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through Collaborative Network Relationships**

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Structural Embeddedness and Community-Building through Collaborative Network Relationships

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This paper examines the role of structural embeddedness as an organising phenomenon within interdependent networks. While conceptual and philosophical in nature, data from a longitudinal ethnographic case study of an icon tourism destination is used to illustrate new framings of this concept. This method of research enables deeper insights to be attained that add both explanation and understanding to our current appreciation of the interdependent organizing phenomena. The case data illustrate how the network has structural attributes of heterogeneity, interconnection and reciprocity that contribute to its anti-hierarchical state. This enables an infinite number of structural possibilities to occur, some of which can be developed to form strategic capabilities that belong to the network. Assisting this process, is a symbiotic and mutual participation from the interdependent actors which critiques the notion of structural redundancy. The paper illustrates how the aggregated patterns have formed in the network and how reciprocal obligation has built long term exchange patterns that contribute to forming the embedded macroculture.

INTRODUCTION

It is commonly acclaimed that we live in an interconnected networked world. Competitive and cooperative enterprises, suppliers, customers, employees, regulatory authorities and related institutions and stakeholders are embedded in linked networks through a process of interdependent coordination. Interactions among these organisations form webs of interconnection, and these webbed patterns, or structural configurations, give rise to aggregated conditions of cohesion or disorder. Because of the informal organizing that occurs through this generative structure, understanding how they function remains ambiguous. Indeed, for those more familiar with linear-determined supply chain management, these complex and interconnected territories can be extremely difficult to negotiate. The paper presents some underlying governing formulae of how and what network organisation means. Its purpose is to present a conceptual understanding of co-dependence, while using an empirical study as illustrative of this concept. The paper posits a view that organisations co-exist within a broader community of webbed relations that include social, econom-

ic, environmental and cultural aspects. In this way, understanding organisations requires a more embractive perspective of macro-organisation than has been conventionally viewed in management theory literature.

The most established field of management research for understanding macrolevel organizing dynamics is seen in the network structure literature. A key component of this literature focuses on the fluidity of networks, as the structural configuration can change regularly through positional changes. While centrality, density and positional elements of network theory have received significant attention, the embedded nature of structural change within networks has been overlooked. Granovetter (1992), for instance, argues that on-going social relations act as coordinating mechanisms which become a facet of the economic vitality that emulates from that interaction. These interactions create patterns that extend beyond the actions of individuals, and, Granovetter continues, the treating of relations and structures of relations as if they had no history offers inadequate explanations of economic behaviour. «In on-going relations, we do not start afresh each day, but carry the baggage of previous interactions into each new one» (Granovetter (1992: 34). This suggests that rather than organisations conducting activities independently, they are embedded in networks of relationships that affect others and are in turn, impacted on through past activities. While relational embeddedness has a direct effect on individual economic action, structural embeddedness more specifically indicates consequences of those actions that shape system-connected patterns at a macrolevel.

To date, there has been limited research into how the macrolevel structural properties may influence the growth and development of the network system. This becomes particularly important to strategists, as the stockpiling that may occur within the network structure can assist in the development of strategic capabilities that belong to the network. As Kogut (2000: 423) notes, networks «are more than just relationships [... they] constitute capabilities that augment the value of firms (...) encoding coordination within and between specialised firms in specific cooperative and competitive structures [so] that the “missing” sources of value can be found».

The question arises, then, as to how does the embedded structure influence the growth and adaptability of an organisational network, which incorporates its local context? Taking this approach, this paper examines the role of structural embeddedness as an organising function as it explores the consequences of structural patterns. It takes a longitudinal perspective from an ethnographic study of an icon tourism destination network, focusing on the evolution and transformation of the network macroculture. A case narrative is used to describe the embedded structure of how past actions have affected the strategic future of the network. This provides a context from which to identify a deeper explanatory process of the macrolevel generative structures than are generally observable from the surface (Pentland, 1999). Prefacing this data narrative and conceptualization process is a discussion on the embeddedness debate.

STRUCTURAL EMBEDDEDNESS

Embeddedness has been defined by Marsden (1981: 1210) who argues «the fact that exchanges and discussions have a history, and this history results in the routinisation and stabilisation of linkages among members. As elements of on-going social structures, actors do not respond solely to individualistically determined interests. [...] structure of relations affects the actions taken by the actors composing it (...) by constraining the dispositions of those actors toward the actions they may take».

Granovetter (1992: 33) explains this more simply, in that embeddedness «refers to the fact the economic action and outcomes (...) are affected by actors' dyadic (pairwise) relations and by the structure of the overall network of relations». Much of the theorising on networks has centred on relational embeddedness, with its emphasis on strong/weak ties (Granovetter, 1973; 1985), trust building (Larson, 1992; Uzzi, 1996) and problem-solving (Uzzi, 1996). These relational theories examine the sets of relations that build social cohesion and focus more centrally on the dyadic relations and how they contribute to building the network. The literature on knowledge acquisition, too, has taken a relational perspective (Gulati, 1998; Simonin, 1999; Dyer and Nobeoka, 2000), and to date, the aggregated structural patterns that result from interactions and their implications for strategy have been less closely examined (see Khanna, 1998; Uzzi, 1998; Gulati, 1999; and Gnyawali and Madhavan, 2001).

Structural embeddedness shifts the focus from dyadic or triadic coordination activities to the network system. Underpinning this approach is the extent to which a dyad's mutual contacts are connected to one another, with these aggregated patterns acting as a mechanism to build social cohesion (Granovetter, 1992). The focus of this paper therefore examines, not only the relationships that organisations have with one another, but also those experienced indirectly through third parties. These linkages bring different groups together, allowing the transmission of information and common understandings to flow across boundaries. As such, benefits accrue not only to the individual firms, but also to the network as a whole, as the information and resources are transferred through the interconnection of embedded ties. Uzzi (1997: 134-135) declares: «Since an exchange between dyads has repercussions for the other network members through transitivity, embedded ties assemble into extended networks of such relations. The ties of each firm, as well as the ties of their ties, generate a network of organisations that becomes a repository for the accumulated benefits of embedded exchanges. Moreover, the longer an actor has made embedded contacts within their present and past networks, the more the benefits of embedded ties can be "stockpiled" for future needs».

Thus, structural embeddedness excludes a focus on atomisation and dyadics; rather it is more concerned with exploring the structural history that has shaped the present situation and the aggregation that has occurred from the subtleties of these interconnected on-going rela-

tions. The stockpiling of reciprocal obligations and the aggregated effect on the network reinforces the importance of social relations as a coordinating mechanism of embeddedness. As networks are fluid forms in a constant state of movement, their current aggregated state is a result of past interactions. The stockpiling of webbed interactions plays an important role in the network's organisation and contributes to its strategic future.

Conceptually, structural embeddedness remains enigmatic. Those who have endeavoured to explain the concept have referred to known structural properties. For instance, Gulati (1998: 296) defines structural embeddedness as «the informational value of the structural position these partners occupy in the network». He continues, «Actors occupying similar positions need not be tied to each other. [...] They reflect different status groups. [...] Status evokes a series of observable characteristics associated with a particular position (...) in a social structure that entails a relatively defined set of expected behaviors toward other actors». Gulati's implicit referencing to centrality (Freeman, 1979) and strong tie redundancy (Burt, 1992) locates his propositions within current network theorizing which continues to offer a static representation of networks. We need further understandings of the aggregation that results from on-going inter-relational configurations, which underlies the essence of embeddedness.

Rowley, Behrens and Krackhardt (2000) synthesise their understanding of structural embeddedness into avenues of network density. They argue that relational and structural embeddedness have a closer interplay than is previously suggested, and they propose that firms operating within dense networks require strong ties under conditions of exploitation and weak ties for exploration. They posit that structural embeddedness can be examined through governance implications, arguing that like strong ties, dense networks serve as a trust-based governance mechanism. They further state that in dense networks firms need less strong ties and more weak ties for optimal performance. Thus, «[t]he structure itself has produced behavioral norms to guide actions. (...) The positive relationship between strong ties and firm performance is greater in sparse ego networks than in dense ego networks» (Rowley, Behrens and Krackhardt, 2000: 372). Again, while this statement assists us to appreciate the implications of structural properties of networks, these insights do not address the stockpiling that underpins embeddedness and the accumulated aggregation that results.

Notable contributions for understanding structural embeddedness have come from Jones, Hesterly and Borgatti (1997) who focus on the web of affiliated patterns stemming from the structuring process. While acknowledging the exploratory nature of their research, they profile four themes that may unravel the social mechanisms for understanding structural embeddedness: macroculture, restricted access, reputation and collective sanctions. These themes act as the glue that binds interests together in patterns or webs of integration. Of interest to this paper are these authors' insights related to macroculture, which offer pertinent explanations of coordination within networks because of its long term focus.

A macroculture is what Jones *et al.* (1997: 929) describe as «a system of widely shared assumptions and values (...) that guide actions and create typical behavior patterns among independents». Macroculture is said to evolve from webs of direct and indirect relationships, including the institutional environment and the culture within which the organisations exist. Thus, macroculture emerges from the relational system in which it is embedded. The more structurally embedded, (i.e., the more connected and frequently interacting), the more actors share their values, assumptions and routines. In this manner, the macroculture is formed through action within the relational system, as structurally webbed patterns are crafted over time. Nevertheless, these authors acknowledge that the architectural patterns and the formation of conventions amongst actors and its institutional environment can take decades to form, as they are established from reciprocal repeated interactions, reinforcing cultural beliefs and customs from previously autonomous organisations.

The identification of a network macroculture by Jones *et al.* (1997) is strategically significant. Macroculture suggests that the network is an independent unit of accrual, and that network forms have structural properties that belong to the network rather than to individual organisations within it. In this instance, the macroculture is a property of the network. As Zajac and Olsen (1993: 137) state, «Parties use the interorganizational strategy to establish an on-going relationship that can create value that could otherwise not be created by each firm independently». This feature has gained further legitimacy in the strategy literature, with both Dyer and Nobeoka (2000) and Kogut (2000) demonstrating how the network is a repository of knowledge. Dyer and Nobeoka (2000) provide a case illustration of the Toyota network and Toyota's ability to create and manage knowledge-sharing processes with its suppliers. They reveal the process in which accumulated knowledge is created within the networked group, through the establishment of rules for entry and participation, and show how this accumulated knowledge provides competitive advantage for the network. Kogut (2000) scrutinizes knowledge interdependence further by illustrating how individual firms do not have independent ownership or access to these compositions of knowledge, but rather the accumulation remains a property of the network. Organisations within networks become interdependent as tacit knowledge is created, and this process reinforces the network as an independent unit of accrual. This feature is strategically significant in that it acknowledges that the network configuration possesses its own structural form which holds the knowledge repository of the network.

These contributions suggest that structural embeddedness refers to the aggregated patterns of interconnection that have been built over time, with networks providing a pertinent context to explore this phenomenon. Yet questions remain. How does structural embeddedness act as an organizing mechanism within these interdependent and aggregated networks? How do history (Marsden, 1981), reciprocity (Powell, 1990) stockpiling (Uzzi, 1997), and macroculture (Jones *et al.*, 1997) shape the organisation and coordination of the network? What

is the importance of the aggregated patterns and how do they inform our understanding of the strategy process? Finally, how does structural embeddedness return organisational action into the context of local community?

Thus, the overriding theme of this paper is to examine the role of structure as an organising mechanism, as interconnectivity accumulates benefits or constrains the growth of the network for strategic leverage. Because the focus is on developing deeper understandings and explanation of phenomena, a qualitative methodology is used, which enables deep insights to be revealed that contribute to new conceptualisations and theory building within this domain. This is consistent with a synthesised coherence approach, claimed by Locke and Golden-Biddle (1997) to be appropriate when our current understandings of this concept are incomplete. The above issues are explored using in-depth data from a larger ethnographic study which examined the informal organising mechanisms that occur within the tourism destination. The following section gives a brief outline of the case context before describing the method of data collection and analysis utilised in this research. Key features of network structure are then unravelled in the data which offer insights into embeddedness and strategic capability-building.

THE WAITOMO CAVES TOURISM CONTEXT

The case study is set within an 'icon' tourism destination in New Zealand, the Waitomo Caves. This isolated rural village is located within a limestone karst landscape, and is famous for its tourism attraction, the Glowworm Cave. Unique to this cave is its fauna, the glowworms, which twinkle in the dark cave like millions of stars in the night. The forty minute tourism experience consists of a passive 200 metre amble through grand and imposing limestone formations within the cave, followed by a mystical river float amongst the twinkling glowworms, each one no bigger than a mosquito, which inhabit the narrow chambers of the caves. This experience can be a highlight in the New Zealand tourism experience, and 500,000 people make the excursion to Waitomo each year, in a country with a population base of 4,000,000.

The Glowworm Cave has been a major tourism attraction for more than 100 years, and Waitomo has historically been a single-attraction destination site with a heavy dependence on the day-trip coach market. However, a change in tourism patterns during the 1980s witnessed a growing interest in free and independent travel (FIT) by the youth market seeking adventure. This market created a new opportunity for tourism in Waitomo with smaller specialist firms emerging to provide caving adventures. So, today, two distinct production systems operate. The core tourism product, the Glowworm Cave, remains an important feature particularly within packaged coach tours of New Zealand and, because of its short-stay, continues to operate independently within the Waitomo destination. The caving adventures, however, require a different type of production system, with symbiotic interdependencies

Relationships

forming among the primary and support activities, such as transport, food and overnight accommodation providers. This local production network system, then, characterises a small, but dense network, with complex inter-organisational dependence on both the ecological environment and the commercial market. This unique context enables illustration and understanding of structural embeddedness as these aggregated patterns have impacted on the development of the destination network.

METHOD

Case data were collected over a five year period, 1996-2000. A mixture of formal interviews, archival data, informal conversations and personal observations was used to gather information from the twelve firms located within this destination site. These firms include the central organisation, the Glowworm Cave (with its operational licence held by Tourism Holdings Ltd, a major tourism company in New Zealand), three smaller adventure caving organisations, the Waitomo Caves Museum and Visitor Information Centre, four accommodation providers, a restaurant, and two supporting activities. Only the Glowworm Cave has independent corporate management, with the other local participants all being privately owned small businesses. The owner/manager of each organisation participated in four semi-structured ninety-minute taped interviews over the research period, accounting for more than 100 hours of formal interviews for transcription. External agencies were also included in the data collection, as local government, tourism agencies, and environmental government agencies play an active role in the organising activities within this context.

Interviews focused on the nature of interorganisational collaboration within the tourism destination. Because of the range of participants, from tourism operators and regional councils to local community residents, a diversity of narratives were recorded, enabling a collective memory to unfold. Typical of rural villages, many of these families had lived in Waitomo for generations, and thus many oral histories were accessible. This enabled an evolutionary and transformational perspective of the tourism destination to be crafted so that the structural dimensions of embeddedness could then be reconstructed from both the textual narratives and research-oriented observations and conversations. To illustrate this evolutionary structural connectivity, a visual diagram of nodal interconnection was produced in accordance with the format used by network analysts (Burt, 1992; Krackhardt, 1992; Madhavan, Koka and Prescott, 1998).

This research process conformed to a mid-range theorising, which, as noted by Laughlin (1995: 81), is characterised by skeletal features, with this metaphor «painting a picture of incompleteness yet also reasonable stability». The role of the researcher becomes entwined with the context and the two elements form the discovery process. While the data are heavily descriptive, it is also analytical as «it complements

and completes the skeletal theory» (Laughlin, 1995: 81). These theoretical insights provide general discoveries which support a broad understanding of relationships. Thus, through telling the stories, a 'fabula' (Pentland, 1999) is able to be framed in which underlying generative structures are identified. Weick (1995) calls this sensemaking, where the researcher constructs deeper explanations to account for the observed actions, and depends on one's ability to look back retrospectively in order that we may construct an understanding of future events.

In this way, the data were analysed in a manner that was consistent with interpretative research methods. It began with the transcript texts, which became centre stage as the researcher endeavoured to make sense of the phenomena being studied (Locke and Golden-Biddle, 1997). Again, through the on-going reductionist process of data collection and data analysis (Huberman and Miles, 1994), the focus of the research began to be narrowed through the years in the field, and participants too became more attuned with the nature of the inquiry. The iterative process of highlighting related acts in the narratives enabled major themes and events to be synthesised, some of which finally emerged as significant. In this context, the thematic phenomena were synthesised into several areas of network-based collaboration, referred to in the forthcoming case narrative as collective groups. The insights from this analysis are included in the following discussion, which firstly reconstructs case data and then identifies macrolevel generative structures which expand upon our understandings of structural embeddedness and its construction or constraint of network systems.

CASE DATA AND ANALYSIS

EVOLUTION OF THE DESTINATION NETWORK:

ONE HUNDRED YEARS OF EXPLOITATION, 1887-1986

Tourism in Waitomo began in 1887, after local Maori chief, Tane Tinorau, showed the Glowworm Cave to his friend, British surveyor Fred Mace. Mace immediately notified the New Zealand state government of its existence, as the previous year an eruption of Mount Tarawera which had destroyed the world famous Pink and White Terraces in nearby Rotorua, claimed to be one of the great wonders of the modern world. The Government immediately recognised that the Glowworm Cave could be an important alternative tourism destination, and in 1903 it was nationalised under State management, ostensibly to ensure its protection and conservation for future generations (Arrell, 1984).

By 1910, an embryonic destination had begun to develop. Alongside the core attraction were transport (a regular coach service, a blacksmith's shop and stables), accommodation (a private boarding establishment and the Government hostel which still forms the old wing of the present Waitomo Hotel), and support activities (the general store). The Government (through the state Tourist Department) retained control of the emergent destination with its governance of the Glowworm

Cave and the accommodation sector. Although simple, a complementary production system had emerged to provide a comprehensive visitor experience.

However, over the following 70 years, there was minimal investment into the destination and little development and growth occurred. The lack of structural change can be seen in **Figure 1** which compares the nodal structure of the destination in 1910 and 1986.

This limited change is surprising, because during these years, the Government had responsibility for the provision and marketing of all the key tourism activities within New Zealand: transportation, travel agencies, and accommodation within the icon locations. Its influence ensured that Waitomo remained one of the primary icon attractions in New Zealand. However, the directional flows of this relationship were one-way, as the Tourism Hotel Corporation (THC, a quasi-government agency whose function was to manage the icon tourism attractions in New Zealand) exploited large amounts of revenue from the caves with little reinvestment returned to Waitomo. Indeed, in 1965, an editorial cartoon in a national newspaper asserted that «now on holidays about 1,500 visitors queue at the Waitomo Hotel each day to pay as much for their tickets as the caves cost» (New Zealand Herald, 1965: 14).

By the early 1980s, the destination was in a state of inertia. With no information and resource flows into the destination, there was low absorptive capacity within both the Glowworm Cave organisation and the tourism destination network. Local people too were peripheralised from any decision-making roles, which resulted in limited specialised learning processes. Indeed, while conservation and protection of the cave were the stated reason for government acquisition, there was little learning and knowledge development to enhance cave management. Thus, for nearly 100 years, the destination was managed unmindful of the responsibilities that these specialised activities required; for instance, the management of visitor flows (peak-time overcrowding; carbon dioxide levels and glowworm populations; light-

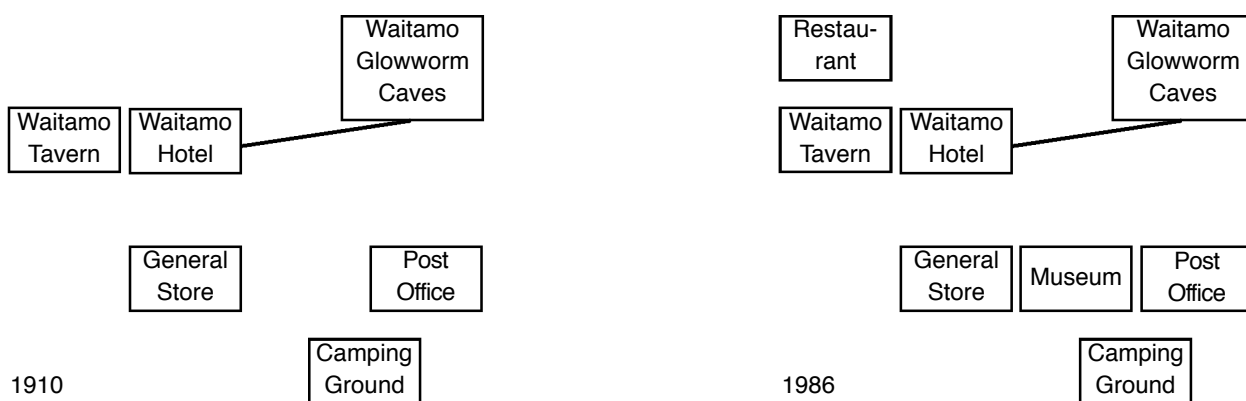


Figure 1. Comparison of the Nodal Structure in Waitomo: 1910 and 1986

ing systems to enhance visitor experiences), karst management practices (hydrology and temperature controls, water quality systems, limestone maintenance) and other important land management practices. This meant that instances such as the reconstruction of the doorway into the cave in 1979, causing a change in airflows and devastation to glowworm populations, became a catastrophe because there was no knowledge and memory of karst management in the structure of the network.

By 1986, the Glowworm Cave had been operating as a major tourist attraction for 100 years and while a few complementary attractions existed within the area, a comprehensive tourism destination had never really developed. The only additions to the destination were a museum and a lunch-time restaurant catering to the rapidly growing Japanese coach market. Capital development into Waitomo by the THC included the construction of a small shop, administrative facilities and toilet block in 1982 outside the Glowworm Cave, and while adequate for the 225,000 visitors at that time, there was no provision for the significant growth that was about to occur.

The data offer pertinent insights into structural embeddedness, particularly as a comparison with the following case data sections. A key notion of networks is their constant state of fluidity that emerges from the webbed interactions occurring through the structural history of the network. It is clear from both these data and **Figure 1**, that there was little fluidity and adaptability in this destination over its 100 year history. Indeed, the structural history indicates meagre growth in enterprise activity during this time, despite Waitomo being a major tourism destination. While the THC had impressive links with national tourism sectors, there were no additional linkages with other organisations within Waitomo. This restricted access, noted by Jones *et al.* (1996), results in status maximisation as the central firm interacts only with firms of equal status. In this case, the ties developed by the THC were outside of the destination with benefits accruing only to the external status organisations. Through this strategic reduction, the THC separated itself from the wider community within which it was embedded, thus denying the mutual learning opportunities that can evolve from reciprocity. The macroculture of this network was based upon constraint, separation and inertia which contributed to low adaptability, resulting in a stagnation of destination vibrancy, as evident in the single-attraction destination history. The central organisation was organised as an isolated node, with no connections flowing into the community, resulting in little social cohesion.

RADICAL CHANGE AND EVOLUTION OF THE TOURISM NETWORK, 1987-

The dramatic growth in international visitors to New Zealand during the late 1980s, the inert state of the THC and the growing frustrations within the Waitomo Caves community all crystallised into major upheavals over the following decade. First, a major impact on the Waitomo destination was the 'revestment' of land. On 14 June 1990, 20 hectares of land, which included the Glowworm Cave, were returned to the fami-

lies of the original Maori landowners as part of the settlement of land claims under the Treaty of Waitangi. This meant that for the first time since the land confiscations in 1903, Maori were included in strategic decision-making within the tourism destination. Second, the State (the THC) sold its interest in the Caves and Hotel, with the cave operations being leased by Tourism Holdings Limited in 1996.

Finally, adventure tourism arrived. With its unique limestone karst formations, flora and fauna, the Waitomo Caves region offered splendid opportunities for participation in leisure, environmental and aesthetic experiences. In 1987, Blackwater Rafting (BWR) was formed by two local residents who foresaw the potential in commercialising the 'laundry trip', a fun trip that recreational cavers used to clean their clothes after caving. Suited out in wetsuits, the rafters and guide walked through native bush reserve and after entering the cave, floated down the river stream in tyre tubes amidst the darkness and glowworms of the neighbouring capacious Ruakuri Cave. Shortly afterwards, a second adventure enterprise, Waitomo Adventures (WA), was initiated by a non-local person, who came to Waitomo expressly to develop the Lost World adventure tourism business, which involved a 100-metre abseil into the cave shaft. The third adventure operation, Waitomo Down Under (WDU), began operating in 1992. With its owners being part of the Maori community, this organisation had a uniquely indigenous perspective.

These new ventures provided more authentic and compelling personal experiences than that of the passive Glowworm Cave, and their arrival was described as changing the nature of tourism in Waitomo as they brought back overnight stays. By the year 2000, 50,000 people came to Waitomo each year to participate in adventure caving. Numerous support activities too were developed to complement the caving activities: backpacker lodges, horsetrekking, a guest lodge, canoe caving, an agricultural pioneer show and jet-boating alongside the original camping-ground and general store. While the population of this village remained a constant 300 people, 200 full-time equivalent jobs were now located within Waitomo. The core Glowworm Cave product remained the icon attraction, but the adventure caving products created a new market complementing the primary activity and added supporting activities to extend the value of the destination. The nodal structure of the network in the year 2000 is illustrated in **Figure 2**.

The last fifteen years have seen a significant structural change in Waitomo, and **Figure 2** depicts a more complex nodal configuration than the 1986 structure presented in **Figure 1**. For the first time, multiple exchange relationships began occurring in the destination as visitors were passed from one supplier to the next, and an ecosystem of interdependence began to develop.

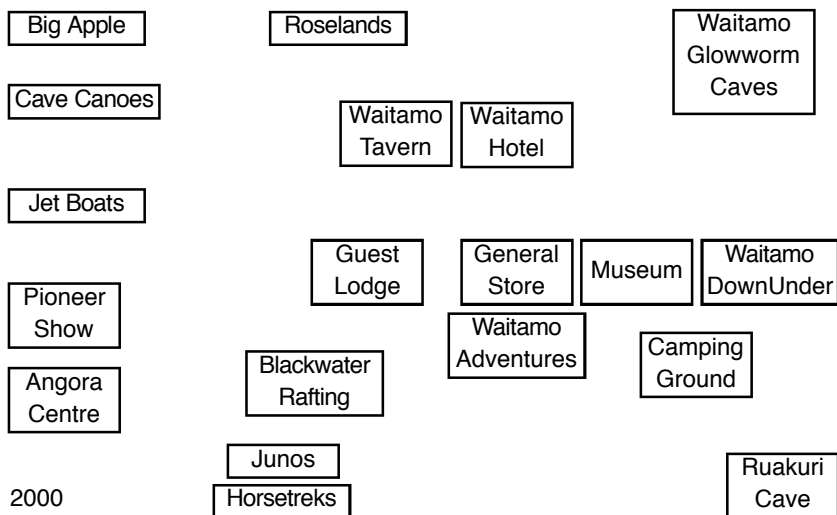
However, the collective memory of the destination remembers this absence of learning, and the exploitative structural history of Waitomo continued to impact throughout the 1990s. Following the sale of THC, the Glowworm Cave continued its simple routines with little information sharing and absence of knowledge creation processes. Its routines mainly involved profit retention and focused largely on guiding visitors

through the cave. Administrative technologies were limited to tele-phones and faxes until 1996, and while a research institute was contracted to assist in the measurement of cave hydrology, there was no insistence on the analysis and interpretation of results until the mid-1990s. It was not until Tourism Holdings acquired the lease of the Glowworm Cave that specialist systems and processes were developed.

This preceding section illustrated how the structural history of exploitation lingered and the central organisation was unable to initiate leadership within the emergent network. Rather, the newly emergent organisations, with their own portfolio of ties, provided bridges for many structural holes as they seized opportunities and introduced new ideas. Network change, illustrated in the following section, occurred through the more peripheral organisations, unencumbered by the structural constraints, as they endeavoured to develop learning capabilities in the destination.

CAPABILITY BUILDING WITHIN THE NETWORK

As the destination changed from a single attraction short stay to a wider collection of adventure activities requiring overnight stays, so did the exchange of information and sharing among tourism suppliers, which has resulted in the development of a network-based capabilities. Capabilities are what Eisenhardt and Martin (2000: 1107) describe as «the antecedent organisational and strategic routines by which managers alter their resource base to generate new value-creating strategies». When these resources integrate complementarities, they can become activity-related systems that have the potential to create sustained competitive advantage. The original data analysis identified several areas of interdependent collaboration that have the potential to



To keep the clarity of this visual illustration, the complex interactions have been removed.

Figure 2. Nodal Structure in Waitomo, 2000

build network-based strategic capabilities, contributing to the stockpiling of benefits for the future leverage of the network. While a more comprehensive analysis of these capability developments can be read in Pavlovich (2003), three of these groupings are briefly described, as these structural configurations play a significant role in the subsequent theoretical implications.

Above-Ground Landcare. The first and most robust of these collaborative groups was the above-ground Waitomo Landcare Group formed in 1992. Facilitated by the Regional Council, Environment Waikato, the group included the local farming community (donating land to be fenced and replanted), tourism operators (contributing financial inputs), community members (providing voluntary labour) and other outside institutions (Waitomo District Council, Department of Conservation, and universities). The purpose of the Landcare Group was to protect the Waitomo Caves system from sedimentation through appropriate and sustainable land management practices. Collaboration among these internal and external stakeholders included fencing off the waterways and forest replanting programmes, primarily to improve water quality for sustaining glowworm populations and the cave environment. The group is promoted nationally as a 'best practice' example of a Landcare group. Its initial purpose of improving the longevity of the cave environment has been achieved, and the participation of the community has resulted in widespread consensus and acceptance of the land management practices to sustain the destination environment.

Adventure Risk Management. The second collaborative group involved managing the risk attached to the underground cave environment. Given that caves are dark, cold, wet and often confined spaces, the ability to manage these potentially risky and dangerous situations requires an advanced standard of guiding to ensure client safety. This network-based capability has been developed in three ways. First, informal information exchanges among operators in Waitomo enabled better safety practices, stemming from experience of their own organisational routines. A second mechanism occurred through the formation of the Waitomo Caves Rescue Team, with specialist guides from the adventure caving organisations working together in emergency situations—most commonly arising from situations involving recreational cavers. Finally, the adventure caving organisations in Waitomo have been instrumental in building caving standards throughout New Zealand, as their systems and standards have been incorporated into institutional frameworks. Thus, these organisations are seen as adventure sector leaders in New Zealand.

Waitomo Caves Marketing. The third area of collaborative activity involves marketing. First, there is the Destination Waitomo Group, which involves local operators. The main focus of this group is brochure development to reach domestic marketing channels, as international marketing is the focus of a government body, Tourism New Zealand. Second, the association with Tourism Holdings, licensee of the Glowworm Cave, brings many benefits to Waitomo through its centrality in the New Zealand tourism industry. Connections with major

operators such as Air New Zealand and Tourism New Zealand, mean that much of the destination's marketing occurs through these rich external connections.

NETWORK ATTRIBUTES

The above capabilities demonstrate the nature of knowledge development in the network. Building on the case data from the network capabilities, three important attributes of networks emerge as important in developing the social glue that coordinates a structurally optimal adaptive network. This involves having a cohesive portfolio of strong and weak ties (Uzzi, 1997), and the presented collective groupings from the data confirms this. Three attributes achieving this cogency include heterogeneity, interconnection and reciprocity. While not mutually exclusive, each offers pertinent insights into understanding how embeddedness can impact on the structural configuration for strategic leverage, as discussed below.

Heterogeneity. The Waitomo network is configured from complementary nodes: transport, accommodation and core attractions, with closer and denser ties being developed as customers are passed from one supplier to the next. This heterogeneity assists the collaborative endeavour, as related and unrelated organisational activities complement each other more readily than direct competitors. Uzzi (1997) claims that by adding diversity, partners' strengths can compensate for others' weaknesses, which allows a more comprehensive range of actions than if the nodes existed alone. Thus, complementarity underpins the characteristics that different ties can reinforce in the network configuration.

The importance of heterogeneity relates to its nodal complexity. Each node has access to independent sources of information. Unlike the constraining central structure under the THC, the movement to a multi-centred 'hydra' network (Liu and Brookfield, 2000) has enabled the network multiple access points to new information. This means that no node has significant control over others in the network, as each node has the ability to develop independent ties. This complementary configuration encourages heterogeneity rather than duplication of current patterns. This is clearly evident in the Waitomo Landcare Group, which, as noted earlier, is comprised of a number of sectors contributing complementary skills and activities. In this group, there is minimal replication of similar activities; rather there is rich differentiation and an appreciation of the different tasks, resources, and outcomes that build the land and karst management capability. Indeed, this heterogeneity is illustrated by the diversity of groups involved in the project: tourism operators, farm owners, local residents, local and regional government, environmental groups. Each group contributed different resources, skills and knowledge to the karst management programme. Although initiated by residents in 1992, local government was instrumental in facilitating the group, and it brought new sources of expertise regarding the interconnection of the twin landscapes that have protected the underground cave hydrology and glowworm populations. Local residents brought their passion and commitment. Commercial

operators, who assisted in funding the programme, are now required to include cave and karst conservation issues in their asset management plans, and visitors to this region are educated on these principles through tourism product delivery processes. As most of the businesses are locally owned and tourism is the central employer within this region, accountability becomes a more transparent practice in this network. This heterogeneity has been a key factor in assisting the collaborative organising phenomena.

Interconnection. While heterogeneity focuses on organisational diversity (nodes), interconnection concerns the quality and intensity of the ties, and the above landcare data illustrate how interconnection acts as a conduit for information and resource flows. While Environment Waikato initiated the central organising role, its function diminished as the group developed and became self-organising. By this stage, the interconnections were linked through collective norms, task responsibility and trust, as sharing permeated the group. This group demonstrated strong and intense ties over multiple tasks, and it can be contrasted with the less complex connections that occurred within the destination regarding formal marketing activities. The marketing group was less optimal, with external marketing connections aimed more specifically towards Tourism Holdings, rather than flowing through all network nodes. The risk management group illustrated a third configuration, with key organisations strongly connected to the institutional environment. This endorsed their legitimacy, and assisted local groups in becoming involved with the interdependent issue. Together, these collective groups demonstrate how these connections between the nodes become the vehicle for transmitting information through the network, and the case data indicated how the flows back and forth are the social glue that exist in the present to build the future, but based on the past.

Reciprocity. Achieving adaptive vibrancy in the network, however, required collaborative flow between the nodes, which is based on sharing and reciprocity. Reciprocal flows (as referenced by Granovetter, 1985; Powell, 1990; and Uzzi, 1997) require two-way flows between nodes. For learning to occur, the information that is exchanged needs to be acted upon. This creates an obligation to return further information, whether to the original source, or to another. It is this reciprocal obligation that assists in stockpiling knowledge into the structural memory as it flows through the network. Reciprocity becomes strategically important to embeddedness as it includes open-ended relationships which are built up over indefinite time frames, as noted by Powell (1990). Hence, the exchanges may not appear equivalent at any immediate point, yet the embedded stockpiling network finds an equivalence through the structural history of the network. An example of this involves cave monitoring, with the commercial longevity of the destination reliant on karst management processes. Yet, evidence that there was little understanding of this was foreshadowed by the closure of the Glowworm Cave for four months in 1979 after the cave entrance-door was replaced. If this closure was to occur today, all tourism organisations would be seriously affected. Eight years after a

destination karst management plan was installed, there is now a comprehensive data base of environmental and hydrology conditions that is accessible for all operators in Waitomo. Indeed, tourism operators using other caves work with the Glowworm Cave, the Department of Conservation and the regional council to provide inputs and data into central systems to understand the complex interrelationships of visitor flows, glowworm populations, hydrology, and water quality systems. This demonstrates the function of reciprocal information sharing as a prerequisite for building network knowledge repositories.

CONTRIBUTIONS TO STRUCTURAL EMBEDDEDNESS

The above data illustrated the development of strategic capabilities from the collective groups through structural optimisation of ties that emerged from network heterogeneity, interconnection and reciprocity. These strategic capabilities confirm, as Kogut (2000) noted, compositions of knowledge that become accumulated properties of the network, whereby individual firms do not have independent ownership of or access to. This is evident in that each organisation connected with Waitomo is dependent on sustainable management of this cave resource, realised through the development of strategic capabilities of landcare, risk management and commercial marketing. This reinforces the aggregation of actions into system-based networks, as earlier referenced in the literature. However, unlike prior research which has retained existing network theoretical constructs of positional attributes (Gulati, 1998) and density (Rowley *et al.*, 2000), this paper presents new contributions for understanding structural embeddedness which expand the macro perspective initiated by Jones *et al.* (1997).

First, we offer further insights into the function of structure as a coordination mechanism. Second, we examine structural equivalence and how it impacts on the embedded nature of interdependence. Throughout this discussion, we argue that a reframing is required in how we view the role and function of organisations, as the data clearly indicated economic vitality only occurred when organisations were collaboratively engaged with their local context.

The first contribution illustrates how the structure acts as a coordinating mechanism. A key feature of networks not previously addressed in the literature, is their anti-hierarchical structure. With their complex structure of nodes and interconnections, any point can be connected to any other point. This is clear in the tourism case study, where suppliers have multiple connections with other organisations through product/market synergies, problem-solving activities, employee movements and social ties. This leads to a second dynamic, where no node in the network structure comes before another. Thus, tourism visitors can begin their experience at any point they wish, whether a tourism activity, food and sustenance, or accommodation needs. This is in contrast to hierarchies (manufacturing, for instance), which require linear flows of activities. A final feature of anti-hierarchy is that no point is

specifically connected to another point, and connections can change from day to day. Because of this fluidity, there is a constant modification of the connections to allow the inflow of new information and resources that enable creation and dispersion through the structure. Verifying this is the contrast with **Figure 1** which demanded a specific point of entry with a linear flow between nodes. This formalisation of structure inhibited the destination fluidity and adaptability. To make this anti-hierarchical structure more explicit, it can be likened to the structure of the underground caving system—a network of underground tunnels, each connecting with others, seemingly going nowhere, and yet together creating an amorphous whole.

This anti-hierarchical structure leads to a second insight, in that it enables multiple possibilities of strategic connection (a term adopted from Deleuze and Guattari, 1987). Through the network properties of heterogeneity, interconnection and reciprocity, there are an infinite number of structural possibilities, a myriad of alternative patterns, which may form within the interdependent network. Any point can and must be connected to any other point to create structural coherency. It is the aggregation of those possibilities that may create strategic capabilities for the network. Indeed, this illustrates the significance of the capabilities earlier described: landcare, risk management and commercial marketing capabilities, each of which were created after the network emerged. Thus, the multiple possibilities occur through the nodes and connections. When reciprocal learning relationships are added to the configuration, knowledge repositories are able to be formed. This suggests that when collaboration and learning occur in a network, an indefinite number of strategic capabilities have the potential to be formed, dependent only on the intensity of the structural connections. It is through these aggregated connections that Waitomo has currently become a more vibrant and appealing destination than during its earlier 100 year history. Thus, through the structure, there is an interdependent pattern of organisation and self-renewal. The structural coupling that occurs through the network nodes (multiple possibilities) can develop in any direction with no-predetermined territory; with only their history hinting at potential patterns.

In this way, all nodes in the structure play an active role in the network's coordination, as they all have the potential to grow and develop in new directions. This brings forth a second contribution, that of structural equivalence and its effect on embeddedness. If no point within the web is more fundamental than the others, each dynamic link contributes equally to the functioning and overall patterning of the entire system. This directly correlates with the anti-hierarchical nature of network structure, whereby any point can connect and no point is more important than any other. Thus, the interactions between nodes may not appear equal, but the embedded stockpiling network finds an equivalence through the structural history of the network. This critiques Burt's (1992) proposition of structural redundancy, as in this analysis, the seemingly redundant ties play pertinent roles in the stockpiling over the network's lifetime. This is evident in that the history of exploitation in Waitomo remained in the structural memory of those peripheralised

from economic activities. Yet, while seemingly redundant commercially, those peripheral ties and embedded memories have become strategically significant in the emergent network. The return of the Glowworm Cave to the indigenous Maori families is one example of this, where after 100 years of absence from tourism, Maori are now landowners of the icon tourism attraction. This absence, however, has demanded significant learning curves to overcome knowledge deficiencies. Thus, the nature of reciprocity, obligation and equivalence are much less precise in a network system and involve longer term time frames for understanding the stockpiling of the interactions that may occur.

Finally, these elements demonstrate that for cohesive functioning of network systems, a change in consciousness is necessary. This research puts forward an alternative mechanism of organising, whereby network coordination occurs through structural attributes of participation. Although context specific, these case data demonstrated the stockpiling mechanism: competitive and isolation processes stymied network and community development, while inter-organisational collaboration enabled coordinated adaptive learning to occur throughout the system. This suggests that economic prosperity is based upon a vibrant community sustained by a web of interconnected relationships. Thus, a fundamental shift in economic practices is required: from the defensive protective stance of profit maximisation for individual firms, to an acknowledgement of knowledge creation and network-based sustainability through cooperation. It is this change in philosophy that enables structural embeddedness to take its form, through understanding that while all possible patterns have the potential to form, only those working with collaborative consistency will last.

CONCLUSION

The paper has taken a conceptual approach towards structural embeddedness and offered deeper insights into the current, but incomplete, understandings of this field of study. Most specifically, it has examined how structural embeddedness assists or impedes organization within networks, and the case data were able to illustrate both constraint and construction through interconnection. The data indicated how heterogeneity and interconnection assisted the reciprocal flows of resources and information for the development of strategic capabilities. These are unique in that they encompass both commercial and non-commercial aspects that reside in the network structure. An important feature of networks is their anti-hierarchical state and multiple possibilities that can be leveraged through on-going reciprocal, but not equivalent, social ties. This fluidity assists the network to grow, adapt and evolve. In this way, the structure acts as a vehicle for information transfer and knowledge repository, and acts as a memory of historical activity. In seeking this explanation, the paper has addressed its original inquiry of offering further understandings of structural embeddedness as an organizing mechanism. Through the

historical evolution of the network, current theoretical constructs of history, reciprocity, stockpiling and macroculture were confirmed. However, most importantly, the data illustrated the role and function of the aggregated patterns of interconnectivity, and how they offered pertinent insights into the formation and development of strategic capabilities that belong to the network. Yet, a necessary precondition is understanding that organisations exist within broader structures, and that the collaborative coordination process is vital to creating and maintaining these strong and vibrant communities.

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REFERENCES

- Arrell, R. 1984
Waitomo Caves: A Century of Tourism, Waitomo Caves Museum Society.
- Burt, R. 1992
The Social Structure of Competition, in N. Nohria and R. G. Eccles (Eds.), *Networks and Organizations: Structure, Form and Action*, Boston, MA: Harvard Business School Press, 57-91.
- Deleuze, G., and F. Guattari 1987
A Thousand Plateaus: Capitalism and Schizophrenia, London: Althone Press.
- Dyer, J., and K. Nobeoka 2000
Creating and Managing a High-Performance Knowledge-Sharing Network: the Toyota Case, *Strategic Management Journal*, 21: 13, 345-367.
- Eisenhardt, K., and J. Martin 2000
Dynamic Capabilities: What Are They?, *Strategic Management Journal*, 21: Winter Special Issue, 1105-1121.
- Freeman, L. 1979
Centrality in Networks: Conceptual Clarification, *Social Networks*, 1: 1, 215-239.
- Gnyawali, D., and R. Madhavan 2001
Cooperative Networks and Competitive Dynamics: A Structural Embeddedness Perspective, *Academy of Management Review*, 26: 3, 431-445.
- Granovetter, M. 1973
The Strength of Weak Ties, *American Journal of Sociology*, 78: 6, 1360-1380.
- Granovetter, M. 1985
Economic Action and Social Structure: The Problem of Embeddedness, *American Journal of Sociology*, 91: 3, 481-510.
- Granovetter, M. 1992
Problems of Explanation in Economic Sociology, in N. Nohria and R. Eccles (Eds.), *Networks and Organizations: Structure, Form and Action*, Boston, MA: Harvard Business School Press, 25-56.
- Gulati, R. 1998
Alliances and Networks, *Strategic Management Journal*, 19: 4, 293-317.
- Gulati, R. 1999
Network Location and Learning: The Influence of Network Resources and Firm Capabilities on Alliance Formation, *Strategic Management Journal*, 20: 5, 397-420.

- Huberman, A. M., and M. B. Miles 1994
Data Management and Analysis Methods, in N. Denzin and Y. Lincoln (Eds.), *Handbook of Qualitative Research*, Thousand Oaks, CA: Sage, 428-444.
- Jones, C., W. Hesterly, and S. Borgatti 1997
A General Theory of Network Governance: Exchange Conditions and Social Mechanisms, *Academy of Management Review*, 22: 4, 911-945.
- Khanna, T. 1998
The Scope of Alliances, *Organization Science*, 9: 3, 340-355.
- Kogut, B. 2000
The Network as Knowledge: Generative Rules and the Emergence of Structure, *Strategic Management Journal*, 21: 3, 405-425.
- Krackhardt, D. 1992
The Strength of Strong Ties: The Importance of Philos in Organisations, in N. Nohria and R. G. Eccles (Eds.), *Networks and Organizations: Structure, Form and Action*, Boston, MA: Harvard Business School Press, 216-239.
- Larson, A. 1992
Network Dyads in Entrepreneurial Settings: A Study of the Governance of Exchange Relationships, *Administrative Science Quarterly*, 37: 1, 76-104.
- Laughlin, R. 1995
Empirical Research in Accounting: Alternative Approaches and a Case for "Middle-Range" Thinking, *Accounting, Auditing and Accountability Journal*, 8: 1, 63-87.
- Liu, R.-J., and J. Brookfield 2000
Stars, Rings and Tiers: Organisational Networks and their Dynamics in Taiwan's Machine Tool Industry, *Long Range Planning*, 33: 3, 322-348.
- Locke, K., and K. Golden-Biddle 1997
Constructing Opportunities for Contribution: Structuring Intertextual Coherence and "Problematizing" in Organizational Studies, *Academy of Management Journal*, 40: 5, 1023-1062.
- Madhavan, R., B. R. Koka, and J. E. Prescott 1998
Networks in Transition: How Industry Events (Re)Shape Interfirm Relationships, *Strategic Management Journal*, 19: 5, 439-459.
- Marsden, P. 1981
Introducing Influence Processes into a System of Collective Decisions, *American Journal of Sociology*, 86: 6, 1203-1235.
- *New Zealand Herald* 1965
Three Caves are Gold Mines, 7 June, 14.
- Pavlovich, K. 2003
All That Jazz: An Analysis of Dynamic Structures and Learning Networks, *Long Range Planning*, 36: 5, 441-458.
- Pentland, B. 1999
Building Process Theory with Narrative: From Description to Explanation, *Academy of Management Review*, 24: 4, 711-724.
- Powell, W. 1990
Neither Market nor Hierarchy: Network Forms of Organization, in B. M. Staw and L. L. Cummings (Eds.), *Research in Organizational Behavior*, Vol. 12, Greenwich, CT, JAI Press, 295-336.
- Rowley, T., D. Behrens, and D. Krackhardt 2000
Redundant Governance Structures: An Analysis of Structural and Relational Embeddedness in the Steel and Semiconductor Industries, *Strategic Management Journal*, 21: 3, 369-386.
- Simonin, B. 1999
Ambiguity and the Process of Knowledge Transfer in Strategic Alliances, *Strategic Management Journal*, 20: 7, 595-623.
- Uzzi, B. 1996
The Sources and Consequences of Embeddedness for the Economic Performance of Organisations: The Network Effect, *American Sociological Review*, 61: 4, 674-698.
- Uzzi, B. 1997
Towards a Network Perspective on Organizational Decline, *International Journal of Sociology and Social Policy*, 17: 7/8, 111-155.
- Uzzi, B. 1998
Structural Embeddedness and the Persistence of Repeated Ties, *Academy of Management Annual Meeting*, August 9-12, San Diego, CA.
- Weick, K. 1995
Sensemaking in Organizations, Thousand Oaks, CA: Sage.
- Zajac, E., and C. Olsen 1993
From Transaction Cost to Transactional Value Analysis: Implications for the Study of Interorganizational Studies, *Journal of Management Studies*, 30: 1, 131-145.