Understanding DMOs' Online Information Communication and Networking A New Zealand Case

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ABSTRACT

Destination marketing organizations (DMOs) are the industry's peak body in most destinations, as they are usually supported by sets of formal and informal networks spanning public and private sectors. Although studies show that DMOs are the most central stakeholder across tourism networks, very limited efforts have been made, if any, to examine the information exchange and communication behaviors of DMOs in cyberspace, despite the fact that the Internet has already been a prevalent tool for the daily operation of the tourism industry. DMOs are also called Regional Tourism Organizations (RTOs) in New Zealand. Using a New Zealand case, this study attempted to gain an exploratory understanding on the connectedness of DMO websites in cyberspace and their usage by other individuals and organizations online.

Keywords: *network analysis, webomatrics, hyperlink analysis, DMO, New Zealand*

INTRODUCTION

Local tourism organizations are the industry's peak body in most destinations, as they are usually supported by sets of formal and informal networks spanning public and private sectors (Dredge, 2006). Aiming at attracting tourist visitation for a given area, the local tourism organizations usually take their appearances in the form of destination marketing organizations (DMOs) (Gretzel, Fesenmaier, Formica, & O'Leary, 2006). DMOs' responsibilities include developing a unique destination image, coordinating private and public tourism industry constituencies, providing information to visitors, and leading the overall tourism industry at a destination (Prideaux & Cooper, 2002). If the destination is viewed as a network of interdependent tourism businesses and organizations, then the destination marketing organization is one of the major gatekeepers of this network.

Despite the importance of DMOs across tourism networks, very limited empirical efforts have been made toward an understanding of how DMOs are connected with other stakeholders for information communication and networking. The majority of existing interorganizational network studies mainly focus on how the interorganizational communication linkages operate, by studying the patterns of relationships within and between organizations in the context of complementing human networks (Kettinger & Grover, 1997). There is even less, if any, research examining the information exchange and communication behaviors of DMOs in cyberspace, despite the fact that the Internet has already been a prevalent tool for the daily operation of the tourism industry.

The web is of tremendous importance to business development, particularly e-commerce (Vaugh, Gao, & Kipp, 2006). It is believed that websites best represent the modern organization (Park, 2002), as most organizations run their own websites,

regardless of whether their activities, services, or products are concerned with the internet (U.S. Department of Commerce, 2000). These websites are connected with hyperlinks that are created to direct the Web visitors from one Web page to another, or from one Web site to another.

As the basic structural element of internet, a hyperlink can be defined as "…a technological capability that enables, inprinciple, one specific Web site to connect seamlessly with another. The shared (bilateral or unilateral) hyperlinks among Web sites allow documents and pictures to be referred to through the Web" (Park & Thelwall, 2003). A hyperlink from website A to site B is a recommendation of site B by the author of site A (Henzinger, 2001). Hyperlinks represent a wide range of communication behaviors, as some may concern the social ties, while others may be related to the flow of Web information. They are considered not simply as a technological tool, but as a newly emerging social and communicational channel. It is assumed that hyperlinks may be the formalized bridge between the authors of the hyperlinking and hyperlinked Web sites, serving as social symbols or signs of communication hyperlinkage among themselves (Park & Thelwall, 2003). Through a hyperlink, an individual website plays the role of an actor who could influence other websites' trust, prestige, authority, or credibility (Kleinberg, 1999). As argued by Jackson (1997), hyperlink structure designed or modified by the owners of the web sites reflects their communicative choices or agendas. Thus, the structural patterns of the hyperlinks on their websites serve as a particular social or communicative function and also can be used as a lens through which the interactions among the individuals or organizations can be more thoroughly understood.

DMOs are also called Regional Tourism Organizations (RTOs) in New Zealand. Focusing on the hyperlink networks of this particular sect of the New Zealand tourism industry – the regional tourism organizations (RTOs), this study attempted to gain an exploratory understanding on the connectedness of DMO websites in cyberspace and their usage by other individuals and organizations on the Internet.

METHOD

This study involved the 30 New Zealand Regional Tourism Organizations affiliated with the national-level tourism organization- *Tourism New Zealand*. The homepage URLs of the websites of these New Zealand Regional Tourism Organizations were first identified as the seed sites for data collection. For a comprehensive exploration of NZRTOs' online information pattern, this study consisted of three major phases of data collection and analysis.

With the assistance of Webomatric Analyst (Thelwall, 2011), a link impact analysis was conducted on the 30 NZRTO websites in phase one. The purpose of link impact analysis is to evaluate whether a given website has a high link-based web impact compared to its peers. Link impact can also be used as an indirect indicator of other attributes of the owning organizations. For example, the domain name of a URL tend to reflect the organization hosting the website that generating the hyperlinks. By counting the number of hyperlinks pointing at each identified website and extracting the information from the URLs of the inlinks, the link impact analysis takes

advantage of the structure implicit in most URLs and provide a basic understanding of who, and from where, developed hyperlinks to connect with the NZRTO websites.

A interlink network among the 30 NZRTO websites was constructed and analyzed in phase two. Interlink data contains information on the direct connections among a group of web nodes. Using the Yahoo! Link search command [linkdomain: A site: B] (search for pages in web site B that link to web site A), this study conducted a link search for the hyperlinks between each pair of the identified NZRTO websites. As the hyperlinking between site A and site B is directional, the relationships between the two sites need to be examined by searching both the hyperlinks originating from site A to site B and the hyperlinks from site B to site A. For a set of n websites, n(n-1) times of link searches are needed to construct the full hyperlink network. In this study, 870 hyperlink searches were run for constructing the hyperlink network among the 30 NZRTO websites. Since this study mainly focused on the presence/absence of online connections among the NZRTO websites other than the strength of these relationships, the linkages in the hyperlink network were dichotomized with 1 (i.e. has one or more hyperlinks) and 0 (i.e. has no hyperlink). Using the social network analysis (SNA) software 'UCINET 6.0' (Bogatti, 2002), the structural characteristics of this interconnected network at both network level (e.g., network centralization and density) and node level (e.g., indegree and outdegree centralities) were examined.

Phase three of this study involved the construction and analysis of the co-inlink network among the identified NZRTO websites. The term co-inlink refers to the concept that when two web nodes are simultaneously receiving links from another web node (analogous to the concept of co-citation) (Björneborn, 2001). The co-inlink network was constructed using the Yahoo! Link search command [linkdomain: A linkdomain: B -site: A -site: B] (search for web pages containing both links to site A and site B, excluding those generated from either site A or site B). From all the collected colinking web pages, 1000 webpages were randomly sample for content analysis, in order to understand which country the webpage was generated; what language it used; what kind of website it was from; and why the hyperlink was generated.

RESULTS

Link impact analysis

Table 1 reports the number of pages (URLs), domains, Second Top Level Domains (STLD), and Top Level Domains (TLD) matching the link search query for each of the 30 NZTTO websites. Given the fact that only few visitors to a website would actually create a hyperlink to it, websites that attract more links are usually considered having a higher probability to have more visitors or being regarded as more important by their visitors (Thelwall, 2009). Counting the number of hyperlinks pointing at a given NZRTO website, the URL counts to some extent estimates and compares the online popularity or impact of the NZRTO websites. It is also important to note the possibility that hyperlinks might be copied across multiple webpages within the same website, in which case the number of domains would be more reliable as an indicator for online impact assessment. Both the URL and domain counts suggested that Tourism Auckland (URLs = 38, Domains = 35), Positively Wellington Tourism (URLs = 35, Domains = 32), Christchurch Canterbury Tourism (URLs = 28,

Domains = 23), Destination Rotorua (URLs = 28, Domains = 25), and Destination Northland (URLs = 27, Domains = 23) were the five NZRTO websites receiving most external attentions. And among these five, three belonged to the RTOs of the three gateway cities/regions (i.e., Auckland, Wellington, and Christchurch) of New Zealand.

Table 1
Link Impact Assessment of NZRTO Websites

RTOs	URLs	Domains	STLDs	TLDs
Tourism Auckland	38	35	12	9
Positively Wellington Tourism	35	32	6	4
Destination Rotorua	28	25	6	5
Christchurch Canterbury Tourism	28	25	4	3
Destination Northland	27	23	6	4
Nelson Tasman Tourism	25	22	8	7
Tourism Dunedin	24	21	6	5
Lake Wanaka Tourism	23	22	6	5
Venture Hawke's Bay	23	21	7	5
Destination Fiordland	23	21	6	6
Tourism Coromandel	22	21	4	4
Destination Queenstown	22	21	8	6
Tourism Central Otago	19	16	4	4
Destination Marlborough	17	16	5	5
Destination Wairarapa	17	15	4	3
Venture Southland	17	14	6	5
Tourism Eastland	16	14	4	4
Tourism Bay of Plenty	15	13	6	6
Destination Manawatu	13	11	6	5
Destination Great Lake Taupo	9	9	5	5
Wanganui Incorporated	9	9	4	4
Venture Taranaki	9	8	5	5
Tourism Oamaru and Waitaki	9	8	3	2
Hamilton Waikato Regional Tourism	8	6	2	2
Destination Mount Cook Mackenzie	7	6	5	5
Nature Coast	5	4	3	2
Tourism West Coast	5	5	3	3
Central South Island Tourism	5	5	3	2
Hurunui Tourism	4	4	3	2
Visit Ruapehu	3	3	2	2

The numbers of top level domains (e.g., .com, .nz, .au, .cn, etc.) and second level domains (if existing, otherwise the top level domains) (e.g., .co.nz, .ac.nz, .govt.nz, etc.) of the collected inlinking URLs to the NZRTO websites are also reported in the last two columns of table 1. The top level domain (TLD) to some extent reveals the geographic information of the hosting websites that direct hyperlink(s) to the NZRTO websites, as most TLDs correspondent directly to nations (Thelwall, 2009). A high number of TLDs may suggest a wide international coverage of the inlinking webpages. When existing, the second level domains provide additional information to the TLDs, for example, on the organization type of the hyperlink generating websites (e.g., co.nz, ac.nz, and govt.nz, etc.). Together, the

TLDs and STLDs indicate the geographical and organizational diversity of the inlinking hyperlinks received by a given website. The results suggest that the websites of Tourism Auckland (TLDs = 9, STLDs = 12) received most diverse inlinks from other websites, followed bythe websites of Nelson Tasman Tourism (TLDs = 7, STLDs = 8), Destination Queenstown (TLDs = 6, STLDs = 8), Tourism Bay of Plenty (TLDs = 6, STLDs = 6), and Destination Fiordland (TLDs = 6, STLDs = 6).

Table 2 provides a closer look at the diversity in the TLDs and STLDs of the inlinking hyperlinks pointing at the NZRTO websites. It was found that the majority of the inlinking webpages were domestic (with the TLD of .nz) and commercial (with the TLD.com and STLD .co.nz). There were also inlinks from websites of different countries (e.g., .de - Germany, .au - Australia, and .uk – United Kingdom, etc.) and organizations (e.g, .govt.nz – government, .ac.nz – university, etc.). However, one important drawback of this TLD/STLD domain-based statistics is the prevalence of generic TLDs, such as .com that is not nation-specific. In order to have a better geographic and organizational understanding of the inlinks to NZRTO websites, a content analysis of the inlinking webpages or websites is needed to identify not only their country of origin, but also other linking pattern attributes including the use of language, the type of website, and the linking motivation. Relevant analysis results will be presented in the following sections.

Table 2
The Top Level Domains and Secondary Top Level Domains of inlinking webpages

TLD	n	TLD	n	TLD	n	STLD	n	STLD	n	STLD	n	STLD	n
.nz	199	.info	3	.cz	2	.co.nz	174	.govt.nz	8	.im	2	.4travel.jp	1
.com	159	.uk	3	.cn	1	.com	159	.de	4	.edu	2	.be	1
.org	19	.br	2	.nl	1	.org	19	.net.nz	4	.cz	2	.gov	1
.se	16	.edu	2	.fr	1	.se	16	.com.au	3	.nl	1		
.net	13	.ch	1	.be	1	.net	13	.co.uk	3	.fr	1		
.de	4	.im	1	.jp	1	.org.nz	7	.com.br	2	.in	1		
.au	3	.in	1	.gov	1	.ac.nz	7	.info	2	.ch	1		

Interlink network Analysis

Interlink Network Visualization

Facilitated by Netdraw (Borgatti 2002), the interlink network of the 30 NZRTO websites was constructed and visualized. Figure 1 presents the structure of the hyperlink network, in which the nodes stand for the NZRTO websites, the ties denote connections among them, the width the ties represent the strength of the connections (i.e., the number of interlinks existing between the two websites), and the arrows of the ties indicate the direction of the hyperlinks. Using a spring-embedding algorithm based on geodesic distance, the distance of one node to another in this map indicates the extent of connectedness of these websites in cyberspace. Two websites respectively belonging to the Destination Great Lake Taupo and Wanganui Incorporated were found completely isolated from the rest of the network. It was also observed that the connections between some websites were stronger than that between the others. For example, the websites of Tourism Auckland and Nature Coast, and

between Nature Coast and Venture Hawke's Bay were much stronger than that among other NZRTO websites.

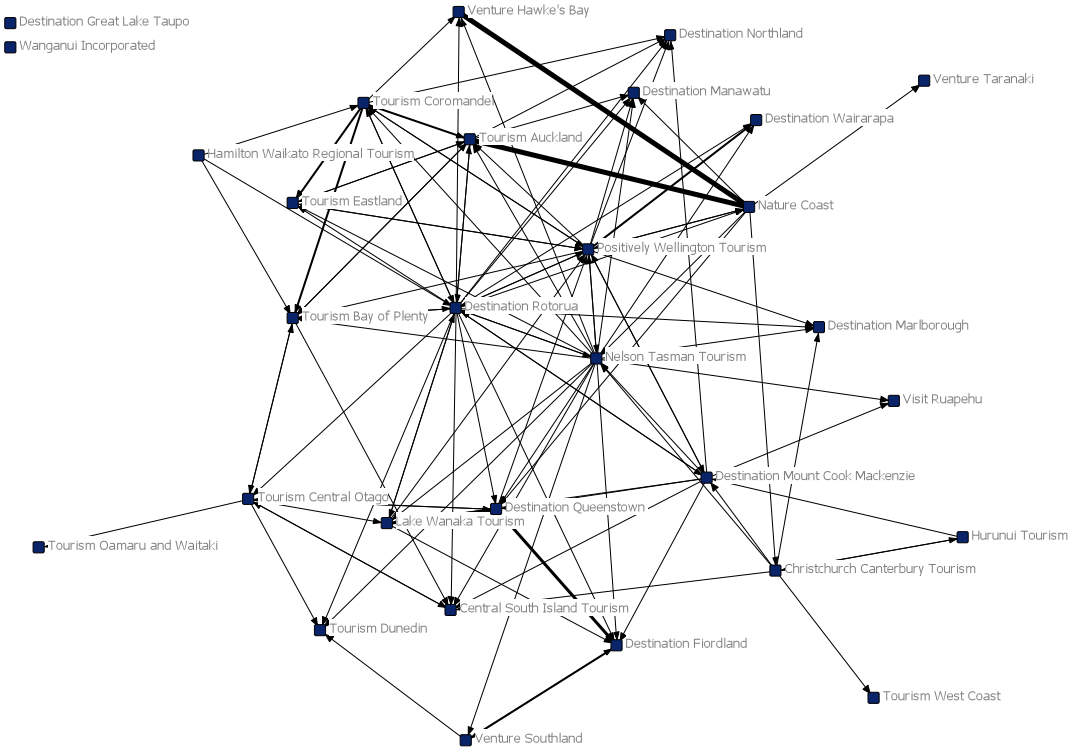

Figure 1
Interlink Network of NZRTO Websites

Network Density, Centralization, and Node Centrality

Network density measures the extent to which all possible relations in a network are actually present. Ranging from 0 (nodes are isolated from one another) to 1 (every node is connected to each other), network density is calculated as the number of actual connections between nodes divided by the number of possible connections (Scott 2000). As this analysis focused on the presence rather than the strength of connections among the NZRTO websites, the interlink network was dichotomized for network density measurement. One hundred and twelve ties were found existing in the interlink network. The network has a density of 0.129, suggesting that about 13% of all the possible online connections among the 30 NZRTO websites actually existed. It indicates a relatively sparse network.

Centralization is a network-level property generally measuring the distribution of power or prominence among actors in a given network. It is calculated by computing a centrality measure (e.g., degree, betweenness, or closeness centrality) at node level and then getting the sum of the absolute deviations from the graph-wide maximum. Centralization actually measures the extent to which the network "revolves around" a single node or a small number of nodes (Ackland and O'Neil, 2011). In this study, the betweenness centralization was calculated and examined for a structural understanding of the interlink network among the NZRTO websites. While betweenness centrality refers to the extent to which a particular point lies 'between'

the other points in a network (Scott 2000), betweenness centralization describes the betweenness existing in the entire network by calculating the ratio of the actual sum of betweeness centrality for each node to the maximum possible sum (Freeman 1979). A high betweenness centralization indicates a hierarchical network structure, where a single or a small number of nodes in the network tend to be more central than the rest. The betweenness centralization of the interlink network was 0.1296 (1.979) which indicating relatively flat structure in terms of interconnections among the NZRTO websites.

At node level, the indegree and outdegree centralities were computed respectively for each of the NZRTO websites in the network and reported in table 3. While a high outdegree centrality may suggest a RTO's stronge intention to link with other RTOs online, a high indegree centrality may indicate a RTO website's prestige and influence in online information comunication among its peers. The websites of the RTOs of Auckland (indegree = 34), Hawke's Bay (indegree = 26), Fiordland (indegree = 19), and Lake Wanaka (indegree = 14) received relatively higher indegree centrlities than the others, suggesting that their websites contained valuable information that would interest the visitors of the websites of their peer RTOs. In contrast, the websites of RTOs of Nature Coast (outdegree = 56), Nelson (outdegree = 30), and Queenstown (outdegree = 28) were the three having high outdegree centralities, indicating their information needs from peer RTO websites

Table 3
Outdegree & Indegree Centralities of RTO Websites in the Interlink Network

NZRTO	Outdeg	Indeg	NZRTO	Outdeg	Indeg
Nature Coast	56	2	Hurunui Tourism	4	2
Nelson Tasman Tourism	30	6	Venture Hawke's Bay	3	26
Destination Queenstown	28	6	Central South Island Tourism	2	7
Destination Rotorua	20	12	Tourism Eastland	2	9
Positively Wellington Tourism	20	11	Destination Fiordland	1	19
Tourism Coromandel	20	4	Destination Northland	1	5
Christchurch Canterbury Tourism	15	10	Destination Manawatu	0	5
Destination Mount Cook Mackenzie	13	5	Destination Marlborough	0	7
Venture Southland	10	2	Venture Taranaki	0	1
Tourism Bay of Plenty	8	11	Tourism Oamaru and Waitaki	0	1
Tourism Central Otago	6	4	Tourism Dunedin	0	5
Tourism Auckland	6	34	Destination Wairarapa	0	6
Hamilton Waikato Regional Tourism	5	0	Wanganui Incorporated	0	0
Lake Wanaka Tourism	5	14	Visit Ruapehu	0	2
Tourism West Coast	5	3	Destination Great Lake Taupo	0	0

Co-inlink network analysis

Multidimensional Scaling of the NZRTO Co-inlink Network

Multidimensional Scaling (MDS) was applied to the co-inlink netowrk matrix of the 30 NZRTO websites using SPSS. The MDS output is a map on which each NZRTO website was positioned according to their similarities as measured by the number of co-inlinks. The higher the co-inlink count between a pair of the NZRTO websites, the more likely that they were similar or related, ad the closer the two websites would be placed in the MDS map.

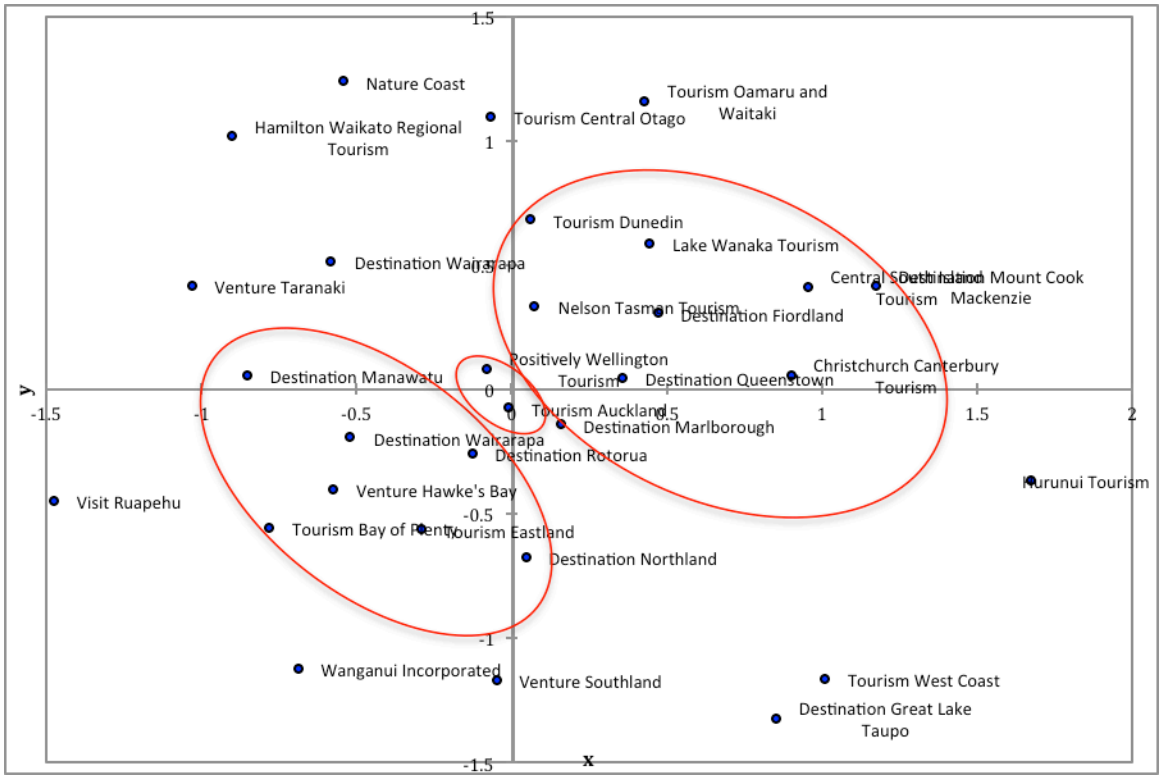

Figure 2

MDS Map of NZRTO Websites with Co-ininks

Figure 2 present the MDS mapping results of the data set collected using co-inlink queries. The stress value of the MDS analysis was below 0.05, indicating a good fit between the input data and the output maps (Meulman & Heiser, 2001: 201). The positions of each NZRTO websites on the map reflect their overall popularity and interrelationships on the internet. Three major groups of websites were identified. Close to the origin of the coordinates of the MDS map, the RTOs of the two major gateway city of New Zealand (i.e., Auckland and Wellington) formed up a single group. One being the country's largest city (Auckland) and the other as the capital city (Wellington), it is not surprising to find that the RTOs of these two cities received most online attention compared with their peers. The second group consisted of RTOs of North Island regions, including Manawatu, Wairarapa, Rotorua, Hawke's Bay, Bay of Plenty, Eastland (Gisborne), and Northland. The third group mainly included RTOs of South Island regions, such as Dunedin, Lake Wanaka, Nelson, Fiordland,

Queenstown, Christchurch, Marlborough, Mountain Cook, and Central South Island, etc. It was observed that geographic locations (i.e., North/South Island) seems to be an important factor contributing to the co-inlinking patterms among the RTO websites. There were also a few NZRTO websites spreading out across the peripheral area of the MDS map. These websited were found sharing considerably less co-inlinking hyperlinks with their peers.

Content Analysis of Co-inlinking Hyperlinks

Linking Pattern by Country. Countries where the sampled co-inlinking webpages were located (i.e., where the links originated) are summarized in table 4. The majority (61.8%) of the sampled webpages were domestic (i.e., originated from NZ websites). There were also a significant number (n=91) of webpages linking from websites located in the US. The numbers of inlinks from Germany, Taiwan, and Australia were quitely similar. The countries that gerneated less then 10 inlinks in the sample were all categorized as "Others".

Table 4
Country of Origin

Country of Origin	n	%
NZ	596	61.78
US	91	9.42
Germany	45	4.71
Taiwan	40	4.19
Australia	35	3.66
UK	30	3.14
Japan	25	2.62
China	20	2.09
France	15	1.57
Others	51	5.19
Total	960	100

Linking Pattern by Language. The languages used in the sampled inlinking webpages are shown in table 6. Corresponding to the distribution of generating countries of the sampled links, English was the dominant language used in the sample webpages (n=758, 78.65%). Including both traditional and simplified Chiense, Chinese (n=60, 6.25%) was the second most popular language used in the sampled co-inlinking webpages. German webpages accounted for 5.21% (n=50) of the total sample, and Japanese for 2.60% (n=25).

Table 6
Use of Language

Use of Language	n	%
English	758	78.65
Chinese	60	6.25
German	50	5.21
Japanese	25	2.60
Dutch	15	1.56
French	16	1.56
Russian	10	1.04
Korean	6	0.54
Others	23	2.56
Total	964	100

Linking Pattern by Types of Websites. The types of websites that link to the at least two of the 30 NZRTO websites are summarized in table 7. Eight types of websites were identified in the sample. It was observed that 53% of the sampled webpages originated from comercial websites, which was further divided into 8 categories, including genreal comercial websites (not necessarily tourism-related), tour operators, travel agents, tourism transport, tourist attractions, destination marketing netowrk, tourist product marketing network, and other tourism-related businesses. Blogs (12.56%) and informational website (14.21%) also made up significant portions of the entire sample. This suggests that links to NZRTO websites were most likely business-related, although there were some links from personal sites or just for information purposes.

Table 7
Types of Websites

Types of Website	n	%
Commercial	512	53.16
– general/inclusive	36	3.68
– tour operator	5	0.53
– travel agent	20	2.11
– tour transport	20	2.11
– tourist attraction	61	6.32
– destination marketing network	335	34.74
– tourist product marketing network	15	1.58
– other tourism-related	20	2.11
Organizational	41	4.21
Educational	56	5.79
Governmental	25	2.63
Forum/BBS	20	2.11
Blog	147	15.26
– organizational	61	6.32
– personal	86	8.95
Informational	137	14.21
– general/inclusive	71	7.37
– travel information	66	6.84
Others	25	2.63
Total	**964**	**100**

Linking motivation. The classification scheme was developed using a ground theory approach. The results of the classification of motivations for link, namely why the links were created, is summarized in table 8. The 4 most common types of linking mtivation is 'travel information directory' (28.33%), 'general online directory' (18.33%), 'destination information (15.56%), & 'links to affiliated tourism organization' (12.22%). These four categories constitute the majority (74.44%) of the links of all types.

Table 8
Linking Motivation

Linking Motivation	n	%
General online directory (including search engine directory) Webpages containing links to not only tourism-related websites, but also other non-tourism websites	177	18.33
Travel information directory Webpages containing links to only tourism-related websites	273	28.33
Destination information Webpages using the RTO website as an information source to introduce a place, not necessarily as a tourist destination	150	15.56
Links to affiliated Tourism organizations/associations	118	12.22
Links to business partners	37	3.89
List of tourist products/services	48	5.00
List of sponsors or participants	16	1.67
List of suppliers	5	0.56
Links to NZ RTOs	43	4.44
List of NZ Tourism Industry Associations	37	3.89
Others	59	6.11
Total	964	100

DISCUSSION AND CONCLUSION

Using Webomatric and social network analysis techniques in a New Zealand case, this study investigated the destination marketing organizations' online information and communication networking by examining the link impact, interlink network structures, and the content of the coinlinking webpages to their websites. In the results, the diversity in the Top Level Domains and Second Top Level Domains of the inlinking webpages towards the RTO sites was a sign that the New Zealand Regional Tourism Organizations, and hence the New Zealand Tourism Industry, is farely visible internationally. The study also found that the majority of the inlinks came from sites within New Zealand, and particularly from commercial websites.

The study took a qualitative content analysis approach that complemented the quantitative method employed in earlier hyperlink studies. Each sampled linking page was classified by country, language, types of websites, and motivation for linking. The results showed that commercial sites were the most common type of websites that generated co-inlinks to NZRTO websites. Blogs were also a important souce of co-inlinks to NZRTO websites. Almost half of the co-inlinks were generated

for informatinonal and online directory purposes. There was also a significant number of sites creating co-links to show their affiliations to the tourism organizations and associations. When two related RTO websites appear in a list or a webpage, they are colinked (i.e., page A and page B are colinked if there is a third page linking to both). Comparing the interlink network and the co-inlink network of the NZRTO websites, it was noticed that fewer links were created to point to peer RTO websites comparing to the coinking hyperlinks created by a third party website or webpage. This shows that simple link analysis would not provide much information on tourism collaborations or competitions between different NZRTO regions, but the co-inlink analysis could be a useful direction to pursue for information on this matter. In summary, results from the study not only help in the current understanding of hyperlinking phenomenon, but also provide new directions for future research.

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