. Fourth, correlation among independent variables is within acceptable limits (Borgatti & Cross, 2003) to include the variables in MRQAP analysis.

4.1. Hypothesis testing

Table 7 summarizes the hypothesis tests of the associations with the *Innovate with* and *Innovation Centrality* dependent variables, with and without controls. As indicated by the *p*-values for the models, each model is significant at the 0.001 level, indicating that all four models explain a significant amount of the variance in the data. As reported, the models with main effects and controls for *Innovate with* account for about 32% of the variance in the data and, the main effects and controls for *Innovation Centrality* account for about 76% of the variance. Finally, in both the A and B models, the addition of the controls improved the models but only in a modest way – indicating that the independent variables are the variables associated in a significant and material way with the choice and prominence of an innovation partner.

Across the two dependent variables, our results provide support for Hypothesis 1 concerning network position and Hypothesis 3, concerning current collaboration. Support for Hypothesis 4 is mixed, with relational trust being associated with the choice of innovation partner but not the likelihood of association with a prominent innovation partner. Finally, our results partially contradict Hypothesis 2, concerning the negative effect of knowledge redundancy, and suggest instead that knowledge redundancy influences the choice of innovation partners but not likelihood of association with a prominent innovation partner.

Hypothesis 1a: ***Whether a firm occupies a brokerage position in a destination will be positively associated with the choice of that firm as an innovation partner.*** In Model A1 of the *Innovate with* tests, *Work Network Betweenness Centrality* ($\beta = 0.033$, $p \leq 0.01$) has a positive effect as predicted in Hypothesis 1a, but the magnitude of the effect is small, compared especially with *Current Collaboration* ($\beta = 0.328$, $p \leq 0.001$) and *Knowledge Redundancy* ($\beta = 0.275$, $p \leq 0.001$); the magnitude of the variables holds when the controls are added in Model A2. Hence, our data provides tepid support for Hypothesis 1a: The higher the brokerage value of a firm in the work-with network, the more likely that it is also an innovation partner.

Hypothesis 1b. ***Whether a firm occupies a brokerage position in a destination will be positively associated with that firm's prominence as an innovation partner.*** For *Innovation Centrality*, *Work Network Betweenness Centrality* ($\beta = 0.858$, $p \leq 0.001$; Model B1) has a positive effect as predicted in Hypothesis 1b (growing to $\beta = 0.862$, $p \leq 0.001$ when the controls are added), and the magnitude of the effect is *much* more prominent than that of any other variable; the significance and the magnitude of the variables holds when the controls are added in Model B2.

Taken together, we interpret these findings as support for Hypothesis 1: that the higher the brokerage value of a firm in the work-with network, the more likely that it is also an innovation partner – but add the twist that brokerage position is a particularly strong indicator of a firm's prominence as an innovation partner.

Hypothesis 2a. ***Knowledge redundancy will be negatively associated with the choice of that firm as an innovation partner.*** In Model A1 of the *Innovate with* tests, *Knowledge Redundancy* ($\beta = 0.275$, $p \leq 0.001$) has a positive effect as predicted in Hypothesis 2a, and the magnitude of the effect is quite large, compared especially with *Relational Trust* ($\beta = 0.109$, $p \leq 0.01$) and *Work Network Betweenness Centrality* ($\beta = 0.033$, $p \leq 0.01$); the significance and the magnitude of the variables holds when the controls are added in Model A2. This contradicts hypothesis 2a concerning a negative relationship between knowledge redundancy and the choice of innovation partners; instead, the findings suggest that the greater the knowledge redundancy between firms in the work-with network, the more likely that these firms are also innovation partners.

Hypothesis 2b. ***Knowledge redundancy will be negatively associated with a firm's prominence as an innovation partner.*** Intriguingly, in Model B1 of the *Innovation Centrality* tests, *Knowledge Redundancy* becomes *non*-significant (with or without controls) and provides no support for an association between *Knowledge Redundancy* and choice of a central and prominent innovation partner.

Taken together, these mixed results suggest that knowledge overlap is useful for identifying an innovation partner but not for

Table 7
Test of the association between choice of innovation partner, network position and dyadic attributes.

Variable	Innovate with		Innovate Centrality	
	Model A1	Model A2	Model B1	Model B2
Current Collaboration (H3)	0.32768***	0.31564***	0.04667***	0.04531***
Relational Trust (H4)	0.10873**	0.10532***	−0.01290	−0.01314
Knowledge Redundancy (H2)	0.27445***	0.27800***	0.01510	0.01414
Work Network Betweenness Centrality (H1)	0.03324**	0.03890*	0.85807***	0.86271***
Perceived Innovativeness		0.01101		0.00106
Perceived Major Player		−0.01214*		−0.00020
Dummy size – employees (up to 2 employees)		0.01624*		−0.00725
Dummy size – budget (up to $250,000/year)		−0.00337		0.00417
Dummy Elkhart County		0.04648		0.01421
Dummy Eastern Shore VA		0.03946		0.02803
Dummy Porter County		0.00012		0.03270
Intercept	0.00000***	0.00000***	0.00000***	0.00000***
R^2	0.32465	0.32838	0.75589	0.75757
Adjusted R^2	0.32449	0.32793	0.75583	0.75740
P-Value of Model	0.00050	0.00050	0.00050	0.00050

Dependent variables: **Innovate with** (whether ego chooses to innovate with alter) and **Innovate Centrality** (InDegree centrality of alter); Significance: *p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001, N = 138; 2000 permutations.

predicting which firms from a population will be the most prominent among innovation partners.

Hypothesis 3a. ***Current collaboration will be positively associated with the choice of that firm as an innovation partner.*** In Model A1 of the *Innovate with* tests, *Current Collaboration* ($\beta = 0.328$, $p \leq 0.001$) has a positive effect as predicted in Hypothesis 3a, and the magnitude of the effect is quite large, compared especially with *Relational Trust* ($\beta = 0.109$, $p \leq 0.01$) and *Work Network Betweenness Centrality* ($\beta = 0.033$, $p \leq 0.05$); the significance and the magnitude of the variables holds when the controls are added in Model A2. Hence, it is more likely that firms that collaborate in the work-with network will also choose to innovate with each other.

Hypothesis 3b. ***Current collaboration will be positively associated with a firm's prominence as an innovation partner.*** In Model B1, *Current Collaboration* remains significant at the $p \leq 0.001$ level, but the magnitude of the effect is reduced to $\beta = 0.047$ (and 0.045 with controls). That is, when the measure of innovation collaboration shifts to the centrality and so prominence of the innovation partner, the predictive value of current collaboration becomes much smaller, suggesting that, while still supportive of hypothesis 3b, collaborating in the work-with network has only a modest association with the prominence of a firm as an innovation partner.

Together, these findings support Hypothesis 3, that current experience working together is associated with innovating together, but provides only a fraction of an explanation of whether one's choice of an innovation partner will be prominent as an innovation partner in the population.

Hypothesis 4a. ***Relational trust will be positively associated with the choice of that firm as an innovation partner.*** In Model A1 of the *Innovate with* tests, *Relational Trust* ($\beta = 0.109$, $p \leq 0.01$) has a positive effect as predicted in Hypothesis 4a, but the magnitude of the effect is small, compared especially with *Current Collaboration* ($\beta = 0.328$, $p \leq 0.001$) and *Knowledge Redundancy* ($\beta = 0.332$, $p \leq 0.01$); the significance and the magnitude of the variables holds when the controls are added in Model A2. Hence, in support of Hypothesis 4a, the more trust between firms in the work-with network, the more they are to be innovation partners.

Hypothesis 4b. ***Relational trust will be positively associated with a firm's prominence as an innovation partner.*** More interestingly, in Model B1 of the *Innovation Centrality* tests, *Relational Trust* becomes *non*-significant (with or without controls) and provides no support for an association between *Relational Trust* and choice of a central and prominent innovation partner; thus rejecting Hypothesis 4b.

Taken together, these mixed results suggest that trust is useful for choosing an innovation partner but not for predicting which firms from a population will be the most prominent among innovation partners.

Combined Results. Our findings suggest that firms choose to innovate with firms with whom they already work and with whom they share knowledge. The choice of innovation partner is also facilitated by trust and the potential innovation partners' boundary spanning potential, but these are less telling. On the other hand, a potential innovation partner's position as a boundary spanner in the work-with network is an overwhelmingly powerful indicator of the likelihood that that firm will be a prominent innovation partner among the population of possible innovation partners, while trust and shared knowledge have no effect. That is, relationship measures are associated with the choice of innovation partners, but network structure measures are better indicators of the prominence, and presumably the innovation effectiveness, of possible innovation partners.

5. Discussion: the interplay between network position, relationship factors and innovation in tourism destinations

The purpose of this study is to help disentangle the contribution of network position from the contributions of relationship characteristics to a firm's desirability as an innovation partner in a tourism destination. By studying small firms, we were able to combine network position measures with direct measures of knowledge redundancy and relational trust, thus avoiding the common methodological problem of using network measures as proxies for compositional measures (Phelps, 2010). More specifically, we included *betweenness centrality* in the regional network of firms (the "work-with network") because such centrality could affect the focal firm's boundary spanning access to flows of knowledge and resources from across the region (Borgatti & Halgin, 2011; Burt, 2004; Cowan & Jonard, 2009b; Sørensen, 2007). We considered day-to-day *collaboration* with other firms because such familiarity could reduce the risks associated with expanding into an innovation partnership (Nooteboom et al., 1997). We also examined the *knowledge redundancy* between innovation partners because the degree of knowledge overlap could affect firms' ability to combine new ideas effectively and/or reduce a firm's exposure to new ideas (Cowan & Jonard, 2009a; Rindfleisch & Moorman, 2001). Finally, we considered the degree of *relational trust* that characterizes an innovation partnership because the quality of trust could ease or hinder knowledge flows between partners (Saparito et al., 2004).

Our results support the predictions that current collaboration and betweenness centrality in the *work network* of a destination combine with knowledge redundancy and relational trust to help explain the choice of an innovation partner in a tourism destination. At the same time, our findings point primarily to the network position, specifically to betweenness centrality, as an indicator of a partner's prominence as an innovation partner. Our results also provide *no* support for relational trust or knowledge redundancy between partners as a predictor of a firm's prominence in the set of possible innovation partners. That is, relationship-level characteristics facilitate innovation partnerships but network structure characteristics identify the most influential innovative partners.

Practically, our findings suggest that the facilitation of innovation in a destination involves two simultaneous efforts: Investment in boundary spanning to facilitate the discovery and in-flow of new ideas and the facilitation of collaboration and knowledge sharing to support the implementation and application of these ideas. Further, neither trust nor knowledge sharing seem particularly important to firms when interacting with the most prominent innovators, but collaboration in day-to-day work, knowledge sharing and a modicum of trust all encourage innovation efforts with less prominent partners. Thus, the horticultural organization in Elkhart County's Amish Country was instrumental in importing the idea of a quilt-themed themed driving tour, but it took the active, innovative collaboration of gardeners, garden supply firms, quilt makers, tour operators, restaurants, farm wives, and other community firms to, over time, generate a series of gardens planted in the manner of Amish quilts and strung out along pre-determined tour routes to provide both a memorable experience for visitors and a host of new product and service offerings for the collaborating entities.

Similarly, for tourism firm owners and managers, our findings suggest that firms would do well to stretch to find innovation partners who provide new information and ideas, even if the relationships involved prove to be uncomfortable. For example, when reporting our findings to representatives from the destinations, one participant told the story of the surprising but effective

collaboration between a sweet shop and an organizer of specialized nature walks – a collaboration between two well-connected, boundary-spanning owners from different business and social circles who managed to close the interpersonal and social distance between them enough to innovate together effectively.

For scholars, our findings contribute to ongoing efforts in the tourism and innovation literature to better understand the interaction between innovation and networks; specifically to separate out and evaluate the differential effects of stocks and flows on innovation (Rodan & Galunic, 2004; Sundbo et al., 2007); to determine the role of shared knowledge and relational trust in destinations (Beaumont & Dredge, 2010; Cowan & Jonard, 2009a; Santoro & Saparito, 2006; von Friedrichs Grängsjö & Gummesson, 2006); and to specify the role of local, national and even global networks in feeding innovation in small firms in specific destinations (Sørensen, 2007). More specifically, our findings suggest that it could be productive to explore other ways in which the qualities of organizations might augment network structure in explaining knowledge and resource flows through networks. What factors might turn flows on or off? What factors might modulate the volume and speed of flows? At what point does the cost of managing multiple relationships, especially if ties are strong, overwhelm the benefits (McFadyen & Cannella, 2004; Wadhwa & Kotha, 2006)?

Second, our dependent variables, the choice of a firm as an innovation partner and the in-degree centrality of that innovation partner, indicate the desirability and prominence of a firm as an innovation partner without specifying whether the firm is an effective innovator, a frequent innovator, a facilitator of innovation, or even a publicist of innovation. Future studies could try to differentiate the role and impact of the orchestrators of innovation in destinations (Batterink et al., 2010; Dhanaraj & Parkhe, 2006) from the role and impact of actual innovators and so test whether public sector actors in destinations can only facilitate but not innovate (Baggio & Cooper, 2010) or whether tourism offices or other destination decision makers can be more integrally a part of innovation co-creation and implementation (Zach, 2012).

Finally, our mixed results concerning the value of knowledge redundancy and relational trust suggest the need for further study to isolate the mechanisms at work. Drawing from both the literature and our findings, we would suggest that boundary spanning leads the discovery and introduction of new ideas, familiarity through daily collaboration enhances the flow of ideas, and knowledge redundancy combines with relational trust to provide he absorptive capacity necessary to apply new knowledge effectively. If this is so, then one question concerns the optimum proportion of redundancy and reach in generating destination-wide and firm-level innovation. Similarly, although our methods allowed us to separate network structure measures of flows direct measures of composition (in our case, knowledge redundancy and trust), more needs to be done to sort out the direction of causality. To pursue either of these avenues of inquiry, historical or prospective longitudinal studies would be useful to explore the possibility of some sort of spiral (or perhaps ebb and flow) of destination innovation as the interaction of knowledge diversity, network position and pattern, and trust-modulated flows (Dredge, 2006; Haugland et al., 2011; Selin & Chavez, 1995). When doing such studies, it would be important to pay extra attention to collecting as complete information about the networks under study as possible; as with all network studies, our findings are limited to the network we were able to map and cannot be considered representative of some larger population.

For now, we hope that our study provides new insight into the influence of network structure in bringing in and spreading new ideas through a destination and of familiar, shared-knowledge, perhaps trusting relationships in applying those ideas to specific tourist experiences.

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