MEASUREMENT AND MANAGEMENT OF INNOVATION IN SERVICES: ESSAYS ON ICT INVESTMENT, ORCHESTRATION, AND THE ROLE OF THE DESTINATION MANAGEMENT ORGANIZATION

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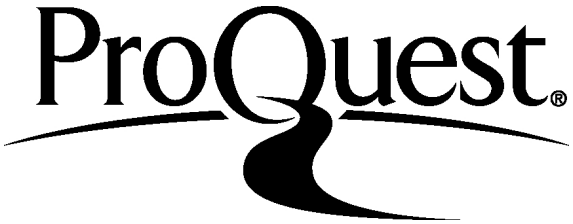

ABSTRACT

Innovation in the services sector is becoming increasingly important to understanding the innovative behavior of the US economy, as more and more sectors become increasingly populated with services. Traditional goods-manufacturing sectors remain a dominant theoretical and empirical force with respect to the measurement and management of innovation activity at different levels of the economy. This includes industry, sector, and firm levels of theory and practice. As the shifting trajectory away from traditional technology-manufacturing to services, it becomes incumbent on researchers in service dominated sectors such as tourism to better understand effective ways to measure and manage innovation in services. This dissertation comprises three essays which singly and in combination, focus on the measurement and management of innovation in services with specific and increasing attention to the role of the destination management organization.

The major bodies of literature used in these essays are the innovation literature, destination marketing and management, and networks. There are multiple lenses used to analyze services within the tourism context at the industry, destination, and organization levels. In addition to multiple lenses, multiple analytic methods are employed raging from latent growth modeling techniques to convergent parallel mixed methodology.

The thesis contributes to the destination management and marketing literature in three ways. First, the thesis integrates tourism production industry into the comparison of between and within group trajectories. Second, the study empirically tests the mediating effect of network orchestration, and contributes mixed methods to the tourism field.

This dissertation is dedicated to my sons,

Christian Jay St-Francis and Colby Paul-Anthony.

My greatest sacrifice was being away from you these past four years.

May you both continually seek the Will of God for your lives;

always mindful that the ultimate sacrifice was made for you on the Cross.

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CHAPTER 1

OVERVIEW

This dissertation research comprises three Essays which singly, and in conjunction, explore knowledge-based measurement and management of innovation in services, specifically within the context of tourism. Knowledge-based approaches advocate learning as a key component of change, and involve the use of knowledge structures (e.g., patents, ICTs) and processes (e.g., knowledge-sharing, exploration) as either direct or indirect measures of innovative activities. An innovative activity is related to but distinct from both R&D and innovation. An innovative activity is a specific, identifiable activity using products of the innovation process from the products' own or other industries or sectors, providing an environment conducive to innovation, or serving as a marker of innovative managerial or organizational capacity (Atrostic 2008, p. 155). An example of this may be the use of technological capabilities produced by bioengineers in capital goods markets for consumption and use by commercial passenger airline companies to significantly improve fleet efficiencies.

In exploring the characteristics and conditions of knowledge-based measurement and management of innovation in services, and specifically within the context of tourism, a key aspect linking the three Essays in this dissertation research is the extent to which various knowledge-based approaches might better inform measurement and management of innovative activities in heterogeneous service sector organizations, such as those found in a tourism destination, and which may not constitute traditional technology-manufacturing-based innovations. Relying on classical and contemporary strategic management theory, the purpose of the research is to establish an initial framework for

managing knowledge exchange, and for organizing towards more successful innovation output within and across organizations within a tourism destination. The tourism production (or destination) system generally refers to the confluence of heterogeneous, independent and inter-related actors, and the engagements linking these actors, who are involved in the creation, development and delivery of tourist destination experiences within a given geographic context.

This overview comprises five sections. Each section contributes a theoretical and empirical foundation to the focal research question: how should service sector actors in a tourism destination organize for more successful innovation output? In the first section, I provide a framework of perspectives which have contributed to the understanding of definitions, sources and patterns of innovation in services. The depiction of an initial 'framework of perspectives' to define innovation is important for three reasons. First, the concept of innovation has both its theoretical and practical roots in manufacturing and non-service sectors. This has contributed to ongoing debates on the extent to which existing innovation measurements are suitable for use across both manufacturing and non-manufacturing (service) contexts. Second, innovation has been conceptualized as either the one-off happening, as in an occurrence, of a specific event; or as a process, as in a sequence of purposeful activities leading up to an occurrence of innovation. This has resulted in a seeming 'empirical trade-off' between research which focuses on innovation as outcome, and innovation as process, with few studies able to address both. Third, contemporary innovation research has tended to focus on the effects of innovation rather than the content and character of the innovation. This is notable in service sectors such as tourism and hospitality, which have largely benefited from adopting technological

innovations from sources outside the industry. It is therefore important to understand innovation measurement and management in the service context. This research addresses these issues in its approach to framing the nomological concept of innovation across the three essays. As will be seen, the concept of innovation in services is discussed against the traditional 'technology-manufacturing' industry-based perspective in Essay 1; from the 'knowledge-based innovative process and outcome' perspective in Essay 2; and from a pragmatic 'mixed-methodology' approach in Essay 3, evaluates a specific type of market-based innovation activity of the destination management organization DMO).

In the second section of this overview, I discuss knowledge-based approaches for measuring and managing innovation in services. Specifically, I present how knowledge-based perspectives have informed our understanding of the management of technological and non-technological innovations in organizations, and establish a raison d'etre for understanding patterns of information and communication technology (ICT) investment varies across manufacturing and service industries addressed in Essay 1.

In Essay 2 I discuss the concept of network orchestration as a knowledge-based measure of innovative activity. Network orchestration assumes that a dominant, central actor within the network is responsible for the management and organization of innovation ("value creation") outcomes via three processes namely managing knowledge mobility; managing innovation appropriability; and managing network stability. Value creation, in this case, accrues from mediated interaction among non-homogeneous actors within the tourism production system. Non-orchestration assumes there is no dominant actor. Instead, tourism actors self-organize in collaborative alliances for the management and organization of innovation outcomes. Value creation accrues from non-mediated

interaction among actors within the tourism production system. Such knowledge-based views focus on interactive processes through which knowledge is created, exchanged and applied to situations within and outside organization. Moreover, this study helps to evaluate the nomological validity of the orchestration of innovation networks within the context of a tourism destination.

In the fourth section, I present the concept of the tourism production system (TPS). I argue that the conceptualization of the tourism destination (TPS) system as a complex, adaptive system is appropriate given the extent to which micro-level innovative behaviors inform macro-level innovative outcomes, and vice versa. Moreover, the tourism destination comprises networks of relations among (micro-structure) actors and groups of actors become interconnected and formed for dynamic outcomes, and the preservation of the (macro-structure). Section five presents the framework for the proposed three-Essay study.

Definitions of Innovation

Innovation is complex. The concept of innovation is perhaps among the most intricate and dynamic phenomena across business, government, and social research. Arguably, it remains as elusive a concept for twenty-first century experts as for earlier researchers, owing to the fact that contemporary views of innovation have been influenced by a number of fields. This has resulted in a variety of perspectives from which innovation has been conceptualized and studied.

The writings of economist, Joseph Schumpeter, throughout the first half of the twentieth century, are among the earliest and perhaps most pervasive views of innovation. Schumpeter viewed innovation as an outcome, as innovative performance. He regarded innovation as a derivative of the mutation concept from the field of biology, describing innovation as incessant and complex change driven by entrepreneurial efforts and motivated by rents. A key idea behind Schumpeter's 'economic mutation' (Louçã 2014) view of innovation assumes that innovation is both endogenous and adaptive. Endogenous in that innovation occurs by incessantly revolutionizing from within the system; adaptive in that modern capitalist society necessarily initiates, creates and responds to change. Such change produces dynamic behaviors which were later referred to as "Creative Destruction" (Schumpeter, 1942). It is from the Schumpeterian ideology that much of the development of innovation theory has evolved, and which advocates both the commercialization of inventions, as well as fundamental change outcomes. Schumpeter proposed a list of five types of innovation namely the introduction of new products; the introduction of new production methods/processes; the opening of new markets; development of new supply/input sources; and the creation of new market structures within an industry.

Other definitions suggest innovation is any idea, practice or material artifact perceived to be new by the relevant unit of adoption (Zaltman, Duncan & Holbeck, 1973); as the creation or adoption of an idea or behavior new to the organization (Daft, 1978; Damanpour, 1996); as the successful implementation of creative ideas within an organization (Amabile et al., 2005); as the process of bringing any new, problem-solving idea into use, or the generation, acceptance and implementation of new ideas, processes,

products or services (Kanter, 1986); or as the implementation and development of new ideas by people who over time engage in transitions with others within an institutional order (Van de Ven, 1986). The Eurostat and OECD accept the Community Innovation Survey (2010) definition of innovation as the introduction of a new or significantly improved product, process, organizational, or marketing method by an organization (Gault, 2013). Collectively, these definitions view innovation as a capability or resource, which is a source of innovative performance.

Taken together, the seemingly common requirement for a definition for innovation is the need to identify the implementation or occurrence of the innovation outcome, as well as the occurrence of a sequence of activities which make up innovation processes. This research accepts a slightly modified version of these definitions to reflect an integration of both outcome and process characteristics of innovation, and defines innovation as the introduction, acceptance and implementation of a new or significantly improved product (good or service), process, new marketing method, or a new organizational method in business practices, workplace organization or external relations.

Innovation in Manufacturing and Service Contexts

Earlier researchers concentrated the search for distinctive features between manufacturing and services by comparing the seminal, economic perspectives of Schumpeter (1934) with the capabilities perspectives mentioned above. On the one hand, economic innovation perspectives, as espoused by Schumpeter, regard innovation as the purposeful tendency to create and pursue change (whether to products, services, or

organizational processes) which contribute positive, economic benefit to the entrepreneurial effort. Capabilities, and more specifically dynamic capabilities, suggest a less outcome-based approach to innovation, arguing that innovation should be conceptualized as the measured capacity to act, emphasizing process-based approaches to the pursuit of more advantageous change outcomes. Schumpeterian views, it has been suggested, are sufficiently encompassing, and applicable to both manufacturing and services contexts. Capabilities views, on the other hand, have identified distinct differences between the characteristics of services, and argue that there is need for distinctive approaches to measuring innovation in manufacturing distinct from (non-manufacturing) service contexts. These latter perspectives have given rise to three broad approaches to studying and measuring innovation in services within the economic policy literature namely, subordinate (assimilation) approaches, autonomous (demarcation) approaches, and integrative (syntheses) approaches (Coombs & Miles, 2000; Gallouj, 1994), and which create an important foundation for these essays. Subordinate approaches suggest adaptation trajectories whereby innovation in service contexts may be measured using similar items from manufacturing contexts. Demarcation approaches argue for a distinction between manufacturing and service contexts, requiring non-transference of measures and increased focus on non-technological innovations. Synthesis approaches acknowledge that while distinctions exist, emphasizes non-technological innovation (e.g., organizational, market-based) in service contexts, and may be measured using similar items from manufacturing.

In more contemporary approaches to 'service innovation' Alter (2014) suggests basic premise on which an operational model of service and service systems (SaSS)

might be based includes the conceptualization of a services system as a social system and a minimalist approach to distinguishing products vs. services product design characteristics. On the other hand, Mangiarotti and Riillo (2014) seek to classify innovation in services based on both the type of innovation and innovation activities which includes technological and non-technological, and manufacturing and services contexts.

As a corollary of the above, the present research is being undertaken during a period of continued debate surrounding the similarities and differences of innovation in the services and manufacturing sectors and relatedly, the implications which these similarities and differences have for the conceptualization, measurement and management of innovations in these industries. While ongoing research shows more similarities than differences in patterns of technological change between manufacturing and service sectors an important acknowledgement has been made: that the services sector remains a key adopter of technological change (Barras 1984; Evangelista 2000). Widely agreed is that the innovation concept has its nomological genesis in the goods manufacturing sector, with specific emphasis on technological innovations. Mangiarotti and Riillo (2014) argue that increasingly, services account for a large portion of economic activities, and while more difficult to detect, service firms do innovate differently from manufacturing firms. It is from this point that much of the debate surrounding the measurement and management of innovation in services has evolved, focusing on the extent to which measurements of technological change in manufacturing sectors are suitable for use in services sectors.

A significant turning point emerged from the field of marketing with the entrance of Vargo and Lusch's (2004) service-dominant logic which advocates that the provision of all goods intrinsically involve a component of services. These authors suggest that the conceptual and methodological focus ought not to be on the value of a single good or collection of goods, given that on their own, certain goods are of limited intrinsic value. Rather, it is the process of production, delivery and consumption of these goods, such as those typical of tourism sector businesses. Service-dominant logic therefore requires that two measurement considerations be given to the present research on innovation in tourism. First, given the simultaneity of production and consumption activities in tourism, methodological approaches ought to consider measurement of processes underlying innovation output performance. Second, given the involvement of multiple actors in the production and delivery of the tourism service experience, methodological approaches ought to consider organizational and inter-organizational levels of innovation measurement.

The present research assumes that co-occurrence of technological and non-technological innovations is possible within innovation in service contexts. This is especially germane to the tourism context wherein technology acts as a key enabler to the implementation of other technological and non-technological innovation output. As such, the ontological view of this research study accepts the synthesis approach to measuring innovation in services. The study assumes that while distinctions may exist between manufacturing and services contexts for innovation, there is no privilege of one over the other. Rather, measures of traditional manufacturing-technology-innovation domain may be synthesized into the services context for innovation.

Innovation in Technological and Non-technological Contexts

While some ongoing economic policy research suggests more similarities than differences in sources, patterns, and trajectories of innovation between manufacturing and service sectors, as previously stated in this proposal, an important acknowledgement has been made that the services sector remains a key adopter of technological change (Barras 1984; Evangelista 2000) from outside sectors. This has also resulted in a paradigm shift from a single focus on new product innovations to a shared focus on services products or innovation in services, suggesting an important intersection of Schumpeter's (1934, 1942) economic development paradigm and Vargo and Lusch's (2004, 2008a) service-dominant logic. Factors identified as having important influence on the rate of adoption (delays) and the rate of realized benefits include benefit-cost dynamics, usability, markets and adaptability. Benefit-cost dynamics relate to the source of benefit which a potential innovation yields when considered against its costs. To the extent that the relative benefit-cost outcomes in conjunction with usability factors maintain short- to medium-term attractiveness, a firm will seek to innovate in the way of these new technological products, services, or processes in line with such desired performance outcomes. An example of this is provided by Brynjolfsson and Hitt (2000). These authors suggest that direct measurement of the impact of information technology investments are in the short-term related to direct effects of the technology investment, and in the longer-term to the effects of information technology when combined with related investments in organizational change. While this view accounts for patterns of technological change in organizational innovation settings, the inherent limitation is its failure to take into

account non-technological change, as well as innovations which accrue from inter-organizational knowledge engagements beyond the organization's boundaries.

Nelson and Winter (1997, 2002) suggest that technological and non-technological innovations fundamentally bring about a shift in the trajectory of current modes of organizational behavior, or routines. Patterns of repeated behaviors over time give rise to routines which are crafted into organizational norms, cultures and practices. These routines continue only to the extent that they serve current organizational and market needs; otherwise they will change. Changes in organizational needs could either motivate a need for new organizational knowledge capabilities, or for new ways of employing existing organizational knowledge capabilities. Any change which requires a fundamental shift in the current organization of human and non-human resources for product or process creation, for delivery of goods and services to users and consumers, or for meeting new institutional regimes, may be characterized as non-technological innovation. Non-technological innovations might include managerial innovations; institutional innovations, and market-based innovations (Hjalager 2010) which fundamentally create novel ('new to the firm') outcomes by introducing a change to the way organizations carry out product or process activities. Managerial innovations for example, deal with new ways of organizing or collaborating, such as new human resource management socialization or training campaigns aimed at building employee satisfaction or nurturing employee talent. Institutional innovations refer to any new, embracing collaborative or organizing structure of which the firm chooses to be a part. Market-based innovations might include new marketing or administrative concepts which effectively change the communication to and with internal or external customers.

Taken together, the present research does not assume exclusivity in the classification types of technological and non-technological innovations. Rather, it accepts the arguments of contemporary scholarship (e.g., Arundel & Hollanders, 2005; Damanpour & Aravind, 2012; de Vries, 2006; Drejer, 2004; Nijssen et al., 2006) that similarities exist between innovation in manufacturing and services. Further, any approach to the conceptualization, measurement and management of innovation in services requires a synthesis approach which gives attention to the fact that the services sector is considered a key adopter of technological innovation, and that these in turn enable both technological and non-technological innovations in services.

Measurement and Management of Innovation in Services

Four recent developments in the measurement and management of innovation in services are important to this proposed research study in tourism: i. the increased importance being placed on non-technological changes in service sector firms; ii. the growing importance of measuring innovative activities at firm, sector, national, and international levels, while ensuring comparability across levels; iii. the need for both process- and outcome-based insight into innovation measurements; and iv. the increased attention being placed on the innovative behaviors of small firms. These developments contribute to foundation arguments about why this research undertaking is important, and are discussed in the ensuing paragraphs.

Historically, attention has been focused almost exclusively on measuring technological innovative activities in the goods-manufacturing and related non-service

sectors. Experts and policy makers however, have begun to recognize the underlying presence of non-technological, innovation in services to economic development and the importance of these innovation processes within the present evolution from knowledge economy to service economy.

A second development is the growing importance of measuring non-technological innovations (Gault, 2013; Oslo Manual 2005). Earlier innovation studies focused almost exclusively on technological innovations, with minimal attention being placed on smaller, less conspicuous innovative activities which contribute to new intangible outcomes. An example of these intangibles might include business process change (e.g., de-centralized reporting structures among business units) which results in a new organizational structure. The new operating structure would represent an intangible, innovation outcome aimed perhaps at improved organizational efficiencies, but which may not involve or result in technological change.

A third development is the collective need to incorporate both outcome-based approaches and process-based approaches to measuring innovation. This highlights the need to evaluate innovative activity from the standpoint of both the quality (e.g., level of success) associated with the innovation implemented, as well as with the quality of processes leading up to the successful implementation of the innovation. An example of this might be the inclusion of communication-based measurements (e.g., formal vs. informal communication; frequency of knowledge exchange behaviors among actors) as well as the inclusion of outcome measures (e.g., change in financial growth levels post-implementation).

A fourth development concerns increased focus on the innovative behaviors of small firms (de Jong & Marsili, 2006; Novelli, Shmitz & Spencer, 2006). The innovative behaviors of small and medium-sized firms can vary substantially, given the heterogeneous distribution of resources and capabilities available for innovation. Within the service economy, certain knowledge resources are resident across rather than within any single firm. In the context of tourism for example, small and medium-sized establishments (SMEs) are resource-dependent on larger firms to appropriate these types of knowledge (e.g., smaller hotels and motels rely on larger, convention and meeting hotels with larger budgets to attract visitors and appropriate hotel room capacity). Typically, in the medium- to short- term these SMEs respond to increased market demand by capacity innovations (e.g., new or expanded hotel rooms, new attractions, dining and night life). The important point here is that innovative behaviors among these groups of SMEs are critical to evaluating the overall innovativeness of a destination at the macro-level as a network of interdependencies. The measurement implication therefore, is that current considerations and definitions of SMEs in terms of employee class sizes for instance, might undermine the relative importance of these firms to the innovation process. Further, failing to account for the innovative behaviors of smaller actors and groups of actors might lead to comparability issues across geographic groups. In response to this, some authors (e.g., De Jong & Marsili, 2006; Novelli, Shmitz & Spencer, 2006) have begun to argue for a sectoral taxonomy of innovative small firms based on aggregated levels of innovation intensity, orientations and output.

Approaches to Knowledge-based Measures of Innovation

With organizational learning (March, 1991) as a key cornerstone, knowledge-based approaches to measuring innovation and innovative activities focus on the mechanisms through which knowledge is acquired, exchanged and exploited within and across organizational boundaries. These approaches have long been held as important indicators of the presence and extent of innovative activity within and across organizations. Following the influence of Schumpeterian innovation for economic development, the Oslo Manual (2005) suggests that important measurement issues surrounding the dynamic processes by which new technologies replace the old, and requires understanding both "radical" and "incremental" innovations. Radical innovations create major disruptive change, whereas incremental innovations gradually advance the process of change over time. The roles of knowledge, technical and non-technical factors individually and collectively contribute to the process underlying innovation in services, and form critical aspects of conceptualizing a framework for measurement and management of innovation in services. The following paragraphs briefly outline three organization-level concepts which have informed contemporary knowledge-based approaches to measuring innovation: absorptive capacity and patent activity; and knowledge search behaviors. Relatedly, Adams, Bessant, and Phelps (2006) propose seven aspects of measurement of innovations to include inputs, knowledge management, strategy, organization and culture, portfolio management, and project management specialization.

The concept of absorptive capacity (Cohen & Levinthal, 1990) stems from evolutionary economic theory and more specifically, from perspectives on learning

within and across firm boundaries. Absorptive capacity refers to the acquisition, assimilation, transformation, and exploitation of external knowledge by a firm. Considered a seminal perspective in the innovation literature (Lane, Koka & Pathak 2002; Zahra & George, 2002), absorptive capacity emphasizes the role of learning in innovation. At the level of the organization, absorptive capacity assumes that greater levels of openness to learning on the part of firms, and to the acquisition and use of external knowledge enhances evolutionary behaviors such as crafting routines, organizational learning and memory.

A second, knowledge-based approach across the strategy literature involves researchers' study of patent behavior (e.g., creation, citation) across innovating firms, with higher patent activity indicative of higher levels of knowledge creation and use within and across firms. Patent creation and citation activity are used by a number of strategy scholars (e.g., Katila & Ahuja, 2002; Stuart & Podolny, 1996) to measure knowledge search behavior, search timing among rivals, and exploratory versus exploitative knowledge searches. These approaches are helpful determinants of innovative activity in sector firms such as bio-technology, engineering and pharmaceuticals.

A third related knowledge-based approach to measuring innovation involves measuring innovative activities as a function of the knowledge search for solutions to current organizational problems (Katila & Chen, 2008; Rosenkopf & Nerkar, 2001). The search for knowledge is subsequently classified as exploration or exploitation (March, 1991). As it relates to innovation activity, knowledge exploration refers to innovation and search for new knowledge, or new ways of using 'new to the firm' knowledge.

Knowledge exploitation on the other hand, refers to innovation and search for existing knowledge, or new ways of using existing firm knowledge. Collectively, these three approaches suggest measuring innovation according to frequency and investment intensity of knowledge capabilities related to search processes, or according to resource investments made into search processes. However, such approaches are limited in their ability to measure innovative activities in sectors which engage in comparatively lower levels of R&D and patent-related behaviors; are adopters rather than inventors; or engage in lower levels of technological innovations. Moreover, service sector firms such as those in tourism, are characterized by varying or lower levels of codified knowledge. These firms may be challenged to produce and reproduce knowledge among heterogeneous actors to the extent that such knowledge might contribute to the study and measurement of innovative activity. The present research therefore proposes a network-based approach to studying knowledge-based innovation activities tourism actors who share autonomous, yet interdependent knowledge relationships.

Framework for the Study

The proposed study is structured around three essays, each contributing to the focal research question: how should heterogeneous, supply-side actors in a tourism destination organize for more successful innovation output? The three separate essays introduced in this proposal contribute a deeper understanding of the conceptual and empirical arguments surrounding the measurement and management of innovative activities in services—across multiple levels and multiple contexts. The multi-level structure appropriately considers the study of services-related innovative activities at the industry-, destination-, and firm-levels. The multi-context structure appropriately considers the study of services-related innovative activities across heterogeneous actors and innovation types. To this end, each essay incorporates existing theoretical and empirical frameworks into the types of innovations in tourism; employs degrees of qualitative and/or quantitative modes of inquiry; and intermingles information and communication technologies (ICT) in order to better understand the content and character of innovations in tourism.

The purpose of the study proposed for Essay 1 is to identify variation in patterns of ICT investment expenditure between select manufacturing and services sectors; between (TPS) tourism and non-tourism service sectors; and between supply-side, (TPS) tourism sectors over time. The essay uses growth curve modelling techniques to analyses secondary, industry-level, cross-sectional/time-series data to determine the extent, if any, of changes in ICT spending in select manufacturing and services industries over time; if yes, the extent of variation in changes in ICT spending; and if yes, which factors contribute to this variation. Essay 1 relies on ten years (2003-2013) of Information and

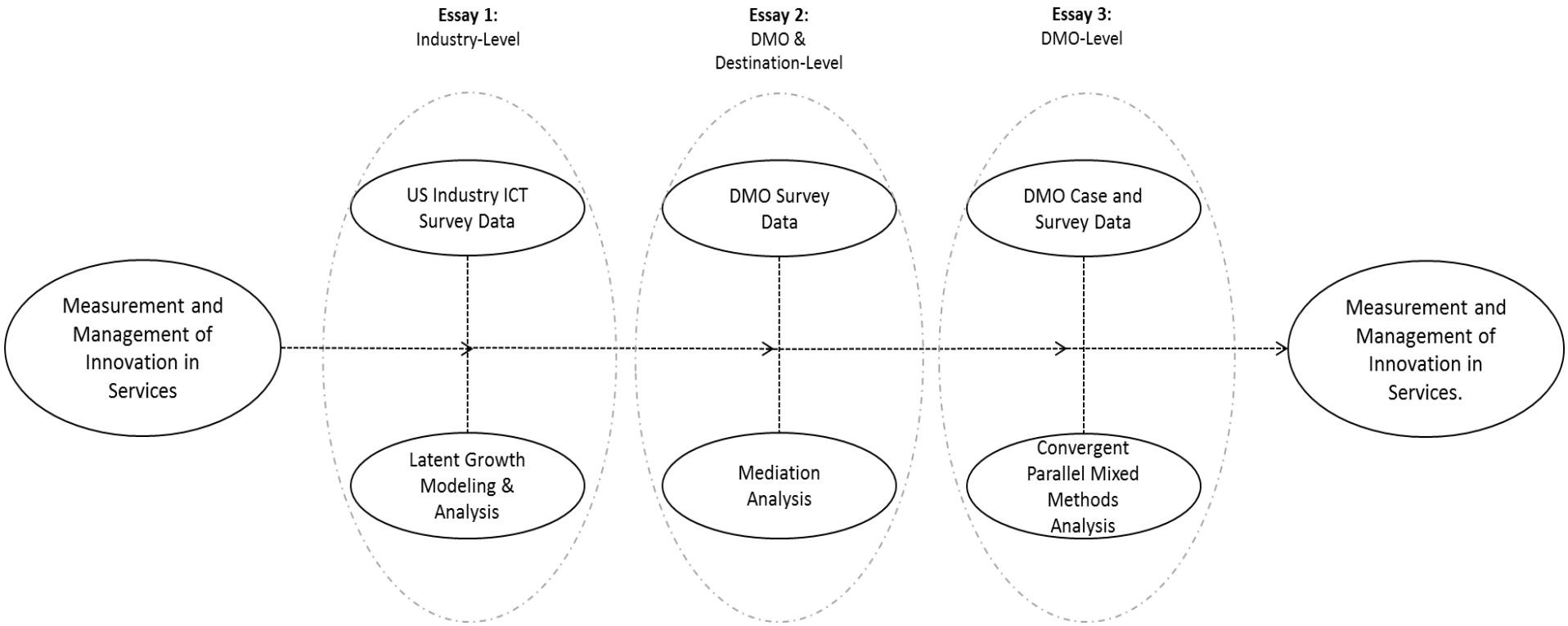
Communication Technology Survey (ICTS) data collected by the US Census Bureau to measure the extent of innovation activities among select manufacturing and service industries based on the North-American Industry Classification System (NAICS).

The purpose of the study proposed for Essay 2 is to test the effect of network orchestration processes (i.e., *knowledge mobility*, *innovation appropriability*, and *network stability*) on the innovation performance output among destination management organizations (DMOs). The essay assumes the destination management organization as a hub firm, central to facilitating innovative activity, and employs structural equation modeling (SEM) techniques to test the effects of orchestration processes on organization- and destination-level innovation performance output. Relying on organization-level survey data from more than 125 US destinations, the study contributes to only a handful of works to empirically test the network orchestration construct.

The purpose of the study proposed for Essay 3 is to explore dimensionality factors which associated with the web-based marketing activities of DMOs. The essay employs a convergent parallel mixed methods approach to help understand success factors associated with website evolution and change. The study combines secondary, non-invasive web data collection techniques with survey data from 125 American DMOs. Relying on both streams of data allows the study singly, and in conjunction, to evaluate for the factors which are associated with innovative behaviors of DMOs in the execution of their web-based marketing activities. By focusing on a single type of tourism organization (the DMO) and a single type of innovation (web marketing), the study contributes to our understanding of the perceived role of the DMO in successfully implementing web marketing strategies in tourism destinations.

Figure 1 provides a graphical representation of the three essays. From left to right, the framework identifies the guiding research question, data collection methods and analyses undertaken. The guiding objective of the dissertation research is aimed at furthering what we already know about innovation in services, and in particular, extending to that to the context of the tourism destination.

Figure 1: Framework For The Dissertation Research



ESSAY 1

ICT INVESTMENT TRAJECTORIES IN US MANUFACTURING AND SERVICE INDUSTRIES

Abstract

This study explores information and communication technology (ICT) investment trajectories in American manufacturing and service industries. Using data from the annual U.S. Information and Communication Technology Survey (ICTS), latent growth modeling (LGM) techniques found that there are differences in initial levels of ICT investment spending across industries, and differences in the rate of change over the time period studied. Industry type and size were found to be significant predictors of both initial levels and rates of change in ICT investment spending among manufacturing and service industries.

Keywords: *information and communication technology (ICT); latent growth modeling (LGM); manufacturing; services*

Introduction

Increasingly, U.S. economic activity is observing a structural shift away from traditional technology-manufacturing output towards services. This shift has implications for how researchers understand and study patterns of research and development (R&D) and innovation activities such as investment in information and communication technologies. This study is motivated by the need to better understand patterns of innovative activities among manufacturing and non-manufacturing (service) industries. Indicators of innovative activities, while distinct from research and development and innovation, require the use of direct and indirect measures of knowledge-enabling behaviors and activities related to the process and outcome of new and/or significantly improved products, processes, marketing, and organizational methods. In the present study, indirect measures of knowledge-based innovative activities must be used because no direct and systematic measure of innovative activities in manufacturing and service industries exist. For this reason, capitalized and non-capitalized purchases in information and communication technologies (ICTs) and related equipment are used as a proxy for innovative activity in manufacturing and services industries over time.

Data on U.S. investment in information technology has generally been found to have a positive relationship with productivity in manufacturing and non-manufacturing (service) contexts. Innovation is considered both a means and outcome of productivity and growth across manufacturing and service economies, with recent data indicating that manufacturing produces almost three times (22%) more product and process innovations than services (8%) (National Science Foundation 2010). While this lends support to the finding that innovation varies substantially by US industry sector, there is need for

corresponding measures of innovative activities, such as investment in information and communication technology (ICT) to better understand patterns of knowledge-enabling activities.

There are three points to be made in understanding the raison d'etre for this essay. The first is the dearth of peer-reviewed, empirical studies which use information and communication technology (ICT) related indicators for understanding innovative activities among manufacturing and services at the industry level. The second is that compared with regions such as the UK (e.g., *Nesta* study) and Europe (e.g., Italy's *ISTAT/ISRDS* and the OECD's *CIS* studies) there is a near non-existence of studies using US Census Bureau/NSF's ICT and related Business Research and Development and Innovation Study (BRDIS) data to understand growth trajectories in manufacturing and service sectors over time. The third is the need for increased research focus on innovative activities within US service sectors, which increasingly display a representational shift from traditional 'manufacturing-technology' domination towards accounting for close to 70% of business and economic activities in the US. Taken together, these points contribute to the overarching dissertation research question regarding whether and the extent to which, measures of innovative activity in traditional technology-manufacturing sector firms may have suitability in measuring similar activities in service sector contexts. Relatedly, this essay represents an initial step towards understanding ICT and related investment trajectories across manufacturing and non-manufacturing ("services") industries within the US economy in recent years.

Theoretical Overview

The use of ICT-related measures as indicators of innovative activities has found wide-reaching support across the service innovation literature. Atrostic (2008) suggests there is inherent value in linking innovation measurement to economic and productivity growth models, citing that ICT data is "less lumpy" than other kinds of investment, and therefore is a suitable measurement of productivity across manufacturing and non-manufacturing sector firms. In their discussion of information technology and business transformation, Brynjolfsson and Hitt (2000) argue that the value of information technology investment is found in its ability to be a direct enabler of complementary organizational capabilities. Moreover, ICT investment spending improves the capabilities for increasing output quality in the form of new product and process innovations and as such, were used in other studies which focused on patterns of innovation in services (e.g., Dosi, 1988; Evangelista, 2000). Building on Dosi and a previous Italian innovation survey in services, Evangelista found that process innovation, innovative investment, and the acquisition and internal development of software represent the most important channels through which service firms innovate. Hipp and Grupp (2005) used ICT investment and trademarks as empirical measures of innovation-relevant, knowledge-based activity among German manufacturing and service firms, finding greater levels of trademark applications among manufacturing than service industry firms. In a comparison of US and German manufacturing firms' use of ICTs for productivity outcomes, Haltiwanger, Jarmin and Schank (2003) found higher variation in US than in German manufacturing firms. The OECD/Oslo manual (2005) further supports the use of indirect, knowledge-based measures of innovative activity. The OECD acknowledges

that knowledge in all its forms plays a crucial role in the complex and dynamic innovation process. The manual advocates for the use of "subject" approaches in the measurement of innovation processes (e.g., innovation activities, expenditures, and linkages) which are not specific to any single innovation, but instead "are representative of all industries, so that the results can be grossed up and comparisons made between industries" (2005: p. 21).

The use of ICT data is however not without contention. Atrostic (2008) identified various definitional and methodological issues associated with the use of census-level data which results in variations in shares of innovative firms over and above variations in actual innovative behaviors (2008: p. 157). Atrostic subsequently identified the need for the systematic collection and accessibility of US *microdata* which is compatible with existing measures of US Census ICT and related data industry-level measures. The US Business Research and Development and Innovation Survey (BRDIS) provides a response to this need; providing limited, publicly accessible data on R&D and Innovation activity in the US economy. The 2008 BRDIS study, for example, found that the incidence of US innovation varies substantially by industry sector, with manufacturing industries exhibiting a considerably higher overall incidence of innovation when compared with non-manufacturing industries—even though manufacturing industries accounted for only 8% of the 1.5 million companies in the surveys respondent population (Boroush, 2010). However, two key limitations of the BRDIS are i. the study does not include companies with fewer than five employees (such as may typically represent services, and some tourism establishments); and ii. the measurement levels used by the BRDIS data have limited compatibility with other related, US census-level data, such as

the industry-level Information and Communication Technology Survey (ICTS) data used in this essay.

In their 2002 study of the adoption and use of ICTs by Italian small and medium sized enterprises (SMEs), Lucchetti and Sterlacchini suggest a taxonomy of ICTs within three major orientations. The three orientations represent the basis for which the organization seeks to adopt and use ICTs and include 1. General-use ICTs which include e-mail and Internet access; 2. Production-oriented ICTs which include LAN, CADs, and CAD-CAMs; and 3. Market-oriented ICTs which include the presence and content of a firm's Web site. General-use ICTs adoption and use is generally very high and do not depend on size, except however, when rate of effective use is measured as a percentage of nonproduction workers with access to e-mail and Internet, only industry differences become relevant. Production-oriented ICTs are significantly and positively associated with firm size, and the share of employees with secondary and especially, university education. The authors find that the adoption and use of Market-oriented ICTs, which are mainly used to improve the organization's visibility and provide information, also do not depend on firm size, but that adoption and use raise according to the extent of the organization's presence on the international such as the presence of international and other markets. Lucchetti and Sterlacchini's study provides further insight at the business and industry levels as to why there is a need to understand differences in ICT expenditure. While the present study is positioned at the industry level, and distinction of the nature of the ICT expenditure by industry is not the focus, studies such as those identified above help to raise the importance in understanding the micro perspectives behind industry behaviors.

This essay represents an initial attempt to leverage the use of related ICTS data as a measure of innovative activities and further, to include coverage of service industries which, though accounting for between 55% and 70% of GDP in some economies, remains scant when compared to the collection and use of manufacturing sector data. The essay is therefore established in pursuit of the following three guiding research questions: i. how does ICT investment expenditure of all manufacturing and service industries change over time? ii. are there statistically significant inter-industry differences with respect to the change parameters (initial levels and rates of change) of ICT investment expenditure over time? and iii. if inter-industry differences do exist, what factors might be used to predict these initial levels and rates of change in ICT investment expenditure in manufacturing and service industries over time?

Modeling and Research Questions

The study addresses the above research questions by way of modeling the growth trajectories of longitudinal information and communication technology (ICT) data from the US economy over a given period of time. From a theoretical standpoint, Figures 2-4 and the corresponding research questions below set out to answer the broader, guiding research questions using a linear growth modeling (LGM) approach.

Figure 2: Path Diagram for Unconditional LGM of Change in ICT Expenditure

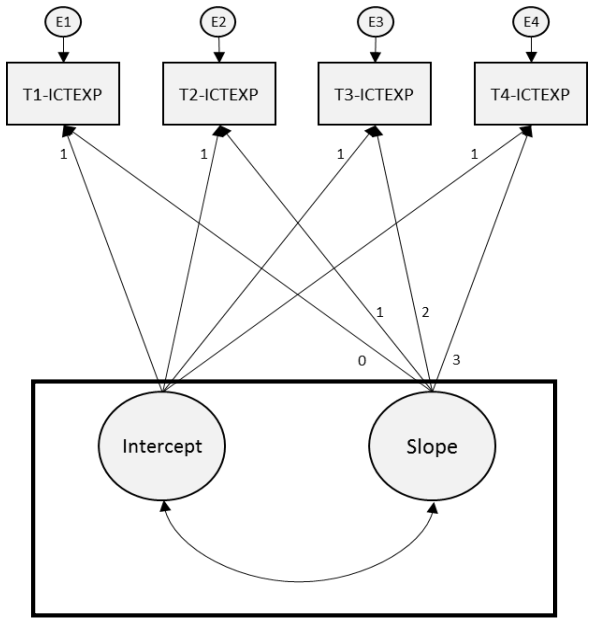


Figure 2 represents a path diagram of the theoretical model used to address the first two guiding research questions, i. how does the ICT expenditure of all manufacturing and service industries change over time? and ii. are the initial levels and rates of change statistically significant? Following typical structural equation models (SEMs) used in existing research (e.g, Serva, Kher, & Laurenceau, 2011), circles represent the latent constructs (intercept and slope) and rectangles represent the observed construct of interest, ICT expenditure, hereafter referred to as ICTEXP. T1-ICTEXP through T4-ICTEXP therefore represent ICTEXP measured at (T=4) different points in time, while the parameters (intercept and slope) are modeled as latent constructs. The paths from the intercept construct to the four measures of [ICTEXP] are fixed to 1, whereas the paths from the slope construct to the measured variables are fixed from 0 to 3 to model the hypothesized linear change over the proposed (T=4) time period. Note, the 0,1,2,3 factor loadings represent equally spaced time intervals from the initial (t=0) to the

fourth (t=3) time point. The 0,1,2,3 factor loadings assume that the time interval between repeated measurement occasions is homogeneous, but may be adjusted to exponential (e.g., 0, 1, 2, 4) or other free-range format for estimating loadings between the slope and the manifest variable, ICTEXP. Taken together, the path diagram in Figure 2 represents the theoretical latent growth model (LGM) for estimating the constructs (latent intercept and slope) in ICT expenditure in manufacturing and service industries over time. Accordingly, research questions RQ1 to RQ3 state:

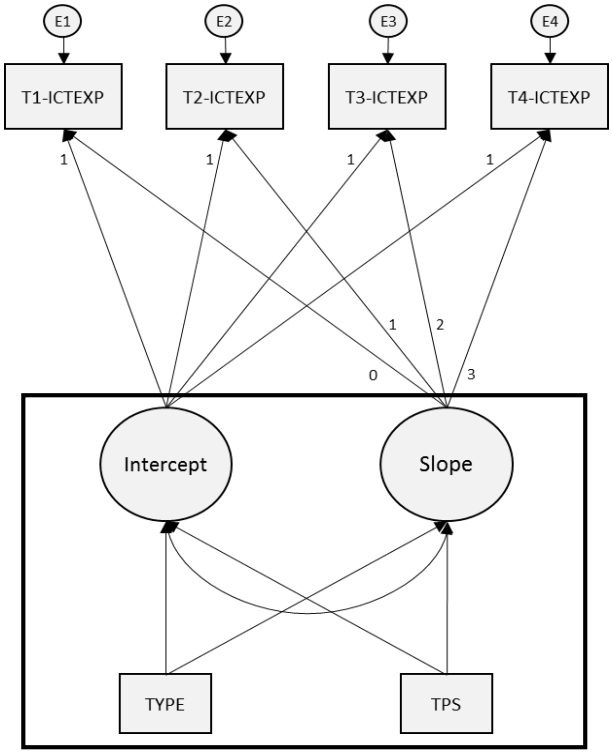
RQ1: *ICT expenditure will increase linearly in all industries.*

RQ2: *There will be differences in the initial level of ICT expenditure across industries.*

RQ3: *There will be differences in the rate of change in ICT expenditure across industries.*

Building on the first two guiding research questions addressed by RQ1-3, Figure 3 represents a path diagram of the theoretical model used to address the third broader, guiding research question: what factors might be used to predict the initial levels and rates of change in ICT expenditure in manufacturing and service industries over time?

Figure 3: Path Diagram for Conditional (Type) LGM of Change in ICT Expenditure



Two time-*invariant* predictor variables related to industry type are posited to explain inter-industry variability: i. manufacturing vs. services [TYPE] and ii. tourism production system [TPS] vs. non-TPS industry. The two sets of paths from the TYPE predictor and TPS predictor variables to the intercept and slope in Figure 3 represent the theoretical LGM for estimating the relationship of TYPE and TPS as dichotomous predictors posited to explain inter-industry variability. Accordingly, research questions RQ4 and RQ5 state:

RQ4: *Manufacturing industries will exhibit higher initial levels of ICT expenditure than service industries.*

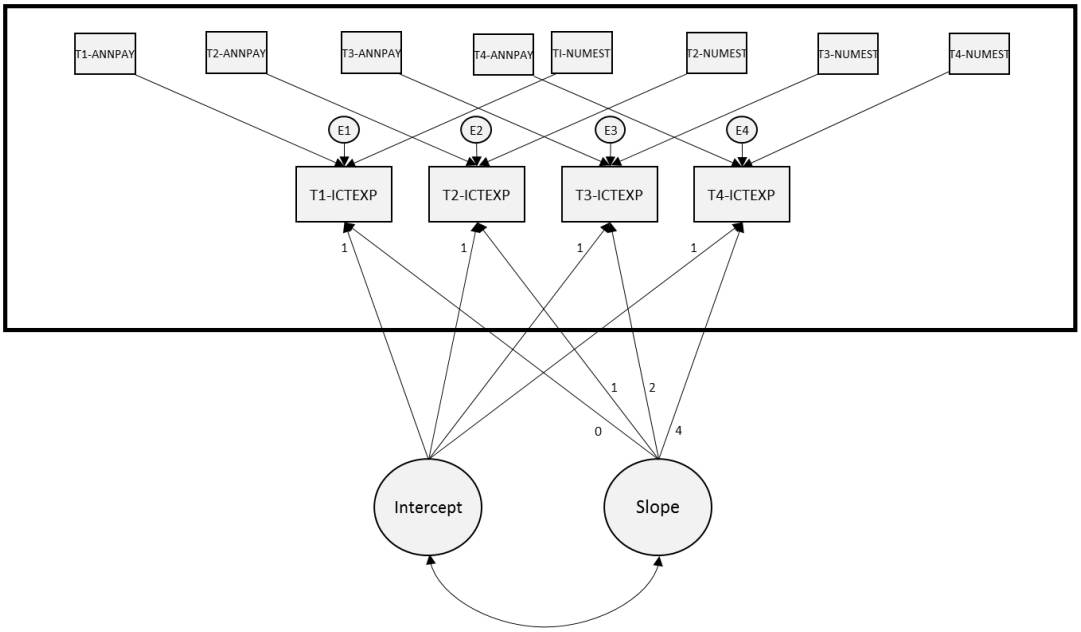
RQ5: *Manufacturing industries will exhibit higher rates of increase in ICT expenditure than service industries.*

RQ6: *Non-TPS industries will exhibit higher initial levels of ICT expenditure than TPS industries.*

RQ7: *Non-TPS industries will exhibit higher rates of increase in ICT expenditure than TPS industries.*

Further building on the first two guiding, broader research questions, Figure 4 represents a path diagram of the theoretical model used to address the third guiding research question: what factors might be used to predict the initial levels and rates of change in ICT expenditure in manufacturing and service industries over time?

Figure 4: Path Diagram for Conditional (Size) LGM of Change in ICT Expenditure



Two time-*variant* predictor variables related to industry size are posited to explain this inter-industry variability: i. total annual payroll [ANNPAY] and ii. total number of establishments [NUMEST]. The four sets of paths from the T1-ANNPAY through T4-ANNPAY predictor and T1-NUMEST through T4-NUMEST predictor variables to T1-ICTEXP through T4-ICTEXP in Figure 4 represent the theoretical LGM for estimating

the relationship of ANNPAY and NUMEST posited to explain inter-industry variability, as shown in research questions RQ8 and RQ9:

RQ8: *Industry size [ANNPAY] is a significant predictor of ICT expenditure in manufacturing and service industries.*

RQ9: *Industry size [NUMEST] is a significant predictor of ICT expenditure in manufacturing and service industries.*

Research Design and Methodology

Data

Secondary data was obtained from the U.S. Census Bureau's Information and Communication Technology Survey (ICTS). Existing data span the ten year period, 2003 through 2013[1], and comprised capitalized (expensed over two or more years) and non-capitalized (expensed in current financial year) expenditure on information and communication technology (ICT) and related equipment. First collected by the US Census Bureau in 2003, the ICTS is a supplement to the Annual Capital Expenditure Survey (ACES), and reports annual capitalized and non-capitalized expenditures for ICT equipment and software by US non-farm businesses with employees. ICT expenditures are reported at the 2-, 3-, and 4-digit North-American Industry Classification System (NAICS) levels. Examples of non-capitalized expenditures include purchases, leases and rentals of ICT equipment; software development payrolls; software licensing and

[1] 2012 not included, as ICTS for that year abandoned due to funding constraints

service/maintenance agreements. Examples of capitalized expenditures include ICT equipment (e.g., phones, GPS equipment, PCs, laptops, servers, personal digital assistant systems (PDAs), automated transaction machines (ATMs), point of sale terminals, communication satellites, and cellphones; ICT construction-in-progress; and leased equipment.

According to the Bureau's *Survey and Sampling Methodology*, estimates are based on annual data collected from an average of 45,000 companies with employees, from a sampling frame of approximately 5.5 million companies with employees. Information is requested from each establishment via one of three survey forms- short (ICT-1(S)), medium (ICT-1(M)) or long (ICT-1(L)) sent. The type of form sent depends on the diversification of the company's operations. In the course of the survey, firms are asked to select all 2-digits NAICS-level classifications which apply to each unit of their operations. To avoid reporting data for individual companies, the Bureau will withhold some data, including them in higher level totals. These higher level totals may also be withheld to avoid disaggregation, resulting in missing observations, and an unbalanced panel.

A point is needed on the traditions of economic sectoral classification, which until recently, classified sectors on three levels: Primary (agriculture, forestry, fishing, and mining); Secondary (construction, manufacturing); and Tertiary (transportation, utilities, wholesale and retail trade). Even more recently, the emergence of a fourth group, Quaternary, accounted for finance, insurance, real estate and services. What accompanied this fourth group however was, according to Kenessey (2006), questions on the legitimacy of the quaternary sector as it related to costs and benefits, the increasing

number of sectors moving towards a service-oriented classification, as well as the often inadequate statistical basis on which to performance analysis of service activities. As more and more sectors shift towards a service sector classification, the current taxonomy of industries created by the US Census Bureau places these quaternary sectors into a third group, "Non-manufacturing Not Elsewhere Classified (NEC)" alongside Manufacturing and Services. It is within this 'shifting' era that the current essay finds need to adopt a position which best reflects the current classification and use of industry terminology. For the purpose of the present essay therefore, three broad industry groups are considered for data collection and analysis namely manufacturing (M), services (S), and non-manufacturing not elsewhere classified (N). This reference is deemed reasonable in light of the historic traditions of sectoral classification, as well as the current classifications being used by the US Census Bureau in reports on innovation activity (NSF/Business R&D and Innovation Survey, 2008). As is seen in the ensuing paragraphs, becomes relevant to the historic traditions as well as current NAICS tradition upon which the ICTS data used in the study is collected and reported.

Information and communication technology expenditure survey data was collected at the 2-digit industry level for the ten-year period, 2003 through 2013. Table 1 shows the twenty broad industries classifications according to the 2-digit North-American Industrial Classification System (NAICS, 2007) classification. Industry codes marked with an ("N") represent non-manufacturing not elsewhere classified sectors. Industry codes marked with an ("M") represent manufacturing sectors. Industry codes marked with an ("S") represent service industries; while those with ("TPS") represent service industries commonly identified with tourism and tourism-related sector firms referred to

as tourism production system sectors, following Roehl's (1998) represent industry categorization (i.e., 48-49: *Transportation and Warehousing*; 53: *Real estate and rental and leasing*; 56: *Administrative and support and waste management*; 71: *Arts, entertainment, and recreation*; and 72: *Accommodation and food services*).

Table 1: Industry Classification For ICTS Data at the 2-digit NAICS Level

INDUSTRY CODE	INDUSTRY NAME
113-115[N]	Forestry, fishing, and agricultural services
21 [N]	Mining
22 [N]	Utilities
23 [N]	Construction
31-33[M]	Manufacturing
42 [S]	Wholesale trade
44-45 [S]	Retail trade
48-49[TPS]	Transportation and warehousing
51 [S]	Information
52 [S]	Finance and insurance
53 [TPS]	Real estate and rental and leasing
54 [S]	Professional, scientific, and technical services
55 [S]	Management of companies and enterprises
56 [TPS]	Administrative and support and waste management
61 [S]	Educational services
62 [S]	Health care and social assistance
71 [TPS]	Arts, entertainment, and recreation
72 [TPS]	Accommodation and food services
81 [S]	Other services (except public administration)
00[N]	Multiple industries

To test the above research questions, information and communication technology expenditure data was collected for all (T=10) time periods across the (n=20) 2-digit industry groups listed in Table 1, with each group reporting (v=3) expenditure on i. computer and peripheral equipment expenditure, ii. Information and communication technology expenditure, and iii. Electro-medical and electro-therapeutic apparatus expenditure. The result was (nT=200) industry-level observations of the focal variable of interest, ICT Expenditure, or ICTEXP. ICT EXP data calculated as a ratio of total ICT (capitalized and non-capitalized) expenditure for an industry in a given year divided by total (capitalized and non-capitalized) expenditure for an industry in a given year. The effective focal variable derived for analysis is therefore referred to as ICT expenditure, or ICTEXP. Given the substantial support for ICT as enabler of innovation activity (Brynjolffson & Hitt 2000; Hipp & Grupp 2005; and Lucchetti & Sterlacchini, 2001), the proportion of ICT expenditure associated with a given sector might reasonably be taken as an indirect indicator of that sector's propensity to innovate by way of increased capacity for technological efficiencies, knowledge accessibility, and other sector advancements.

Results and Analyses

Data Screening and Preparation

To ensure that any change observed in the data over time might be correctly attributed to within-subjects variation, the (n=20) industry-level data was adjusted for inflation. Using historical consumer price index for all urban consumers (CPI-U) for US city averages by expenditure category and commodity and service group reports, all ICT expenditure was adjusted to 2009 dollars. ICT expenditure prior to 2009 (2003 to 2008)

was therefore adjusted for inflation, and post-2009 (2010 to 2013) was adjusted for deflation using the corresponding indices. The CPI-U index was deemed appropriate given that inflation or deflation affects all levels of spending in the US economy regardless of whether that spending was undertaken by consumers, government or businesses.

Analysis of 2-digit level ICT Expenditure Data

Longitudinal data analysis always starts with repeated-measures ANOVA to understand how much of the variation in the focal variable *Y*, comes from cross-sectional (between-subjects) or longitudinal (within-subjects) variation (Jackman 2009; Zheng, Pavlou & Gu 2014). In a repeated-measures ANOVA time is treated as a categorical variable and the results of the repeated-measures ANOVA tells whether time explains a significant portion of the variance in *Y*. It was therefore decided to conduct a repeated-measures ANOVA on the ten years of 2-digit data measuring ICT expenditure across US manufacturing, service, and non-manufacturing not elsewhere classified industries, spanning 2003 through 2013 (excluding 2012).

Results of Repeated Measures Split-plot ANOVA

A repeated measures split-plot ANOVA was used to test for within-subjects and between-subjects variation in ICT expenditure data from 2003 to 2013. Tables 2 and 3 provide descriptive statistics and sample correlations for the 2-digit industry-level ICT expenditure data for the ten year period, 2003 through 2013.

Table 2: Descriptive Statistics For Industry-Level ICT Expenditure

Measure of ICT Expenditure	Mean	Std. Deviation
ICTExp2003	.7361	.0946
ICTExp2004	.6986	.0925
ICTExp2005	.7131	.0954
ICTExp2006	.7089	.0956
ICTExp2007	.6788	.1052
ICTExp2008	.6729	.1074
ICTExp2009	.6160	.1391
ICTExp2010	.6264	.1290
ICTExp2011	.6145	.1271
ICTExp2013	.5484	.1428

Table 3: Sample Correlations For Industry-Level ICT Expenditure

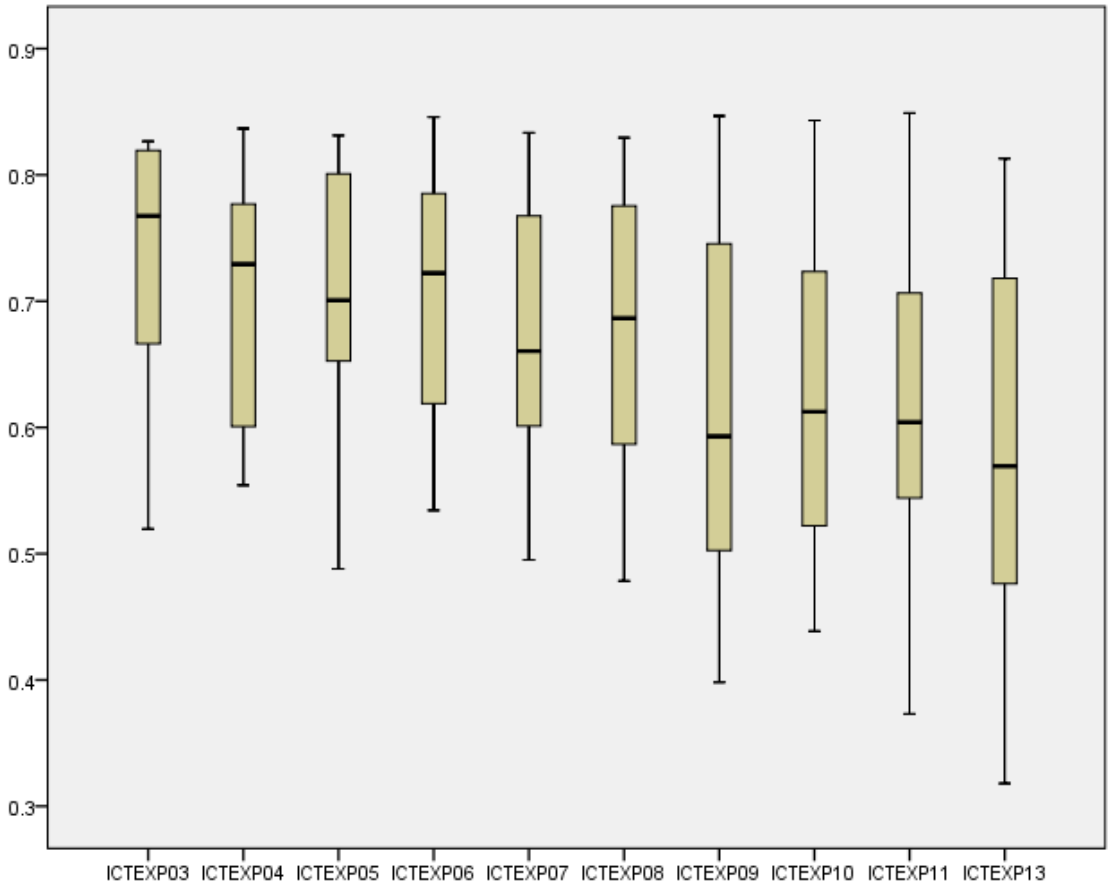
		ICTEXP03	ICTEXP04	ICTEXP05	ICTEXP06	ICTEXP07	ICTEXP08	ICTEXP09	ICTEXP10	ICTEXP11	ICTEXP13
ICTEXP03	Pearson Correlation	1	.615**	.755**	.701**	.522*	.607**	.607**	.542*	.525*	.421
	Sig. (2-tailed)		.004	.000	.001	.018	.005	.005	.014	.017	.064
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP04	Pearson Correlation	.615**	1	.864**	.912**	.657**	.740**	.765**	.740**	.811**	.644**
	Sig. (2-tailed)	.004		.000	.000	.002	.000	.000	.000	.000	.002
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP05	Pearson Correlation	.755**	.864**	1	.925**	.794**	.828**	.822**	.811**	.821**	.632**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.003
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP06	Pearson Correlation	.701**	.912**	.925**	1	.727**	.789**	.744**	.738**	.756**	.643**
	Sig. (2-tailed)	.001	.000	.000		.000	.000	.000	.000	.000	.002
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP07	Pearson Correlation	.522*	.657**	.794**	.727**	1	.887**	.905**	.928**	.829**	.677**
	Sig. (2-tailed)	.018	.002	.000	.000		.000	.000	.000	.000	.001
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP08	Pearson Correlation	.607**	.740**	.828**	.789**	.887**	1	.890**	.888**	.864**	.743**
	Sig. (2-tailed)	.005	.000	.000	.000	.000		.000	.000	.000	.000
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP09	Pearson Correlation	.607**	.765**	.822**	.744**	.905**	.890**	1	.940**	.916**	.788**
	Sig. (2-tailed)	.005	.000	.000	.000	.000	.000		.000	.000	.000
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP10	Pearson Correlation	.542*	.740**	.811**	.738**	.928**	.888**	.940**	1	.917**	.843**
	Sig. (2-tailed)	.014	.000	.000	.000	.000	.000	.000		.000	.000
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP11	Pearson Correlation	.525*	.811**	.821**	.756**	.829**	.864**	.916**	.917**	1	.774**
	Sig. (2-tailed)	.017	.000	.000	.000	.000	.000	.000	.000		.000
	N	20	20	20	20	20	20	20	20	20	20
ICTEXP13	Pearson Correlation	.421	.644**	.632**	.643**	.677**	.743**	.788**	.843**	.774**	1
	Sig. (2-tailed)	.064	.002	.003	.002	.001	.000	.000	.000	.000	
	N	20	20	20	20	20	20	20	20	20	20

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Mean industry-level ICT expenditure shown in Table 2 is between 54.84% and 71.31% across the data, all within one standard deviation. Mean ICT expenditure in earlier years (2003 - 2006) show a period of declining ICT expenditures; while from 2007 through 2013, the data shows a gradual decline in ICT expenditures. Standard deviation generally follows most longitudinal trajectories, showing a gradual increase from 0.0946 to 0.1428. Sample correlations in Table 3 show significant ($p < .01$) and strong positive correlations between ICT expenditure in 2003 and subsequent years (2004 through 2009), but that this significance generally decreases in years further away from 2003, as reflected in the box plot of the data shown in Figure 5 below.

Figure 5: Box Plot For Industry-Level ICT Expenditure

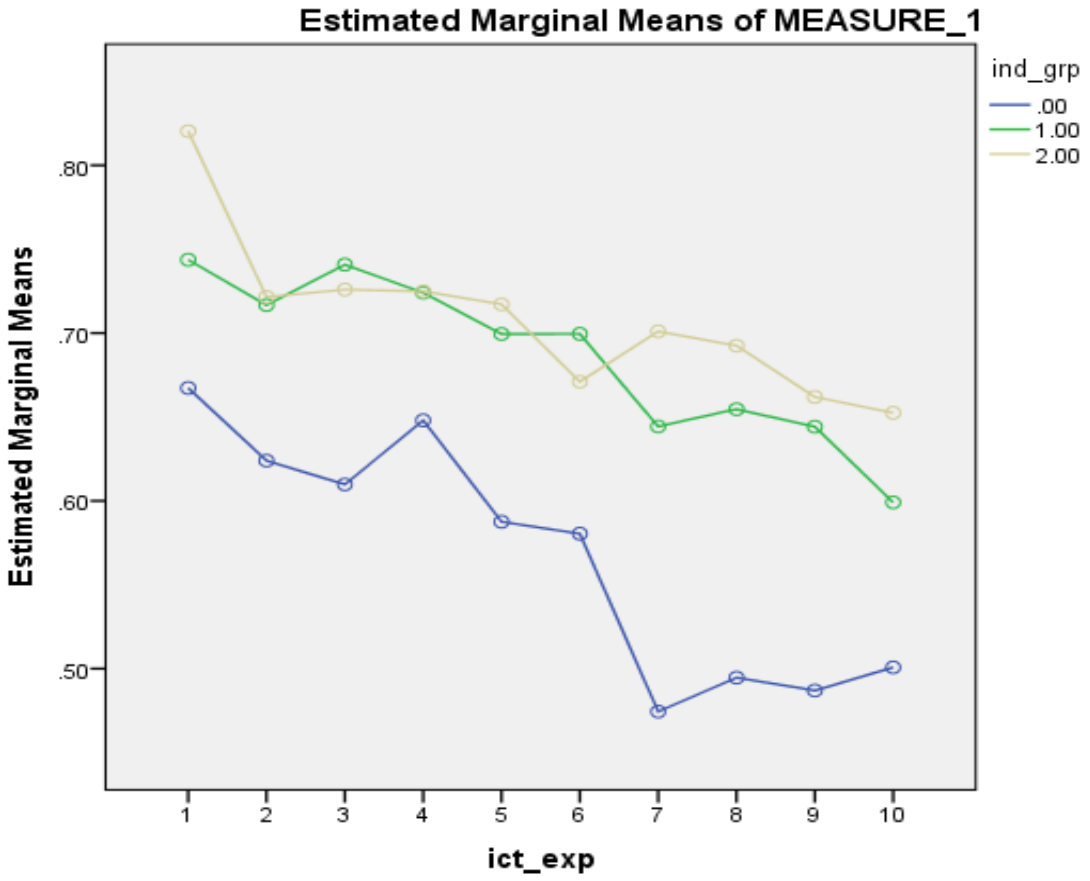


Multivariate tests of within-subjects effects results were used to ascertain if the magnitude of the main effect across the (n=20) industries was contingent upon the industry group that is, whether variation in ICT expenditure at the 2-digit industry-level was contingent upon whether the industry was manufacturing, services, or non-manufacturing not elsewhere classified. Results of these tests Wilk's Lambda were non-significant (F = 1.307, df=18, p = .288), with corresponding partial eta squared (η_p^2 =.567), suggesting that variation in ICT expenditure in the data set was not due to industry grouping. On the other hand, a test of homogeneity of variance using Mauchly's Test of Sphericity (Approx. $\boldsymbol{\chi}^2$ = 91.663; df = 44) was statistically significant at the (p < .001) level. The Greenhouse-Geisser correction factor (F = .862, df = 6.938) for tests of within-subject effects was also non-significant at the (p = .541) level, and a corresponding partial eta squared (η_p^2 =.092), suggesting that time accounts for less than ten percent of the variance in ICT expenditure. These results suggests that within-subjects and between-subjects variation in the data set of ICT expenditure over the ten year period could not be explained by time nor industry. Post hoc tests were therefore conducted across the three industry groups (manufacturing, services, and non-manufacturing not elsewhere classified). Using the least-significant-difference (LSD) tests, results showed significant mean differences between manufacturing and non-manufacturing not elsewhere classified (NEC) but not between manufacturing and services, or between services and non-manufacturing not elsewhere classified.

A few points should be made regarding the results of the repeated measures ANOVA. Gottfried, Marcoulides, Gottfried, and Oliver (2009) assert that repeated measures ANOVA is indifferent to time, and suggest that time serves only as a label to

indicate repeated measures, and that the same results would accrue if the researcher was to "reshuffle the order of the assessment occasions." By this, the authors suggest that the order of assessments in the above analysis (shown as a plotted line graph in Figure 6 below) were to be reversed, the statistical results would remain unchanged, thereby providing limited longitudinal insight into key aspects of the data such as accounting for time lags, duration, or rates of change in ICT expenditure over time.

Figure 6: Plot of Mean ICT Expenditure by (0=N, 1=M, S=2) Industry Group



More importantly, the focus of repeated measures ANOVA is on the aggregated level of time effects on same subjects, providing little insight into individual-level time effects which is of interest to the present study. Moreover, given that secondary data was employed in this study, it was near impossible for the researcher to be certain that the

assumption of same subjects had been satisfied. The use of 2-digit NAICS aggregates industries into unbalanced subsets of one single manufacturing and nineteen non-manufacturing (service) industries. At this higher level of aggregation, it was not feasible to conduct time-invariant analysis of categorical predictors for industry type (RQ1d and RQ1e) using repeated measures ANOVA. In order to satisfy testing of the above research questions, it was therefore decided to instead use ICTS data at the 3- and 4-digit level, as this would provide comparatively more disaggregated industry-level data better suited for latent growth modeling (LGM) techniques.

LGM Analysis of 3-and 4-digit ICT Expenditure Data using

The US Census Bureau did not begin reporting expanded, 3- and 4-digit ICT expenditure industry lines until 2009, which resulted in the removal of six years of data, 2003 through 2008, from the data set. In addition, it was determined to remove industries considered peripheral or potentially problematic to the study. For example, NAICS 81: *'Other Services'* included *non-commercial* civic, religious, grant-making, laundry and death-care categories which were not considered germane to the context of service, and more specifically, tourism services. Also, NAICS 00: *'Multiple Industries'* which could either be placed in the manufacturing or nonmanufacturing industry categories were removed. Coding of the 3- and 4-digit ICT expenditure industries followed the approach used at the 2-digit level. For example, NAICS 7120: *Museums, historical sites, and similar institutions* was coded as "TPS" for tourism production system, based on the coding used for NAICS 71: *Arts, entertainment and recreation.* The final result was (n=103) industries comprising 37 manufacturing and 66 non-manufacturing (service)

sectors for the remaining (T=4) year period 2009 through 2013 (excluding 2012). The final sample size of (nT=412) industry-level observations satisfied sample size requirements for LGMs (Hamilton et al., 2003; Muthén & Muthén, 2002) used to test the eight research questions. ICTEXP calculation remained as the proportion of total ICT expenditure to total expenditure. TYPE and TPS time-invariant predictor variables were dummy coded (1=Services; 0=Manufacturing) and (1=TPS; 0=Non-TPS) respectively. ANNPAY and NUMEST were modeled as continuous latent variables, and calculated as the natural log of ICT expenditure to annual pay and number of establishments respectively.

Results of LGM Analysis

Latent growth curve analysis (LGCA) was used to model the data to test the eight research questions. An exploratory LGCA approach was used given that, to the researcher's knowledge, this study represents the first attempt to understand ICT expenditure trajectories among manufacturing and services contexts using industry-level, ICTS data. Serva et al. (2011) suggest that regardless of whether an exploratory or confirmatory approach is used, once a repeated measures observation has been collected, data plots should be used to identify (or confirm) the functional form of the focal variable. A preliminary analysis of the raw data means plots, observed, and individual (Appendix Ci-Ciii) suggests only partial support for the first research question. The estimated and sample means plots (App. C-i) for T1-ICTEXP through T4-ICTEXP show a near-perfect flat trajectory for the estimated means and a very slight increase at T2-ICTEXP for the sample means. A similar trajectory follows for the estimated individual values (App. C-ii). On the other hand, the observed individual values (C-iii) show that

some industries decline linearly, while others increase linearly. All three plots show generally similar start and end points in ICTEXP across industries for the period 2009-2013.

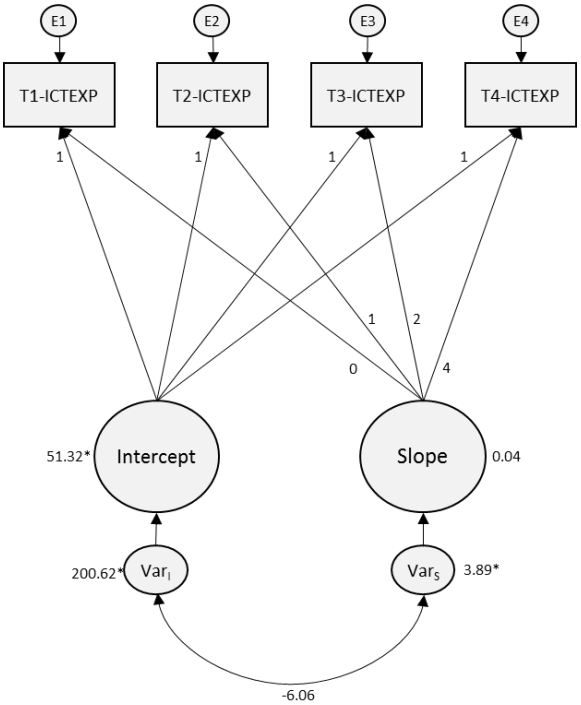
To address the first set of research questions an unconditional linear growth model for change in ICTEXP was specified. The linear growth model was selected, based on anecdotal and other inferences made from recent BRDIS papers (e.g., Gault, 2013; Sanchez, 2014), the guiding research questions, and the test of within-subjects contrasts in the above repeated measures ANOVA. Given the exploratory nature of the study however, other unconditional growth models (e.g., free form, no growth) were also tried. These models either failed to converge and/or produced comparatively poorer measures of model fit. The metrics used to assess goodness of model fit follow previous SEM research (e.g., Gefen et al., 2000; Serva et al., 2011) and use Chi-square, CFI, RMSEA, and SRMR.

The unconditional model for linear change in ICTEXP showed moderate to good fit (χ^2 (df = 5) = 7.565, p = 0.1819; CFI = 0.992; RMSEA = 0.071; SRMR = 0.094). Based on the output for the unconditional linear model, the intercept is 51.32[2] and the z-score significant (z = 34.566; $p < 0.001$), indicating that on average, initial levels of ICT expenditure of manufacturing and service industries is greater than zero. The slope value of 0.042 is however not significant (z = 0.157; $p > 0.5$). Taken together, these results suggest the presence of significant inter-industry differences in starting points for manufacturing and services, but non-significant inter-industry slope for changes in

[2] For interpretability, ICTEXP was indexed to a multiplier of 100. The intercept estimate of 51.32 may therefore be interpreted as 0.5132.

ICTEXP over time. However, the output indicates that the variances for the intercept (200.621) and slope (3.891) are significant (z = 6.022; $p < 0.001$) and (z = 2.312; $p < 0.05$) respectively. Research questions 1 to 3 are therefore supported. The presence of a significant variance for the intercept and slope latent constructs suggest that the global mean of the sample does not reflect the sample as a whole. This suggests that all industries do not follow the same trajectory with respect to ICTEXP. Instead, manufacturing and service industries' growth trajectories exhibit significant individual differences across the sample, differing in mean initial levels of ICTEXP and mean increasing rate. Research questions 4 and 5 are therefore supported. Though not hypothesized, the covariance between the intercept and the slope (-6.06) is not significant. Figure 7 provides a representation of the results of the unconditional linear growth model of change in ICTEXP.

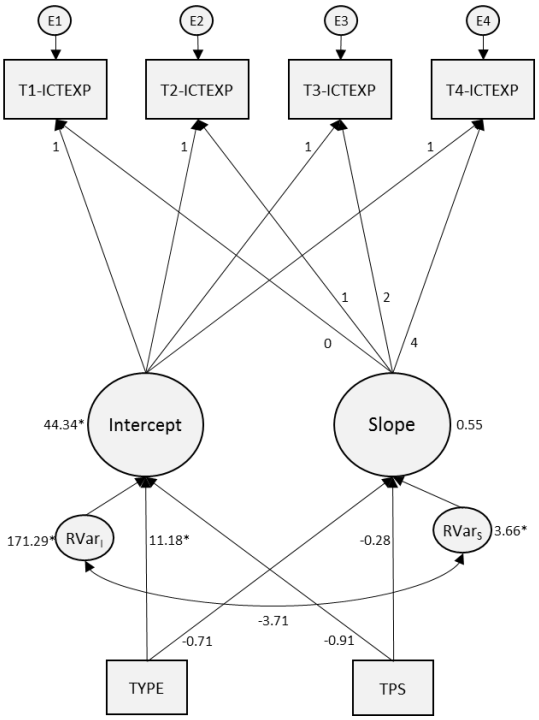
Figure 7: Results for Unconditional LGM for Change in ICT Expenditure



To address the second set of research questions a conditional linear growth model for change in ICTEXP was specified to include the two time invariant dummy predictors: TYPE (set to 1=Services; 0=Manufacturing) and TPS (set to 1=TPS; 0=Non-TPS). The conditional model for linear change in ICTEXP showed moderate to good fit (χ^2 (df = 9) = 17.359, p = 0.0434; CFI = 0.975; RMSEA = 0.095; SRMS = 0.071). Paths from TPS industry to the intercept and slope were not significant, indicating that ICTEXP initial levels (-0.909) and rate of change (-0.279) did not differ across tourism and non-tourism service industries. For industry TYPE however, the path to the intercept (11.185) of the growth model for ICTEXP was statistically significant (z = 3.592; $p < 0.001$), while the path to the slope was negative (-0.708) and non-significant (z = -1.189; $p > 0.05$). Given that industry TYPE was dummy coded 0 for manufacturing, the results indicate that manufacturing industries in 2009 started at higher levels of ICT expenditure than service industries[3], but that industry type does not influence the rate of increase in ICT expenditure (i.e., the slope, or rate of increase in ICTEXP is the same for both manufacturing and service industries). Though not hypothesized, the covariance between the intercept and the slope (-3.71) is not significant. These results therefore support research questions 6 and 7, but not research questions 8 and 9. Figure 8 shows the results of the conditional linear growth model for change in ICTEXP with industry TYPE and TPS as predictor variables.

[3] For interpretability, ICTEXP was indexed to a multiplier of 100. The intercept path estimate of 11.185 is therefore interpreted as 0.1185.

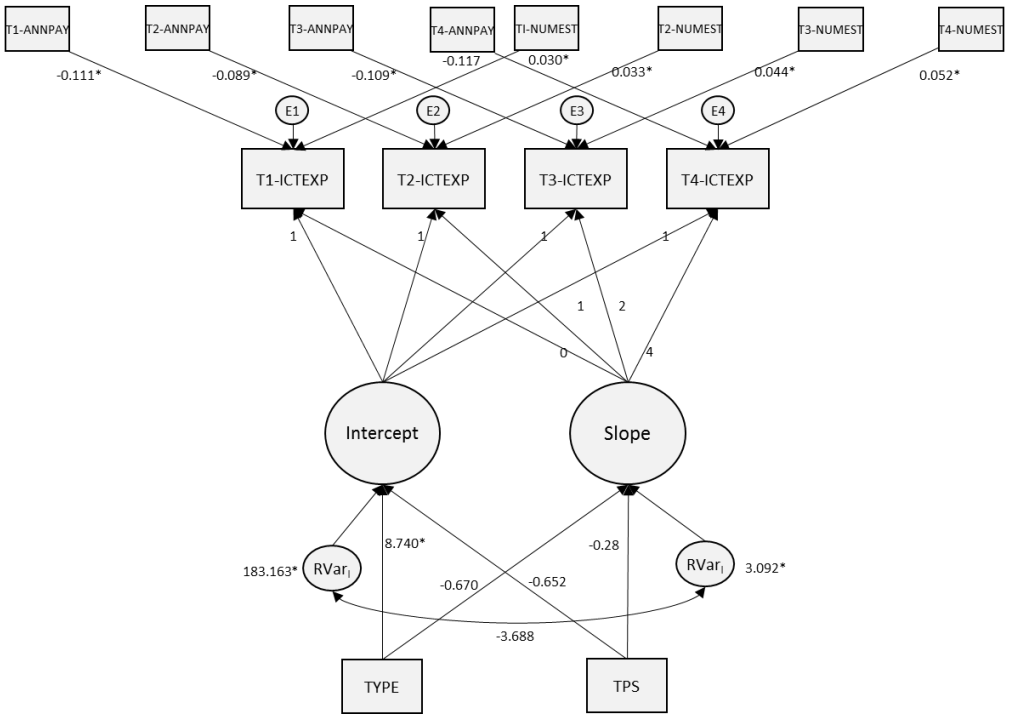
Figure 8: Results for Conditional (Type and TPS) LGM for Change in ICT Expenditure



To address the third set of research questions a conditional linear growth model for change in ICTEXP was specified to include the two time variant predictors measuring industry size: total annual payroll [ANNPAY] and total number of establishments [NUMEST]. The conditional model for linear change in ICTEXP showed poor fit (χ^2 (df = 33) = 132.735, $p < 0.001$; CFI = 0.771; RMSEA = 0.178; SRMS = 0.089). The four paths from T1-T4ANNPAY to T1-T4ICTEXP were all significant at the $p < 0.001$ level. Similarly, the four paths from T1-T4NUMEST to T1-T4ICTEXP were all statistically significant at the $p < 0.001$ or $p < 0.05$ levels. The results indicate that industry size, measured as total annual payroll and as total number of establishments is a significant predictor of change in ICT spending across manufacturing and service industries. Interestingly, total annual payroll is inversely associated with levels of ICT expenditure across all four time periods, while total number of establishments has a positive

association with levels of ICT expenditure across manufacturing and service industries in the sample. Though not hypothesized, the covariance between the intercept and the slope (-3.69) is not significant. Based on these results, research questions 8 and 9 are supported. Figure 9 shows the results of the conditional linear growth model for change in ICTEXP the size variables ANNPAY and NUMEST as predictor variables.

Figure 9: Results for Conditional (Size) LGM for Change in ICT Expenditure



Discussion and Conclusions

This essay set out to understand patterns of innovative activities in manufacturing and nonmanufacturing (service) industries. Relying on secondary data from the U.S. Census Bureau's Annual Information and Communication Technology Survey (ICTS) of American businesses, the study employed a ratio variable of ICT purchases to total expenditures in pursuit of three guiding research questions: i. how does ICT investment expenditure of all manufacturing and service industries change over time?, ii. are there statistically significant inter-industry differences with respect to the change parameters of ICT investment expenditure over time? and iii. if inter-industry differences do exist, what factors might be used to predict these initial levels and rates of change in ICT investment expenditure in manufacturing and service industries over time?

Findings generally support differences in initial levels of investment in ICT among manufacturing and non-manufacturing industries. These differing levels of initial ICT expenditure support previous findings that US innovative activity varies substantially by industry, and suggest that the extent of innovation output and research & development (R&D) may vary according to levels of corresponding technology investments by industry. That is, differences in initial start points of investment in ICT may be linked to differences in innovation activities and resultant productivity and growth.

Support was also found for generally higher levels of initial ICT investment points among manufacturing industries when compared to services industries for the period. This is an important consideration given that within the context of the present study, manufacturing had almost half (n=37) the number of representative industries when compared with (n=66) the number of service industries. These higher initial levels

of ICT investment among manufacturing industries are likely reflective of the traditional manufacturing output of innovation and R&D activities, but must also be considered against the broad shift away from manufacturing and towards services within the U.S. economy. More importantly, higher levels of initial ICT investment could be a corollary of the structural change within manufacturing towards investment in technological capabilities which support services outputs rather than traditional goods-dominated outputs.

Further, findings show that ICT expenditure increases linearly among manufacturing and service industries over time, and that the rate of change differs in manufacturing and services. These linear increases and differing rates of change suggest that manufacturing and service sector may not necessarily engage in innovative activities at the same pace, though both manufacturing and service industries exhibit an increasing tendency to investment in ICT. This signals a tendency for both manufacturing and services industries to engage in innovative activities and R&D expenditure in terms of increasingly investing in technological capabilities. This type of investment is related to productivity and growth within manufacturing and service industries and is important, given that investments in technological capabilities signal an ability to continually improve knowledge-investment capabilities. Taken together, these findings suggest that the type of industry, whether manufacturing or services, can indeed help to explain differences in ICT investment spending across time periods.

It should be noted however, that not all industries experience linear increases in rates of change over the time period. The means plots suggest that in fact, some industries experience increasing and decreasing rates of change in ICT investment spending over

the time period. A possible explanation for this is the fact that new or significantly improved ICT capabilities require corresponding learning 'curves'. These curves represent assimilation periods in which new and existing technologies are integrated into a single, seamless system within an entity. These periods involve both 'technology on technology' resource integration as well as 'technology on human' integration, and might involve training and development, pilot testing and other integrationist resource development activities. These periods may therefore be characterized by lower periods of investment in ICT capabilities.

Within the services industry, disaggregating the data to indicate membership in TPS sectors, did not explain differences in initial starting levels of investment in ICT, when compared with non-TPS industries. Neither did the classification of TPS vs. non-TPS industry-type explain variation in rates of change in ICT investment expenditure within service industries over the time period under study. This suggests that within the services industry, there is little obvious distinction in the way in which the service industries engage in innovative activities such as investment in ICT capabilities. This departs from prior research which suggests that among service sector firms, there is a difference in patterns of innovative activities. A possible explanation for this is ICT investment activity, as a single indicator of innovative activity may be insufficient to explain patterns of variation in innovative activities within services, and requires additional indicators of innovative activities such as R&D expenditure.

Findings suggest that industry size, as measured by the number of establishments within the sector and total annual payroll for the sector, is a significant predictor of ICT expenditure in all manufacturing and service sectors analysed in the period of the study.

This suggests that that industries with a larger number of establishments may invest in more ICT, and has important implications for the North-American Industry Classification System (NAICS) taxonomy, especially in light of the shift away from traditional manufacturing classifications towards services. If establishments which participate in and thereby contribute to industry-level reporting on ICT spending increasingly classify themselves as services oriented, there may be a need for the revision of classifications which placed certain types of organizations in manufacturing. This may result in the need for a broader system of classification of establishments under services.

Collectively, this research has important implications for understanding innovative activities of U.S. manufacturing and service activities over time. Investment in information and communication technology, used as an indirect measure of innovative activity changes over time, and this change varies across industry. There is no evidence that subsets of services industry, such as TPS compared with non-TPS classified service industries, can explain variation in initial levels and rates of change in ICT expenditure over time. However, there is evidence that type and size categories can explain variation in initial levels and rates of change in ICT expenditure over time.

Limitations and Further Research

A few limitations exist within this study, some of which present inherent opportunities for further research.

On its own, investment in ICT at the U.S. industry-level provides only a partial indicator of innovative activity among manufacturing and service economies. Additional measures of business activities such as R&D spending, design, are needed to better understand patterns of innovative activities over time. These measures should also be comparable with other measures of innovation-related activities which likely involve the collection of microdata from the establishments reporting on innovative activity. Research and development and innovation data at the more granular level, would enhance the ability of research to understand the dynamics and trajectories of innovative activities at the industry level. Steps have been taken in this direction through the Census Bureau's Longitudinal Business Database (LBD). Firm-level data from the Survey of Industrial Research and Development (SIRD) was merged with Business Research and Development Survey (BRDIS) data, and linked with establishment microdata in the LBD and NAICS system.

A second inherent limitations lies in reliance on secondary industry-level data for longitudinal studies, as measures are not necessarily collected in a uniform and consistent manner. For example, total sales by industry, a key measure of size, is only collected by the U.S. Census Bureau every five years. This size measure was therefore excluded from the analysis given that it was not compatibility with the ICTS data which is collected annually. Conversely, future research might seek to conduct analyses in five-year increments. This was not possible for the current period of study, given that the Bureau

commenced collection and reporting of ICTS data at the 2-digit level just over a decade ago in 2003, and expanded 3- and 4-digit level six years ago in 2009.

Contribution to the field

This study makes a number of contributions to both theory, methods and industry and practice, some of which are discussed below.

First, the value of using longitudinal data to identify patterns of variation is becoming increasingly important to testing and replicating studies in pursuit of sound theory. This study employed latent growth modeling (LGM) techniques to distinguish patterns of variation in an indirect measure of innovative activity, information and communication technologies (ICTs), over time. Compared with repeated measures ANOVA, the LGM approach is freed from the assumption of homogeneity of variance across levels of between-subject variables. Repeated measures ANOVA also assumes that the same subject is measured repeatedly over time, knowledge of which the researcher relying on secondary data may not always be able to substantiate. Relatedly, LGM is able to account for time lags in the data, such as employed in the period in which no data was available. This study therefore answered calls for use of LGM as a relatively improved technique in conducting longitudinal analyses.

Second, this essay represents a contribution to help stem the theoretical divide concerning assumptions about manufacturing and service contexts, and innovative activities within each of these contexts. In particular, the use of time series data is crucial to scientists' understanding of the dynamics of innovation and R&D, and the role played

by information and communication technologies (ICTs) in contemporary research. The findings may be taken in conjunction with the broader shift away from manufacturing and towards services. Such a shift has direct implications for the three broad approaches to measuring innovation in services namely, subordinate (assimilation) approaches, autonomous (demarcation) approaches, and integrative (syntheses) approaches. The use of technology-manufacturing-based, objective measures of ICT investment spending supports two competing perspectives. On the one hand, manufacturing acts as a continuing *enabler* for service industries, thereby facilitating the development of new or significantly improved products, process, organizational and marketing methods. To appropriately measure these innovative activities in services requires a synthesis approach whereby technology-manufacturing 'inputs' are recognized alongside service 'outputs'. On the other hand, an assimilation view may be adopted by scientists who regard the use of technology-manufacturing inputs as superior, a corollary of which would require privileging the inputs over the outputs. The third perspective of demarcation is not generally supported by this study, given the close alignment of patterns between manufacturing and services. This study therefore contributes to the ongoing dialogue on whether the assimilation or synthesis approach may be appropriate to measure innovation in services, while almost certainly ruling out the demarcation approach to measuring innovative activities in services.

A third contribution of this study is to industry and practice. More specifically, knowledge of how industries behave, and the dynamics associated with innovative activity over time between these industries. Given the increasing proportion of firms which are identifying as service-sector, it is important to understand how ICT and related

innovative activities are being accounted for, and the extent to which latent cross-industry relationships are accounting for increased innovative activities in industry.

ESSAY 2

INNOVATION AND THE DESTINATION MANAGEMENT ORGANIZATION: A TEST OF THE NETWORK ORCHESTRATION CONSTRUCT

Abstract

This essay employs mediation analysis to test the ability of network orchestration to account for innovation processes in the services context. Using data from destination management organizations (DMOs) located in the US, the study finds moderate support for the mediating role of network orchestration and its three subcomponent processes (knowledge mobility, innovation appropriability, and network stability) in explaining how the presence of an openness and capacity for innovative activities shares causal relationships to the creation, development, and implementation of new innovation outcomes at the organization and destination levels.

Keywords: *destination management organization (DMO); mediation analysis; network orchestration;*

Introduction

This study is motivated by the need to empirically test the network orchestration construct, and wider aspects of the construct's nomological network in the business and management literatures and specifically, within service sector contexts. The orchestration of innovation networks generally refers to a set of management processes among actors (individuals or organizations), or a group of actors, engaged in innovative activities. These management processes include the facilitation of knowledge sharing; the fostering of a sense of trust and fairness; and the promotion of active membership and participation in innovative activities by and among network actors.

The study is important for four reasons. First, against the backdrop of decades of research on knowledge, innovation, and networks, there is a dearth of empirical work which tests the network orchestration construct within the business and management fields. The study, to the author's knowledge, is among the first to address this present condition. Second, against the overarching dissertation study, and in response to the call that industry-level data on innovation activities be accompanied by data on "core characteristics and activities of the same businesses" (Atrostic 2008, p. 154) to improve knowledge on non-manufacturing (service) sector firms. Third, the study contributes to the body of knowledge on innovative activities in tourism by empirically testing the network orchestration construct in the context of the tourism destination. Finally, by employing a *synthesis* approach to measuring innovation activities, the study contributes to further blurring the lines of measurement of innovative activities between manufacturing and non-manufacturing service sector firms. The study uses organizational-level, survey data of destination management organizations (DMOs).

Theoretical Overview

Network Orchestration

Research defines network orchestration, or the orchestration of innovation networks, as a set of deliberate, purposeful actions undertaken to extract value from a network, and suggests that network orchestration involves a number of network management processes carried out by a central ("hub") actor. A 'hub' entity represents the presence of a central or lead organizer, network administrator, or champion in the network. Importantly, the emergence of a firm (or organization) as a hub entity is not necessarily based on hierarchical authority or position. Instead, centrality is based on the hub's reputation or other socio-cultural characteristic which allows the hub (to have) influence over other network members. The ability of the hub to orchestrate innovation networks is based on their relative position and reach in the network; their ability to facilitate the creation and extraction of value from the networks; and is a function of their reputation and prominence in the network. According to Dhanaraj and Parkhe (2006), network design factors such as the size and diversity of members, structural density, centrality and status collectively influence the orchestrating roles of the hub firm in managing innovation network processes.

The network orchestration processes mentioned above include managing *knowledge mobility*; managing *innovation appropriability*; managing *network stability;* managing *innovation leverage*; managing *innovation coherence*; and managing *network membership* (Dhanaraj & Parkhe, 2006; Nambisan & Sawhney, 2011). Innovation leverage refers to the ease with which actors are able to redeploy innovative assets (e.g., technologies, processes) for their own innovation output. Innovation coherence refers to

the ease with which network goals (e.g., destination brand, image) are aligned among actors involved in the innovation output. Knowledge mobility refers to the ease with which innovation-related knowledge is shared among network members. Innovation appropriability refers to the extent to which the hub firm is able to secure fair and proportionate distribution of innovation rents among network members, thereby minimizing free-riding behaviors; and the degree to which actors choose to retain membership and actively participate in the network is related to network membership and stability.

Table 4 provides a summary of selected works on network orchestration. The earliest Dhanaraj and Parkhe (2006) is a conceptual formulation of network orchestration. Ritala et al. (2009), Nambisan and Sawhney (2011) and Gardet and Fraiha (2012) used qualitative approaches to understand determinants and factors associated with the construct. Hurmelina et al. (2012) used survey data to test the construct of network orchestration.

Table 4: Summary of Select Studies on Network Orchestration

STUDY	STUDY OBJECTIVE (METHOD)	KEY FINDINGS
Gardet & Fraiha (2012)	Coordination modes of SME hub firm used in an innovation network for the development of a new innovation, MultiTweez disposable tweezers. (Longitudinal Case Study)	Five tools used by SME hub firm for coordinating interactions with innovation network members: *trust, communication, division of benefits, guarantees, conflict resolution.*
Hurmelinna-Laukken, Olander, Blomqvist (2012)	Effect of network orchestration on firm- and network-level innovation performance in Finnish R&D network. (Survey Study)	*Absorptive capacity* important at firm- and network-levels; *Innovation appropriability* important at firm- but not at network-level; *Network stability* important at network- but not at firm level.
Nambisan & Sawhney (2011)	Role of network design factors on network orchestration processes. (Field Study: Descriptive)	Network design factors (*innovation leverage, innovation coherence, innovation appropriability*) are conceptually related to network orchestration processes in network-centric innovation.
Ritala, Armila, & Blomqvist (2009)	Individual and organizational determinants of innovation network orchestration capability. (Expert Panel; Case Study)	*Individual* and *organizational* skills and capabilities are important determinants of orchestration capability
Dhanaraj & Parkhe (2006)	Orchestrating innovation networks (Conceptual Study: Descriptive)	Network orchestration (*knowledge mobility, innovation appropriability, and network stability*) drives innovation performance output.

Within the context of innovation in services, the extraction of value has been conceptualized to exist in the set of activities among actors who are collectively engaged in the production and delivery of new and or significantly improved products (e.g., goods or services), processes (e.g., distribution or delivery methods), or marketing methods (e.g., communication, market strategy). Though actors may refer to individuals, groups, or associations, in the context of the present study actors generally refer to organizational-level entities engaged in network processes aimed at innovative activities and outcomes within the tourism destination.

Network Orchestration and the Tourism Destination

How we conceptualize the tourism destination has important implications for the theoretical and methodological approach to the measurement and management of innovative activities among tourism production system (TPS) actors. This is especially important given inherent spatial, structural and other characteristics which define tourism destinations. One such characteristic is proximity. By proximity, this study borrows from the "downstream" and "upstream" concepts of business strategy (Adner & Kapoor, 2010) and refers to visitor proximity. Visitor proximity suggests that the extent to which TPS service suppliers in the course of normal, daily routines engage directly with visitors will influence the actors' innovative activities. For example, some service suppliers such as transport, hotels, dining and attractions often come in direct downstream contact with destination visitors. This increases the likelihood for visitor involvement in C2B knowledge-sharing processes which influence sources, channels, and patterns of innovation performance measures. On the other hand, tourism suppliers such as tourism boards, convention bureaus, hospitality institutions, state, and other local bodies often come in indirect upstream contact with destination visitors. This decreases the likelihood for visitor involvement in C2B knowledge-sharing processes which influence sources, channels, and patterns of innovation performance output.

Several prior studies have attempted to conceptualize the tourist destination system. Kotler, Bowen and Makens (2013) maintain that a tourism destination is a place with some form of actual or perceived boundary, such as the physical boundary of an island, political boundaries, or even market-created boundaries. Flagestad and Hope (2001) suggest the destination is a geographical, economic, and social unit consisting of

all those firms, organizations, activities, areas, and installations which are intended to serve the specific needs of tourists. Pike and Page (2014) assert that 'a destination represents an amalgam of a diverse and eclectic range of businesses and people, who might have a vested interest in the prosperity of their destination community,' (p. 203). Other recent studies have begun to focus increased attention on the conceptualization of the tourism destination as a complex, social and economic system (e.g., Aldebert, Dang & Longhi 2011; Baggio, Scott & Cooper 2010; Beritelli, Bieger & Laesser 2014). These theories of the 'community' destination system have become synonymous with attempts to reframe the TPS from that which is an inherently static system towards a more fluid and dynamic model of interchange between demand- and supply-side, human and non-human actors and resources.

Pearce (2014) provides an appropriate summation. He suggests that decades of research have conceptualized the destination along five major sets of models namely industrial districts, clusters, networks, systems, and social constructs. In addition to the abovementioned, examples of applications of these models to tourism are found across numerous studies (e.g., Baggio & Cooper 2010; Hjalager 2000; Prats, Guia & Molina 2008; Roehl 1998). From these, Pearce (2014) derives an integrative framework for the destination based on grouping the five concepts along three major dimensions: *geographic*, *mode of production*, and *dynamic*. The *geographic* dimension organizes the tourism destination based on space and place characteristics (e.g., industrial districts, clusters). The *mode of production* dimension conceptualizes the tourism destination based on structural, behavioral and actor-specific considerations (e.g., networks and

systems); while the *dynamic* dimension considers structural and driving factors (e.g., social construction) upon which the tourism destination is modeled.

Roehl's (1998) economic geography approach to the discussion of the TPS provides an appropriate starting point for the concept of the TPS in the present study. Subsequently, the investigation of knowledge-based approaches for innovation measurement and management builds up on the economic geography approach for two reasons. First, Pearce (2014) accounts for Roehl (1998) by acknowledging geographic and mode of production dimensions. Roehl refers to the tourism production system (TPS) as "the mix of businesses and other organizations that provide tourism services" (1988: p. 54) *within* a specific geographic context. By invoking the inter-sectoral organizing framework provided by the North-American Industry Classification System (NAICS), Roehl uses the principal activity of business firms to classify establishments along sector and industry lines *across* flexible geographic contexts. Using this framework, Roehl subsequently establishes a representation of the tourism production system (see Appendix A) which includes five 2-digit NAICS industries and their subsectors: 48-49: *Transportation and warehousing*; 53: *Real estate and rental and leasing;* 56: *Administrative and support, waste management and remediation services;* 71: *Arts, entertainment and recreation*; and 72: *Accommodation and food services.* Second, Roehl complements other accounts of the TPS and in particular, Malerba's (2002) notion of sectoral systems of innovation and production (SSIP) as a set of products and the agents executing their provision, engaged in market and non-market interactions across fixed knowledge bases, technologies, inputs and demand. Collectively, these approaches appropriately identify connecting relationships and levels of engagement among TPS

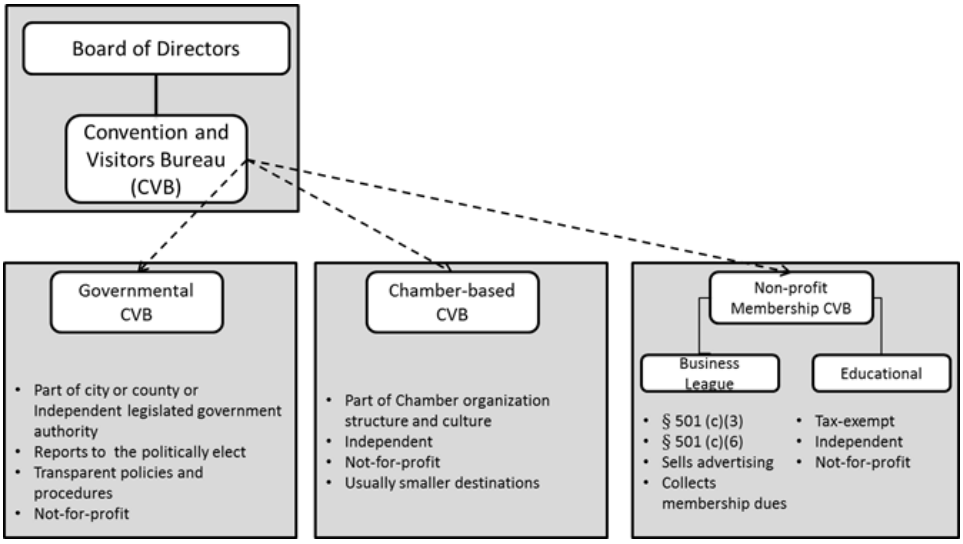
actors and make appropriate the use of network theory and methods. The orchestrated network assumes that a hub possesses the ability to orchestrate innovation outcomes by virtue of their ability to influence knowledge-based network behaviors. In the context of the tourism TPS, examples of hub actors include large, privately-held corporations; local or state governance bodies; and convention and visitors' bureaus, more broadly referred to as destination management organizations (DMOs).

The Destination Management Organization (DMO)

There is both anecdotal and empirical evidence which suggests that DMOs occupy very influential positions within a destination (Pike & Page 2014; Wang & Krakover 2007). This is due to both reputation and member relations (Beritelli & Laesser 2011). The DMO is mandated (usually by state/provincial or local government) to act as a catalyst for destination development, ensuring transparency in investment reporting to state and funding agencies as well as boosting patron support for its constituents. A critical part of their responsibility is working in conjunction with other private and public sector organizations within the destination. As a third-sector (not-for-profit, quasi-government, or member-based) organization, the DMO is tasked with creating and communicating destination value. Knowledge transfer and use is critical to this undertaking. Most importantly, the DMO's task in boosting destination demand involves facilitation and support for the design of destination experiences in the form of new idea, product, process, service innovations by means of mobilizing tourism knowledge among destination partners. The general legal classification of the DMO in the United States is a 501(c) (3) which carries tax-exempt status. The DMO is funded by membership dues or

state, city council of provincial funds. Figure 10 provides a representation of the governance structure of the United States DMO based on Ford and Peeper's (2008) overview of DMOs in the United States.

Figure 10: Governance Structure of a United States CVB



Prior studies (e.g., Morgan 2012; Davis, Schoorman & Donaldson, 1997) suggest that the role of convention and visitors bureaus/destination management organizations (CVBs/DMOs) is one of 'steward' or caretaker, of the destination's resources. As stewards, the attitudes and behaviors of the DMOs are collective; motivated by the attainment of destination performance objectives aligned to the interests of civil society, government and businesses within the destination. DMOs are entrusted with resources and act on behalf of stakeholders with whom there may be no direct contractual relationship (Law & Yuen, 2013). In this paradigm, the role of the DMO as steward is motivated by an alignment of motives with the objectives of the global destination brand. Within this paradigm however, the DMOs' role of building the destination brand

becomes one of relational involvement, wherein the DMO is forced to compete in a globalized and increasingly less intermediated destination. This reality lends implications for knowledge exchange relationships between the DMO and related destination stakeholders. As it relates to inter-organization and inter-sectoral relationships, DMOs are expected to engage tourism actors by building relationships through trust and communication. Earning the trust of tourism actors requires leadership on the part of DMOs, at times in the form of personal involvement. Moreover, as it relates to innovation output, DMOs which promote trust, commitment and reciprocity among members achieve higher levels of firm- and network-level innovation output across a select group of North-American tourism destinations

Research on collaboration culture and absorptive capacity for innovation (Milwood & Zach 2012) found that American DMOs who identify and collaborate with influential partners for external knowledge are more innovative than those who do not. The ability of the DMO to influence innovations is therefore based not only on their relative position and reputation (Beritelli & Laesser 2011) among TPS actors, but also on their ability to access and exploit specific knowledge-innovation resources needed among members of the network. This is supported by Milwood and Zhang (2013) who found that DMOs who engage key destination partners for knowledge which is not resident within the DMO are associated with more successful innovation outcomes.

Research on stakeholder and network perspectives (Milwood & Roehl 2014) found that in the case of a single, North-American DMO pursuing a marketing innovation, the ability to maintain a strategic relationship with external partners in which 'control' is balanced with 'collaboration' was key to successful innovation outcomes.

This means that DMOs who engage stakeholders through involvement *and* support strategies and simultaneously monitoring *and* control strategies, are associated with more successful innovation outcomes.

Antecedents and Consequences of Network Orchestration

According to Cronbach and Meehl, "to make clear what something is means to set forth the laws in which it occurs. We shall refer to the interlocking system of laws which constitute theory as a *nomological network"* (1955, p. 290). By this, Cronbach and Meehl and other researchers (e.g., MacKenzie, Podsakoff & Podsakoff, 2011) advocate that to better understand a concept involves testing the concept's validity within the context of antecedent, consequences and other theoretical 'spaces' within which the concept is hypothesized to exist. These tests may involve a combination of abstract factors which singly, and in combination, lend validity to the network of claims which support the existence of a concept in more concrete terms. In addition, and indeed, prior to establishing the nomological network within a construct exists, it is important to evaluate the construct by way of other validation tests. These include content, convergent, and discriminant tests of validity (Bagozzi, Yi & Phillips, 1991; Cronbach & Meehl, 1955) which shape the construct's existence in keeping with the conceptual dimensions it is said to represent, and in difference to the conceptual dimensions it is not said to represent. Such tests are of primary importance for constructs such as network orchestration which remain in its nascent stages of development, validation, and testing.

The value of the network orchestration construct is found not only in the construct's theoretical existence. Rather, the driving value of network orchestration

concerns lies in the ability of its component processes, (i.e., knowledge mobility, innovation appropriability, and network stability) to relates to antecedent and consequent outcomes. It is by way of testing the construct, and its component parts, its face and content validities, but also to test its nomological validity alongside antecedents and consequences established in the innovation literature. More specifically, to explore the validity of the network orchestration construct, and its component sub-processes, a moderated mediation model was chosen to test the mediating role of network orchestration on the relationship between innovation orientation and innovation performance.

Innovation Orientation

Innovation orientation broadly refers to the 'openness to innovate' (Zaltman, Duncan, and Holbek 1973) and the 'capacity to innovate' (Burns & Stalker 1977) associated with an organization. The concept has been employed in various theoretical and empirical contexts spanning the business, marketing, and management domains. Hurley and Hult (1998) for example related the capacity to innovate to "innovativeness", associating the latter concept with the organization cultural characteristics for support and collaboration, participative decision-making, learning and development. Following Hurley and Hult, other researchers (e.g., Oke 2007; Zhou, Gao, Yang & Zhou 2005) conceptualized the innovation orientation concept as part of the organization's 'strategic orientation' wherein an organization displays "openness to new ideas and propensity to change through adopting new technologies, resources, skills, and administrative systems" (2005, p. 1050). Against this background, Siguaw, Simpson and Enz (2006) provide a

conceptual framework for the integration of innovation research and a consequent definition of innovation orientation which is used in the context of the present study:

> A multidimensional knowledge structure composed of a learning philosophy, strategic direction, and transfunctional beliefs that, in turn, guide and direct all organizational strategies and actions, including those embedded in the formal and informal systems, behaviors, competencies, and processes of the firm to promote innovative thinking and facilitate successful development, evolution, and execution of innovations. (Siguaw, Simpson & Enz, 2006, p. 560).

The definition provided by Siguaw et al. (2006) is embraced in this dissertation study for two important reasons. First, Siguaw at al delineate innovation orientation as a *multidimensional knowledge structure* which defines and directs organizational strategies and actions toward specific innovation-enabling competencies and processes, and do so by invoking knowledge-based theory (King & Zeithaml 2003) and resource-based theory (Barney 1991) as part of the development of innovation orientation. They conceive innovation orientation as a systemic, organizational knowledge structure. This organizational-knowledge structure, according to Siguaw et al. (2006) offers innovation orientation as an explanation for how an organization reinforces and transforms its knowledge to build innovation. Additionally, innovation orientation permits the recognition of the value of external knowledge dynamism and then provides a 'knowledge template' (p558) to develop the required processes (e.g., network orchestration), thereby building the organization's capacity to introduce, develop, and successfully implement innovative outcomes. Second and relatedly, the definition explicitly embraces *learning philosophy* as a fundamental underpinning of the innovation orientation knowledge structure. Learning, and in particular organizational learning, shares umbilical ties to the knowledge-based approach advocated throughout this

dissertation, nd is considered a fundamental dimension of measuring innovation, and related innovative activities, such as the investment in, and access to external industry-relevant knowledge through such media as shared information and communication technology (ICT) platforms and databases.

Information and Communication Technology (ICT) Capability

Information and communication technology (ICT) capability represents tangible and intangible IT infrastructure and human IT resources. Drawing on the resource-based view of the firm, Bharadwaj (2000) defines IT capability as a firm's "ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities" (2000; p. 171). Brynjolfsson and Hitt (2000) argue that the value of information technology investment is found in its ability to be a direct enabler of complementary organizational capabilities. Moreover, ICT investment spending improves the capabilities for increasing output quality in the form of new product and process innovations in services (Leiponen, 2005). Further building on the resource-based perspective, Chen, Tsou and Huang (2009) propose a "hierarchy of composite operant resources (COR) that includes IT infrastructure, human IT resources, and IT-enabled intangibles (2009, p. 41). The authors further posit a positive relationship between ICT capability and innovation in services in keeping with a fundamental view of the present study: that the creation of innovation in services is implicitly tied to the creation of value within and across entities involved in the introduction, development, and implementation of new products, processes, and marketing methods.

The theoretical and empirical role of information and communication technology in contemporary innovation research has increased exponentially across the business and management fields. Taken together, the ability of an organization to exploit technological resources, owned or outsourced, is directly related to its informational capabilities for enhanced knowledge structures, external partner collaboration, and innovation performance.

Innovation Performance

A number of approaches have been used to conceptualize and measure innovation performance in organizations, each with varying inherent degrees of limitation. Some researchers have defined innovation performance in terms of the number of new and improved products (e.g., Carmen et al., 2006). Other research (e.g., Prajogo, 2006) have examined self-reported innovation outcomes (i.e., speed of innovation, level of innovativeness) alongside business financial performance indicators (i.e., sales growth, market share, profitability). Still, others have combined innovation performance metrics to include both novelty and newness (e.g., Oke, Prajago, & Jayaram 2013).

Similar to the advent of innovation in manufacturing technology contexts, is the advent of innovation performance in manufacturing technology domains. The issue then becomes one of ensuring that suitably devised metrics are employed in the measurement of innovation performance in the services contexts, whether it be at the organization- or destination-level. More importantly, and within the context of the present study, innovation performance is measured at the organizational- and destination- levels given the inherent multi-level assumptions (Hox 2010) of the tourism destination as a network.

Summary

The preceding paragraphs provide an overview of three main ideas linking this study together. First, the concept of network orchestration has been largely understudied, and is considered an important mechanism associated with process and outcome dimensions of innovative activities among heterogeneous service actors connected by a focal objective within a given system. Second, the value of the network orchestration construct rests with understanding its role in the context of innovation processes and outcomes. To this end, the nomological validity of network orchestration was discussed alongside antecedent and consequent variables. Third, the tourism destination and related destination management organization (DMO) provides a context within which to test and understand the network orchestration construct. In particular, the role played by the DMO is likened to a 'hub' or orchestrator entity who, in the absence of hierarchical power, is able to facilitate and maintain network orchestration processes related to the use and exchange of knowledge among tourism industry partners (knowledge mobility); the promotion of trust and fair play among industry partners (innovation appropriability); and the active presence and participation of industry partners (network stability) who are members of the tourism destination network.

Taken together, and within the context of the present study, the validity of the network orchestration construct, and its subcomponent process of knowledge mobility, innovation appropriability, and network stability within the context of the tourism destination is tested. More specifically, I employ a simple mediation approach to test the extent to which network orchestration accounts as a mediating mechanism between innovation orientation and innovation performance outcomes.

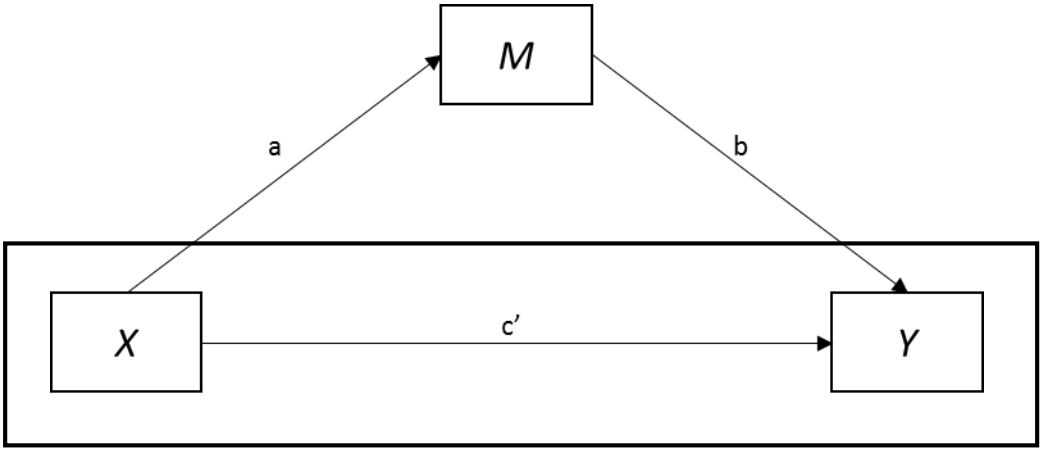
Model to be tested

In order to test the hypotheses associated with the network orchestration construct, a simple mediation model was used. Mediation analysis involves testing for a causal mechanism to explain the effect of one variable on the other variable. In the present study, the concern related to the above research question is the mechanism by which innovation orientation affects innovation performance. Is the network orchestration construct able to account for the effect of innovation orientation on innovation performance? Or, do one of the three subcomponent processes (i.e., knowledge mobility, innovation appropriability, network stability) play a comparatively more significant role in mediating the effect of innovation orientation on innovation performance? Further, how does the role of ICT capability moderate the relationship between innovation orientation and innovation performance? If there is a mediating-moderating role being played by these variables, is the mediating-moderating effect of one variable more significant than the other?

Figures 11-13 represent conceptual diagrams of the simple mediation model used to test the network orchestration construct. The model follows simple mediation analysis model in which an antecedent variable (X) is modeled as influencing consequent variable (Y) directly, as well as indirectly through one mediator (Hayes 2013).

In Figure 2b, X represents innovation orientation and is an antecedent variable with causal relationships to M and Y which represent network orchestration and innovation performance respectively. M is itself an antecedent variable, with causal path to Y. There are in total two consequent variables namely, M and Y in this conceptual model.

Figure 11: Conceptual Model of Simple Mediation:
Direct Effect of Innovation Orientation on Performance



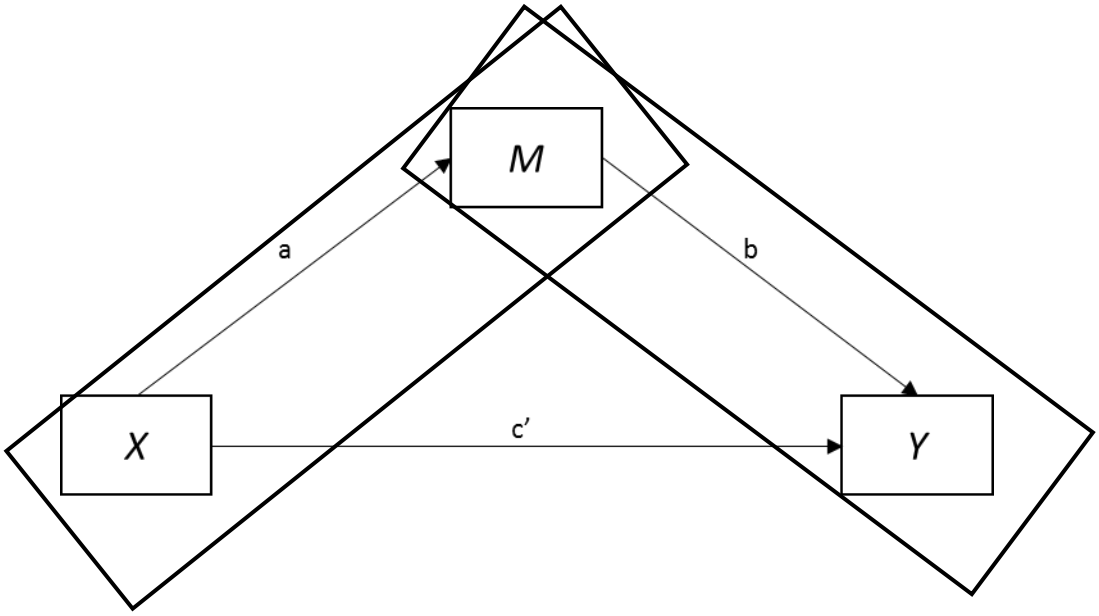
Based on Figure 11 above, and as highlighted by the rectangle, the path showing direct effect of innovation orientation (X) to innovation performance (Y) is represented by *c'*. A test for evidence of a direct effect of innovation orientation on innovation performance is therefore hypothesized as follows:

$$H_0: \quad c' = 0$$

$$H_A: \quad c' \neq 0$$

In Figure 12 below, and as highlighted by the rectangle, the paths from X to M and from M to Y show the indirect effect of innovation orientation (X) on innovation performance (Y) through network orchestration M. These paths are represented by (*a*) and (*b*) respectively.

Figure 12: Conceptual Model of Simple Mediation:
Indirect Effect of Network Orchestration



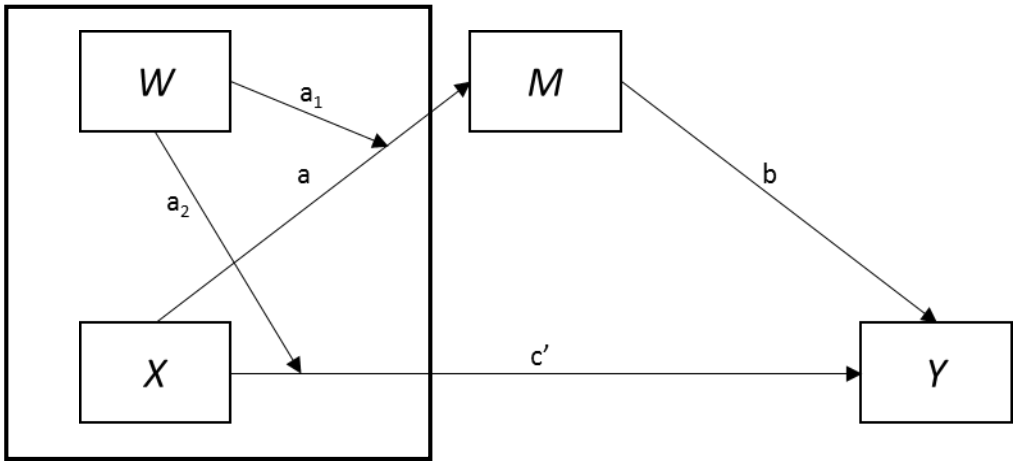
A test for evidence of an indirect effect of innovation orientation on innovation performance through the mediating effect of network orchestration is therefore hypothesized as follows:

$$H_0: \quad ab = 0$$

$$H_A: \quad ab \neq 0$$

In the conceptual model of moderated mediation shown in Figure 13 below, W represents ICT capabilities and as highlighted by the red box, is hypothesized to have a moderating role on paths a (X → M)and *c'* (X → Y). These paths are represented by a_1 and a_2 respectively.

Figure 13: Conceptual Model of Moderation-Mediation:
Moderating Effect of ICT Capability



A test for evidence of a moderating effect of ICT capability on path *a* is therefore hypothesized as follows:

H_0: $a_1 = 0$

H_A: $a_1 = 0$

A test for evidence of a moderating effect of ICT capability on path c' is therefore hypothesized as follows:

H_0: $a_2 = 0$

H_A: $a_2 \neq 0$

Research Design and Methodology

Research context

The tourism destination was chosen for the research context within which to test the models. The tourism destination provides a good research environment for the study, given the large number of heterogeneous members of a network organize for the focal objective of delivering a seamless tourism experience. Within this system, the destination marketing organization provides 'hub' functions aimed at facilitating the introduction, development and implementation of new or significantly improved products, services, and destination marketing strategies. These facilitating mechanisms are hypothesized to be represented by the sub-dimensions represented by the network orchestration namely, knowledge mobility, innovation appropriability, and network stability. The role of the DMO as orchestrator remains therefore a central assumption to testing the network orchestration construct within the context of the tourism system.

Measures

Measures were adapted primarily from prior theoretical and qualitative works. *Network orchestration* construct was measured with reliance on the limited empirical testing in the literature (cf. Table 4 above). Previous empirical testing of *network orchestration* used the three-dimensional scale of *knowledge mobility, innovation appropriability* and *network stability* (e.g., Dhanaraj & Parkhe 2006; Ritala, Armila & Blomqvist, 2009). Other researchers have extended this to include *innovation leverage, innovation coherence,* and *network membership* (Nambisan & Sawhney, 2011; Hurmelinna-Laukken, Olander & Blomqvist, 2012). Nambisan & Sawhney's scale

attempts to theoretically distinguish between network orchestration processes which relate to innovation *network* dimensions (i.e., knowledge mobility, network stability, and network membership), and which might be referred to as 'network-centric' measures from those processes which relate to innovation *design* dimensions (i.e., innovation appropriability, innovation leverage, and innovation coherence), and which might be referred to as 'innovation-centric' measures. Hurmelinna-Laukken et al. (2012) used absorptive capacity as a proxy for knowledge mobility in their use of the six-dimension scale. Absorptive capacity represents a two-phase (Zahra & George, 2002) or four-phase (Cohen & Levinthal 1990) process defined as the acquisition, assimilation, transformation, and exploitation of new, external knowledge for innovation outcomes.

For the purpose of the present study, it was decided to test the three latent measures of network orchestration (i.e., knowledge mobility, innovation appropriability, and network stability) which were found to broadly exist across existing literature for three reasons. First, there was almost exclusive focus on knowledge mobility, innovation appropriability, and network stability in the handful of works available, and a lack of corresponding empirical analysis. Second, the preliminary nature of Nambisan and Sawhney (2011) seemed suited to contexts of high technology-*based* innovation activities rather than technology-*user* innovation activities found in some service sectors. Given that this might detract respondents from identifying innovations which were not heavily technology-oriented in nature, it was decided to omit the additional three measures used by Nambisan and Sawhney. The third reason was guided by survey length considerations. Within the single survey was an attempt to obtain both quantitative (number of innovations) and qualitative (success of innovation) insight about innovative activities

within the given organization and destination. This resulted in a moderately lengthy survey, for which it was decided non-critical to omit both the absorptive capacity proxy in favor of knowledge mobility.

Innovation performance measures were adapted from Alegre and Chiva (2008) and Alegre, Sengupta and Lapiedra (2013). The multi-item scale provides a more complex measure of innovation performance, and allows for comparison of innovation performance with one's competitors, as well as an evaluation of the degree of success associated with the type of innovation activity (e.g, product, process, and marketing) performed. Also included was a set of global innovation performance indicators which measure respondents perceptions of the overall degree of the success associated with innovation performance in the organization and in the destination. The combined scales therefore provided both absolute and relative measures of innovation performance activities at the firm and network levels.

Control variables included in the study were *DMO location, size, and legal form of incorporation. Location* was measured by geographic clustering of IP addresses on four categories, West, Mid-West, North-East, and South. *Firm size* was measured using three bases: employee class sizes ranging from less than 5 to greater than 500 employees; annual R&D and annual ICT budgets ranging from less than US$100,000 to greater than US$1,000,000. *Legal form of organization* (LGO) was measured based on established business and industry classifications used by the US Census Bureau on seven categories, Corporation, S-Corporation, Partnership, Sole Partnership, Non-profit Organization, Government, and Other (e.g., Trust, Joint Venture, Estate, Co-operative).

Data

Data was collected via an online Qualtrics survey from a sampling frame of 450 destination management organizations (DMOs) representing destinations across North America. Of this number, a contact list database for 325 DMOs was compiled by the author. The remaining 125 contacts were obtained through face-to-face introductions to DMOs, CVBs, chambers of commerce, economic development agencies, tourism boards and similar entities attending Destination Management Association International's (DMAI's) Annual Destinations Showcase in March 2015 (Appendix E). The contact lists were combined, checked for duplicates, and the first invitation to participate in the survey sent on April 13, 2015. First and second reminders were sent two and seventeen days following the first invitation. A final reminder was sent twenty-four days following the first invitation via an announcement in DMAI's weekly e-Newsletter. Thirty days from the initial invitation, all data collected to date was downloaded for analysis. All invitations and reminders were addressed to 'The Director'. A total of ninety responses were obtained, seventeen of which contained zero responses. These responses were considered evidence that a respondent may have only opened but did not begin the survey, and were subsequently discarded. This resulted in a final data set of 73 DMO-level responses.

Results and Analysis

Data screening and preparation

Data was checked for conformity to multivariate normality assumptions in keeping with maximum likelihood (ML) estimation procedures which would be used.

Individual univariate distributions showed negative skewness with negative (platykurtic) kurtosis close to zero. Three checks were conducted to determine suitability of data to analysis. First, the statistical significance of each measure of kurtosis was found by dividing the kurtosis value by the standard error of kurtosis. None of the computed values were greater (or less) than the cut-off for statistical significance of 1.96 (or -1.96). Second, the measures of skewness and measures of kurtosis for each variable were all found to be less than three times the standard deviation of the skewness and kurtosis for each of the variables. This was also found to be satisfactory. Third, a subjective, eyeball test of the histograms for each variable revealed no drastically skewed or kurtotic distributions. Based on these three tests, it was decided reasonable to proceed with the analysis. Missing data checks revealed a missing data pattern across all (n=73) cases. Further analysis of the proportion of data present showed that 34 of the 73 cases (or 46.6%) was present for all observed measures which would be included in the analysis.

This low response rate raised concerns associated with the issue of non-response bias. In order to understand if the incomplete responses was due to non-response bias, a logistic regression was used to model response as a function of known respondent characteristics collected in the survey: organization size (total number of employees), geographic location (region), and organization age. Treating the three measures as categorical independent variables, incomplete survey responses were dummy-coded 0="completed" and 1="otherwise"). Results showed a non-significant χ^2 (df = 16) = 17.441, p = .358. Based on the results of the logistic regression, the researcher concluded that there was no systematic pattern of non-response across the variables, and that the

goodness of the sample was, while mediocre, reasonably preserved in integrity to move forward.

Notwithstanding, the smaller than intended sample size forces aggregation within cell categories, and would have implications for the subsequent data analysis. Further, concerns regarding the smaller than intended sample size, is that it would challenge the power of results or statistical inferences from the analysis.

Respondent characteristics

Of the total responses (n=73), 86% self-identified as a DMOs or CVB located in near equal proportions across the West (23%), Midwest (28%), Northeast (29%) and Southern (21%) United States. The majority of respondents (74%) self-identified as non-profit organizations, with annual R&D and ICT budgets of less than US$100,000.00. Respondents self-identified as Presidents, Executive Directors, and Directors typically between 51 and 55 years. Mean number of years of experience in the tourism industry was twenty-three. A summary of survey respondent characteristics including organization location, size, age, type, and legal form of organization (LFO) is provided in Appendix F.

Innovation activities

Respondents were asked to report on their organization's innovation activities (e.g., number and type of innovation developed and implemented). These innovation activities provided information on the number of new or significantly improved product, process, and marketing innovations which occurred in the past three to five years at two levels: i. within the DMO, and ii. within the destination. Tables 5 and 6 provide summary frequencies of responses to questions regarding the organization and destination innovations.

Table 5: Summary of Responses to Organizational-Level Innovative Activities

	Yes	No	Missing	Total
Did your organization create any **product** innovations?	37	31	5	73
Did your organization create any **process** innovations?	17	29	27	73
Did your organization create any **marketing** innovations?	31	10	32	73
Total	85	70	64	

According to Table 5, of the 73 responses, 37 answered that their organizations created new product innovations, 17 answered that they created new process innovations, and 31 marketing innovations. With respect to destination-level innovation activities in Table 6, 37 respondents indicated that there were new products, 14 new services, and 21 new marketing innovations created in the past three to five year period.

Table 6: Summary of Responses to Destination-Level Innovative Activities

	Yes	No	Missing	Total
Did your destination create any **product** innovations?	37	25	11	73
Did your destination create any **process** innovations?	14	31	28	73
Did your destination create any **marketing** innovations?	21	19	33	73
Total	72	75	72	

Respondents typically reported that between 2 and 4 types of innovations were created from each of the innovation categories, i.e., product (goods and/or services),

process (delivery methods and/or distribution systems), and marketing (communication and/or marketing strategies) were created in the past three to five year period. Details of the innovation characteristics related to new or significantly improved products, processes, and/or marketing innovations are provided in Appendix E.

Validity analysis

In the case of the network orchestration construct, exploratory factor analysis (EFA) was used to test whether the observed variables represent the underlying factors they were intended to measure. For network orchestration, based on criteria developed in the existing business and management literatures, the variables were expected to reflect three underlying dimensions namely, knowledge mobility, innovation appropriability, and network stability. While it would have been acceptable to proceed to a confirmatory factor analysis (CFA) given knowledge from existing literature, the author needed to ensure that indeed, three (vs. two or four or five) factors would indeed emerge from the analysis of variables in the services sector, and specifically within the tourism context. The EFA process would help the author to figure out whether all nineteen original variables were needed to evaluate the network orchestration construct.

The first EFA decision involved determining the appropriate exploratory factor analytic technique to be used, and whether a component-based approach such as principal components analysis (PCA) or other variance-based, common factor technique would be more appropriate. Two reasons influenced the choice to use principal axis factoring (PAF) common method technique. First, the data had been obtained from human evaluators, wherein respondents were asked to give their opinions or to report on

historical activities. Second, the responses were subjective, and therefore subject to measurement error (Klobas & McGill 2010).

The second EFA decision involved determining which set of variables to combine in each factor. According to Baggio and Klobas (2011), a number of reasons contribute to the need to discard variables. These reasons include a variable not sharing sufficient common variance with any other variables to form a factor; or a variable being correlated with several other variables that load on different factors which results in that variable having a moderate or strong loading on more than one factor. Both of these reasons support the need to discard variables which exhibit these properties, as such variables do not contribute to 'simple structure'. A third reason may be collinearity of the variable, which results in a correlation matrix with a determinant of zero. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) was used to determine which variables may warrant removal. In addition to the KMO-SMA, the Bartlett's test of Sphericity was used to test the hypothesis that the correlation matrix is an identity matrix (i.e. all diagonal elements are 1 and all off-diagonal elements are 0), implying that all of the variables are uncorrelated. If the Bartlett's Test of Sphericity is significant at the ($p < .05$) level, the null hypothesis that the population matrix is an identity matrix is rejected. Interpretive adjectives for the KMO-MSA include 0.90 as 'excellent'; 0.70's as 'middling'; 0.60's as 'mediocre'; and below 0.50 as 'unacceptable' (Baggio & Klobas 2011). The value of the KMO-MSA for the set of variables was .645, which would be labeled as 'mediocre to middling'; the Bartlett's test significant at the ($p < .001$) level; and the determinant 1.383e-11 (or 0.00000000001383). Since the overall KMO-MSA did not meet a minimum criteria of 0.70 (Baggio & Klobas 2011) set in consideration of sample

size limitations, the decision was taken to examine individual MSAs in the Anti-Image Correlation Matrix.

The 'art' of factor analysis requires some amount of intuition to be used alongside the mechanics of conducting the analysis, particularly as it relates to the parsimony and the interpretation of the final factor solution. Knowledge of existing literature provided valuable insight to the factor analyses process, particularly as it relates to understanding the behavior of the items being studied. As a result, several additional factor analyses were run during which the researcher progressively removed variables which did not contribute to the solution on the basis of the MSA, communality, and factor loadings. Using this approach, six of the nineteen original set of measures were deleted from further analysis in this manner. Table 7 below shows skewness, kurtosis, and measures of sampling adequacy (MSAs) for the network orchestration items used in the analyses.

The final solution which comprised a set of thirteen items were re-tested and produced a KMO-MSA of 0.771; Bartlett's test result at the ($p < 0.001$) significance level; and determinant of 4.527e-5 (or 0.00004527). This second round of analysis lead the author to reject the null hypothesis of independence, and conclude that correlations exist in the data set that are appropriate for proceeding with a confirmatory factor analysis.

Table 7: Skew, Kurtosis and MSAs for Network Orchestration

Item	Skew	Kurtosis	MSAs
KM_1	-0.332	-0.069	0.703
KM_2	-0.355	-0.512	0.777
KM_3	0.047	1.099	0.902
KM_4	0.153	-0.761	0.574
KM_5	-0.025	-1.530	0.649

KM_6	0.054	-1.404	0.705
KM_7	-0.241	-1.742	0.623
IA_1	-0.536	0.506	0.626
IA_2	0.059	-0.182	0.548
IA_3	-0.447	0.020	0.820
IA_4	0.309	-0.560	0.527
IA_5	-0.109	-0.862	0.635
IA_6	0.213	-0.684	0.536
NS_1	-0.261	-0.133	0.621
NS_2	-0.347	0.335	0.710
NS_3	0.486	-0.592	0.698
NS_4	0.011	-0.331	0.513
NS_5	-0.292	-0.675	0.530
NS_6	-0.504	-0.071	0.495

The third EFA decision involved determining the best number of factors to extract based on the eight variables remaining in the data set. Although the business and management literatures had been used to guide the development of the original nineteen variables, the author did not wish to limit the initial (EFA) solution to the three factors of knowledge mobility, innovation appropriability, and network stability. The software default setting which extracts all factors with an eigenvalue greater than 1 (Kaiser's rule) was used to determine the number of factors to extract. In addition to Kaiser's (>1) rule, a scree plot was inspected which also confirmed the presence of a three-factor structure within the items used to measure network orchestration.

Taken together, and based on the results of the exploratory factor analysis, it was decided reasonable to proceed with a confirmatory factor analysis.

Reliability analysis

A final check of internal consistency of the measurement items for network orchestration was conducted using the Cronbach's alpha (Cronbach, 1951) criterion of ($\alpha = 0.70$) as the cut-off point for the three factors extracted from the EFA. In this analysis, factors shown to improve the Cronbach's alpha by an amount greater than 0.6 if deleted, were removed from the scale during this analysis. One item related to knowledge mobility measurement was deleted in this manner. The analysis showed Cronbach's alphas for the three factors all above the 0.70 threshold, and far above the 0.6 threshold (Robinson, Shaver & Wrightsman, 1991) for exploratory research. The factors were subsequently used to create a composite variable of network orchestration for use in the mediation analysis.

For the remaining variables: innovation orientation, ICT capability, and innovation performance checks of internal consistency were also conducted. Using the ($\alpha = 0.70$) cut-off point, one item was deleted from the ICT Capability set of measures and one item from the innovation performance measure. Appendix F provides a list of the final set of measurement items used to measure and test innovation orientation, network orchestration, ICT capability, and innovation performance in the mediation analysis.

Mediation results and analysis

Questions of how a relationship occurring between two variables might be explained are best posed once it has been established that there is evidence of an association between an antecedent variable X and a consequence variable Y (Baron & Kenny, 1986; Hayes & Preacher, 2013). However, some authors advocate against the

position of these authors, arguing that neither a significant X→Y nor a non-significant X→Y relationship is relevant to establishing mediation (Zhao, Lynch, & Chen 2010). This study acknowledges that "lack of correlation does not disprove causation" and "correlation is neither a necessary nor a sufficient condition of causality" (Bollen 1989). It was therefore determined reasonable to proceed with the mediation regardless of a significant association between innovation orientation and innovation performance prior to testing for the effect of the network orchestration mechanism in the relationship. Notwithstanding, it was decided to conduct tests for association between innovation orientation and innovation performance prior to proceeding with the mediation analysis.

Linear tests of association between the antecedent innovation orientation variable and the two levels of innovation performance measured in the survey (organizational-level and destination-level) were performed. At each level, three types of innovation performance were measured, based on information provided by respondents about their innovative activities (cf. Appendix E: Innovation Characteristics). Table 8 reports test results for the linear associations between each level *and* type of innovation activity and innovation orientation, guided by the following hypotheses:

$$H_0: \quad \beta = 0$$

$$H_A: \quad \beta \neq 0$$

Table 8: Results of Linear Association Tests for Innovation Orientation

	Linear Association with Innovation Orientation	
	Organization-level	Destination-level
Product Innovation Performance (goods, services)	r = .167 fail to reject H_0	r = .189 fail to reject H_0
Process Innovation Performance (delivery, distribution)	r = .628* reject H_0	r = .637* reject H_0
Marketing Innovation Performance (marketing, communication)	r = .521** reject H_0	r = .487* reject H_0

*$p < .05$; **$p < .01$; n=34

Based on the results of the linear association tests conducted between innovation orientation and organizational- and destination-level innovation performance for product, process, and marketing innovation types, it was decided to proceed with mediation analysis for all six innovation performance levels: i. product innovation performance (organizational-level); ii. production innovation (destination-level); iii. process innovation performance (organization-level); iv. marketing innovation performance (organizational-level); v. process innovation performance (destination-level); and vi. marketing innovation performance (destination-level).

Mediation and moderation analysis, commonly referred to as a causal path are commonly employed in situations where, given a known relationship between an independent variable X and a dependent variable Y, a third (mediating or moderating) variable is introduced into the model to test for a hypothesized relationship of the third variable to the existing X → Y relationship. If the third variable, or set of variables being

introduced are hypothesized to account for the existing X→Y relationship, the variable is said to be a mediator (M) of the X→ Y relationship. If on the other hand, the third variable, or set of variables being introduced are hypothesized to vary the known X→Y relationship, the variable is said to be a moderator (W) of the X→Y relationship. It should be noted that these relationships are by no means exclusive. A number of researchers have authored peer reviewed arguments on the various types of mediation and moderation (e.g. Edwards & Lambert, 2007; MacKinnon, Lockwood, & Williams, 2004; Hayes & Preacher, 2014), including variants of mediated moderation and moderated mediation. Put another way, a hypothesized mediator contributes an *explanation about how* X causes Y, while a hypothesized moderator contributes to an *explanation about variation* in X→Y is produced by the extent of variation in the moderator. In addition to the mediated and moderated relationships described in the preceding paragraphs, causal paths are described as either first stage and/or or second stage, direct, indirect and total effect mediation and moderation.

In the context of the present study, the focal variable network orchestration was hypothesized to mediate the known causal relationship between innovation orientation and innovation performance. The following sections report statistical results for each of the mediation models estimated for innovation orientation, innovation performance, and network orchestration. Estimation was carried out using Hayes PROCESS macro in SPSS. PROCESS uses ordinary least squares (OLS) regression to estimate model coefficients. Output generated bias-corrected 95% bootstrap confidence intervals (Efron & Tibshirani 1993) for indirect effects and various indices of effect size of the indirect effect, using 10,000 bootstrap samples. Bootstrapping methods employ a statistical

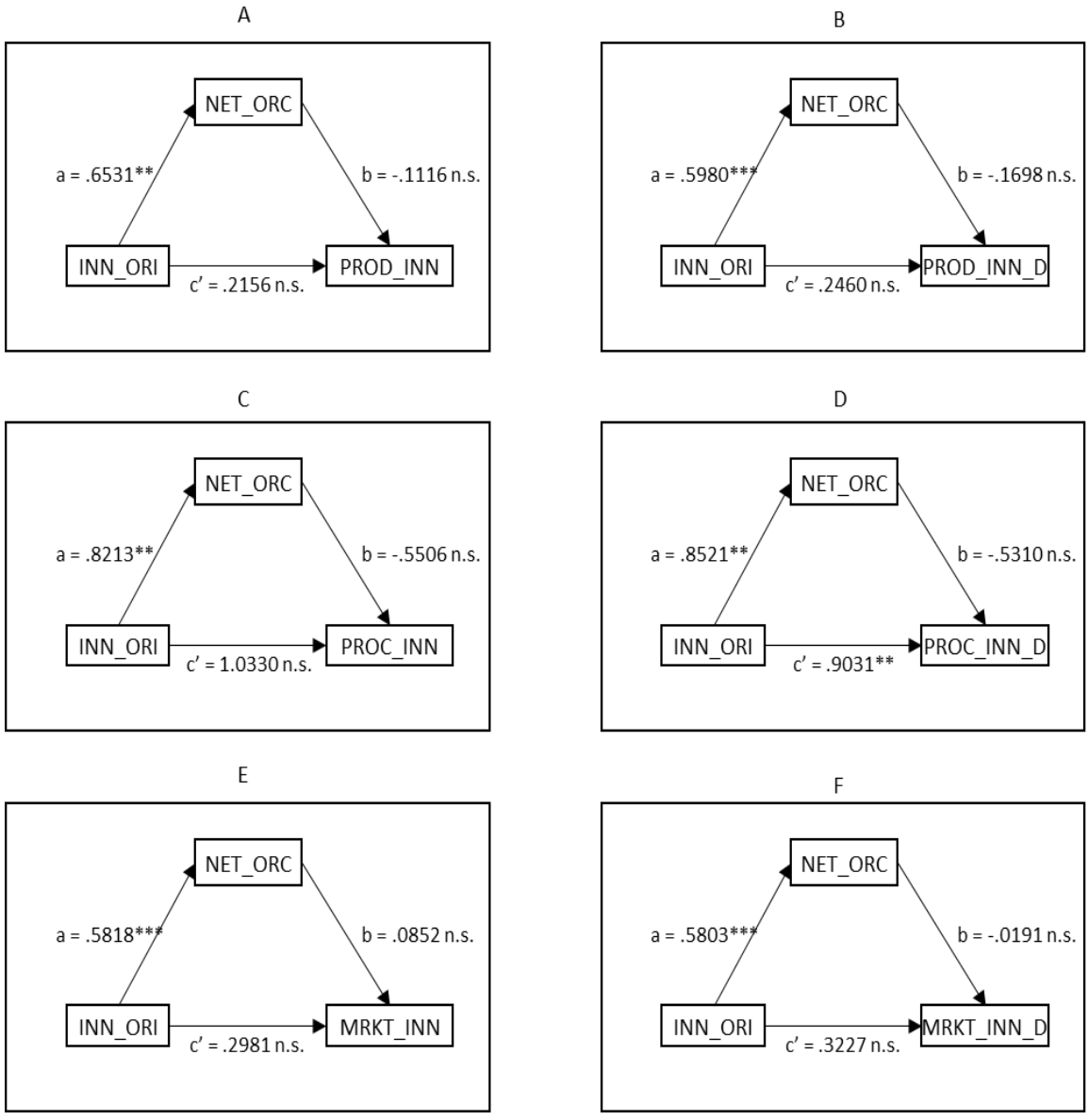
algorithm for resampling from the original sample, and is used to generate empirical estimates of a population distribution.

Zhao et al. (2010) argue that the only requirement for mediation is that the indirect effect *a* x *b* be significant. These authors argue that once it is established that a significant (or non-significant) indirect effect exists, the next step is to report, along with the total effects of the model, the type of mediation (or non-mediation) which may be one of five outcomes. The five broad outcomes are based on Zhao et al. (2010) decision tree (Appendix G) for establishing mediation or non-mediation and include: i. indirect-only mediation, ii. direct-only mediation, iii. no-effect mediation, iv. complementary mediation, or v. competitive mediation. The following results follow Zhao et al. (2011), and report mediation results recommended by these authors. For each model therefore, estimation of the total effects are reported along with the 95% confidence interval from the bootstrap analysis.

Mediation Results for Network Orchestration

Panels A and B in Figure 14 shows mediation results for network orchestration on the innovation orientation-product innovation performance relationship at the organizational and destination levels respectively. At the organizational level, the total effect from the bootstrap analysis is positive and non-significant ($ab + c = .1426$), with a 95% confidence interval including zero (-.3045 to .5898). At the destination level, the total effect is also positive and non-significant ($ab + c = .1445$), with a 95% confidence interval including zero (-.2063 to .4952).

Figure 14: Mediation Results for Network Orchestration



Panels C and D in Figure 14 shows mediation results for network orchestration on the innovation orientation-process innovation performance relationship at the organizational and destination levels respectively. At the organizational level, the total effect from the bootstrap analysis is positive and significant ($ab + c = .5807$), with a 95% confidence interval excluding zero (.0735 to 1.0880). At the destination level, the total

effect is also positive and significant (*ab* + *c* = .4507), with a 95% confidence interval excluding zero (.0056 to .8957).

Panels E and F in Figure 14 shows mediation results for network orchestration on the innovation orientation-market innovation performance relationship at the organizational and destination levels respectively. At the organizational level, the total effect from the bootstrap analysis is positive and significant (*ab* + *c* = .3477), with a 95% confidence interval excluding zero (.1228 to .5726). At the destination level, the total effect is also positive and non-significant (*ab* + *c* = .3116), with a 95% confidence interval excluding zero (.0259 to .5974).

Moderated Meditation Results for the role of ICT Capability

The moderating role of ICT capability on the mediated relationship was tested at both the organization and destination levels, but only on models for which significant total effects were found, that is, for models which resulted in significant total effects for the mediation of network orchestration on the innovation orientation-performance relationship. ICT capability was measured as a two-item scale representing the extent to which the DMO possessed a capacity to integrate external knowledge from destination stakeholders through shared technological platforms. These platforms might include shared databases on visitor information, hardware and other technological media capable of facilitating the free transfer, sharing and use of knowledge between the DMO and destination partners.

For each moderated mediation result, the conditional direct effect(s) of innovation orientation (X) on innovation performance (Y) at values of the moderator (W), in this case, ICT capability, is reported.

With respect to the moderated mediation of ICT capability on product innovation performance, positive and significant conditional effects of innovation orientation on product innovation performance at the organization and destination levels were found at lower levels of ICT capability ($\beta = 1.0514$; $p < .05$) and ($\beta = .5834$; $p = .0591$) respectively.

As it relates to the moderated mediation of ICT capability on process innovation performance, positive and significant conditional effects of innovation orientation on process innovation performance at the organization level was found at average levels of ICT capability ($\beta = 1.0997$; $p < .01$). On the other hand, positive and significant condition effects of innovation orientation on process innovation performance at the destination level was found at lower levels of ICT capability ($\beta = 1.0329$; $p < .05$).

Concerning the moderated mediation of ICT capability on marketing innovation performance, positive and significant conditional effects of innovation orientation on marketing innovation performance at the organization and destination levels were found at lower levels of ICT capability ($\beta = .3661$; $p = .05$) and ($\beta = .5031$; $p < .05$) respectively.

Discussion and Conclusions

From the simple mediation analysis conducted using ordinary least squares (OLS) path analysis, innovation orientation indirectly influences certain types of innovation performance through its effect on network orchestration processes. In the case of product innovation performance (Panels A and B), no mediating effect of network orchestration was found at either the organization or destination levels. In the case of process innovation performance (Panels C and D), complementary mediation was found at both the organization and destination levels. In the case of marketing innovation performance (Panels E and F), complementary mediation was found at both the organization and destination levels. Each of three types of innovation performance results are discussed in turn below.

Product Innovation

In the case of product innovation performance (Panels A and B), no mediating effect of network orchestration was found at either the organization or destination levels These results suggest Zhao et al. (2010) no effect mediation, whereby the hypothesized relationship between network orchestration and the innovation orientation-performance relationship is not supported. A possible explanation for this may be the nature of product innovations, and their locus of control and occurrence within a tourism destination. Product innovation activity refers to the development of new goods and/or services, and are generally located in downstream contexts that is, among vendors and suppliers of the tourism product who have daily, direct and routine contact with destination visitors. The nature of the DMO, the focal group represented by the data, does not provide for the mass

production of new goods and services, rather the role of the DMO may one of facilitation of new product innovation activity. This supports previous tourism theory (Morgan, 2012; Pike & Page, 2014) that the DMO's role is one of collaborative agent among stakeholders within a destination. These authors suggest that the given the appointment of DMOs through governmental and quasi-governmental chains, the Dmo is not associated with wealth of resources to manage or direct innovation activities. Rather, the DMO's task of stakeholder is to facilitate new product development. The fact that network orchestration processes do not, based on these results, appear to mediate the innovation relationships among DMOs in the data set, may therefore be driven by the fact that they are peripheral, rather than central, to new product innovation activities.

Another possible explanation for these results may be tied to the nature of product development in the tourism destination. Hjalager (2002, 2011) suggests that inter-organizational knowledge exchange is key to innovation development in tourism, and may be linked to collaborations among organizations similar knowledge bases within the tourism supply chain. While DMOs may in fact freely share knowledge with other DMOs, hotels with hotels, and restaurants with other restaurants, the knowledge shared may well be of an operational, rather than an innovative nature. What may be equally true, is that entrepreneurs see some information as proprietary, and that sharing such information may not be in the best interest of their (individual) business units. As such, the knowledge mobility dimension of network orchestration will be found to have limited theoretical and empirical support within the context of this data. An example of this is found in structured interviews conducted with a North-American CVB in 2012, whereby

the DMO executive indicated that new knowledge is often sought and shared with other DMOs.

Yet another explanation to the no effect mediation results for network orchestration on product innovation performance might be related to the innovation appropriability. According to one DMO executive, "To maintain integrity we needed control; we chose 'blackout of communication' to maintain control [in the earlier stages of the project]... they became more trusting following the debut..." This example suggests that in the earlier stages, to maintain primary control over a new innovation activity, the DMO deliberately chose to maintain non-communication with partners in the earlier stages of the project, and how this gradually changed as the project matured.

Process Innovation

In the case of process innovation performance (Panels C and D), complementary mediation was found at both the organization and process levels. As it relates to process innovation performance, the results suggest Zhao et al. (2010) complementary mediation at the organizational level and at the destination level. In the case of organizational and destination level process performance the hypothesized effect of network orchestration on the innovation orientation-performance relationship is supported.

Process innovation activity refers to the development of new delivery or distribution or logistics systems within the organization or destination system. Examples include automated kiosks in airport terminals or hotel lobbies (organizational), or new supplier systems for public spaces and related attractions and facilities (destination). The

DMO, the focal group represented by the data, may seek to implement new process innovations via distribution of benefits or awards to stakeholders in the form of local tax (re)allocations, for example, for improved environmental systems. This supports previous tourism theory related to the nature of the DMO as a key trade organization or association (Olsen 1986) which is established primarily for the preservation and development of tourism within a certain area. In addition to tourism however, some CVBs undertake development of the wider community and surrounding areas, thereby being responsible for more than simply the development of 'tourism' as a silo. In such instances, innovation orientation directly drives innovation outcomes, by the openness of an organization to pay close attention to the need for development and change within the destination.

On the other hand, processes internal to the DMO may not benefit from network orchestration (given the benefits are specific to the internal institution), the direct mediation theory therefore supports one of the aims of the DMO as one of maintaining fair play and procedural justice among destination stakeholders. For example, a key role of a DMO may be to discourage free-riding (Ford & Peeper, 2007; Gartrell, 1993) among destination actors. High levels of innovation orientation within DMOs are therefore associated with the success of new initiatives aimed at improving fairness and transparency within the destination.

Another explanation for the direct mediation outcome at the destination level of process innovation performance points to network orchestration as an inter-organizational level construct greater theoretical significance at the destination level of innovation performance than at the organization level. This supports the position of Dhanaraj and Parkhe (2006) who suggest that network orchestration processes affect network-level

innovation outcomes. Organizations who openly embrace change will therefore contribute to higher levels of innovation performance for their particular destination as a whole—a 'rising tide lifts all boats' effect, so to speak. The positive and significant *a* regression coefficient argues in favor of a strong, direct and positive relationship between organizations who are open to embracing innovation, and the effect of this orientation on network-level knowledge mobility, trust, and stability.

A possible explanation for this could be that tourism actors view their internal processes as proprietary and do not feel that there is a benefit to sharing information related to their new internal processes with external actors, whether for competitive or other reasons. At the destination level, the finding appears also contradictory, but in fact, may be indicative of the organizational level phenomena being manifested. An alternative explanation is the low number of process innovations reported at the destination level within the data.

Marketing Innovation

In the case of marketing innovation performance (Panels E and F), total mediation effects were found at both the organization and destination levels. These results support Zhao et al. (2010) complementary mediation, whereby the hypothesized relationship between network orchestration and the innovation orientation-performance relationship is supported in partial direction and significance.

Marketing innovation activity refers to the development of new and/or significantly improved communication or marketing strategy. DMOs are considered the

primary marketing agents for a destination, representing a mediation mechanism between local destination actors such as accommodation, dining, transport and entertainment, and potential destination visitors. As the focal group represented by the data, DMOs are key facilitators of destination marketing and related innovation activities, and as such benefit greatly from network orchestration processes.

Secondly, and in keeping with Dhanaraj and Parkhe's (2006) concept of the 'hub' entity, the significant total effect mediation outcome occurs at the destination level. This finding is consistent with previous research on destination marketing and management. It is widely researched that the DMO is central to the marketing of a destination, as the DMO represents the interests of all actors within the destination. Increased knowledge flow serves to improve the transfer of destination branding and other place marketing knowledge which is representative, and must be represented by, all actors within the destination.

Marketing innovation activity at the destination level is indeed associated with the activities of the DMO, largely considered a 'hub' for destination marketing activities. This is theoretically reflected in network orchestration processes emerging as a significant mediator of the innovation orientation-marketing performance relationship in the data, and further practically reflected in the raison d'etre of the DMO as a quazi-governmental marketing agent for both the organization and the wider destination. That is, the DMO may be considered an orchestrator or marketing activity whose destination directly benefits from their marketing and related innovation activities. DMOs promote an understanding of, and support for marketing activities, reflected in the total mediation effect between network orchestration and innovation orientation-marketing performance.

Also denoted by these results is that the implementation and performance driven side of marketing innovation is in fact driven by the DMO as hub, and more specifically, how the knowledge mobility dimension of network orchestration facilitates the idea generation, acceptance, and implementation aspects of marketing innovation and related activities. According to one stakeholder executive on a new destination-level marketing activity, "[This] was a huge innovation. The DMO championed the initial idea, held meeting to explain the process, explain their thoughts, and establish the parameters so it made sense... which was important... within the confines of those stakeholders with whom the [innovation] actually benefits" (Milwood & Roehl 2014).

Further extending Dhanaraj and Parkhe's (2006) hub and orchestrator concepts, the significant total effect mediation outcome occurs at the organizational level. This finding theoretically and empirically supports the notion that network orchestration processes in the context of marketing and related innovative activities of the DMO have effects on performance not only at the wider destination ("network") level as proposed by Dhanaraj and Parke, but also at the DMO ("organization") level. This is reflected in the positive and significant total effect results in Panel F.

These results further support prior theory on the role of the DMO and specifically the innovation appropriability dimension of network orchestration in the context of new and/or significantly improved marketing innovation activities. The DMO is expected to exercise creativity on their (stakeholder's) behalf, primarily because stakeholders consider the DMO steward of the destination resources Milwood and Roehl (2014).

The moderating role of ICT capability

Results of the data analysis generally support the moderated mediation role hypothesized for ICT capability across all innovation types. In all instances the moderating role of ICT capability was found to be positive and significant in its effect on the innovation orientation-performance relationship. However, the effect was noted to be significant at lower to average levels of ICT capability.

These results suggest possible realities related to the role of ICT capability on innovation performance within the DMO and wider tourism organization.

Firstly, the presence of ICT technologies in the form of shared electronic databases facilitates network orchestration processes and in particular, the knowledge mobility dimension which theoretically represents the extent to which knowledge is shared among DMO and destination partners. The statistical significance occur at the lower levels of ICT capability might suggest that either destination and DMO partners have not fully embraced the facilitative role of ICT in innovation settings or, some DMO and destination actors within the tourism destination place low levels of importance on shared ICT resources. This latter explanation might be linked to lack of knowledge on the importance of ICT capabilities in facilitating knowledge sharing related to innovation activity, or might be explained by a lack of trust among actors within the tourism destination network. Yet another view might support the notion that DMOs and other actors see their knowledge as proprietary and choose to keep their respective institutional knowledge 'close to the chest', and/or do not readily see a benefit to sharing such knowledge.

A second possible explanation might be associated with the type of ICT capabilities referred to in Lucchetti and Sterlacchini's (2002) taxonomy. General-use and production-integrating ICTs may largely exist within an organization, and relate specifically to that organization's innovative capacity. These ICTs, according to Lucchetti and Sterlacchini, are aimed at enhancing internal capabilities related to production equipment and processes, employees and other internal systems.

Other types of ICTs such as market-oriented ICTs which are mainly used to improve the organization's visibility may also exist, but primarily for the benefit of the organization within which the particular technology is resident. In such a case, it is likely that the ICT will have a positive impact on the organization-level innovation activity, and to a lesser extent, on the destination level innovation activity.

Limitations and Further Research

As with almost all studies, there were limitations to the present undertaking, some of which may be considered for future research.

As it relates to the mediation results, there is need for further testing to further explore the presence of "true" direct effects or omitted second mediators. To this end, some of the significant direct effects observed in the absence of significant indirect effects may be due to measurement error. For this reason, further tests of the multiple measurement mediator network orchestration and its dimensions of knowledge mobility, innovation appropriability, and network stability, are avenues for future research.

A corollary of the above is the need for further testing of the conceptual distinction between the mediator variable network orchestration, and the independent variable innovation orientation. Given close proximity of mediation tests of knowledge mobility and network orchestration, further testing should be undertaken as a form of manipulation test between the network orchestration dimensions and innovation orientation. Given the very nascent stages within which the network orchestration construct falls, there is even more of a need to conduct confirmatory factor analysis as a follow-up to the one-factor models tested in the present study.

Secondly, the use of subjective measures was a limitation of the study. Subjective measures involved inherent weaknesses of recall bias, and the tendency to report on more favourable, past performance of innovation activity. Future studies might seek to employ a combination of subjective and objective measures of innovation performance to provide

a more valid measure of innovation performance at the organization and destination levels.

A third limitation was the resultant sample size which posed a significant contributory factor to the power of inferences made from the mediation analysis. Given the factor analysis and mediation analysis conducted, ideally separate samples should have been used to test the network orchestration construct. Future research should seek to conduct additional tests such as know-groups comparisons with DMOs and other ("non-DMO") types of tourism organizations such as hotels, restaurants and attractions.

Contribution to the field

A key element of the essay was to empirically test the hypothesis that network orchestration positively contributes to innovation outcomes in services, and specifically in the context of the tourism organization. Questions such as whether the 'hub' firm exists in the tourism destination context, and whether or not that hub may be characterized by the destination management organization (DMO) are key thoughts underlying this study. This is important given that there exists perspectives which support the assimilationist viewpoint that existing measures of innovation activity may be used in services contexts, and others which advocate a demarcation viewpoint that measures of innovative activity in manufacturing should remain separate and distinct from those use in the services context. This study confirms previous research on the innovation orientation and innovation performance relationship. Indeed, the study serves to extend the generalizability of the study to the context of tourism service organizations. There is

also need to conduct additional testing of the construct, perhaps via known-groups analysis.

A key contribution of this study is the empirical testing of the network orchestration construct. The study represents, to the author's knowledge, one of five writings, on the network orchestration concept. This represents a significant contribution to the field of business and strategy, and to the extended field of service and tourism innovation research. It is hoped that this study will be among those which generously contribute to the understanding of the network orchestration construct, and to the development and extension of the construct's nomological network.

ESSAY 3

DIMENSIONALITY AND THE DMO WEB HOME PAGE: A CONVERGENT PARALLEL MIXED METHODS STUDY

Abstract

This study analyses web dimensionality factors to better understand the extent to which factors associated with DMO web home pages change over time. The study also investigates the web page factors online users associate with more innovative destination management organization (DMO) home pages. A convergent parallel mixed methods approach is used to measure the extent to which a DMO's evaluation of their web marketing activities converged (or diverged) with online consumers' evaluation of the appearance of the homepage. Results suggest that dimensionality factors found in consumer ratings of DMO web home pages change over time.

Keywords: *Amazon's MTurk; convergent parallel mixed methods design; destination management organization;*

Introduction

A home page is the gateway to an organization's web site. In the context of the tourism destination, the destination management organization (DMO) web home page is considered the 'storefront' to the destination. The home page is evidence of the DMO's strategic initiatives to market the destination on behalf of destination stakeholders. In addition, the homepage "is the most important page on any website" (Neilson & Tahir, 2002).

This mixed methods study focuses on the DMO homepage, and is motivated by the need to deepen our understanding of the extent to which the organization's perceived effectiveness of web-based marketing activities in the form of new and/or significantly improved updates is associated with consumers' ratings of dimensionality factors of the DMO's web home page. A convergent mixed methods design is used wherein qualitative and quantitative data are collected in parallel, analyzed separately, and then merged. Survey data collected from DMO executives will be used to explore the concept of incremental innovation theory that predicts that more frequent updates on key dimensions of the web marketing strategy will positively influence the experience for online visitors to thirty US destination web home pages. Consumer panel rating data collected from online visitor evaluation experiment on the thirty DMO home pages will explore the dimensionality constructs of content, form, and emotion associated with the experience of visiting the DMO / destination web home page. The reason for collecting both quantitative and qualitative data is to seek out points of convergence (or divergence) between the two forms of data to bring greater insight into understanding DMO web

home page overall appeal, using insights from both DMO executives' and users' opinions.

Building on the definition of marketing innovation as the implementation of a new or significantly improved marketing strategy or communication strategy, the objective of the study is to provide a more complete understanding of the effectiveness of DMO web marketing activities, and specifically the web home page. As one of the key concepts, incremental innovations (e.g., web updates, changes) is argued to eventually produce new and or significantly improves marketing outcomes. These changes, on their own, are almost indiscernible. However, over time, these changes accumulate to reflect significant change to the marketing platform, in this case, the DMO web home page.

While previous studies have used either an internal evaluation of a web-based activity by the focal organization or an external evaluation from visitors to the website, this study proposes to use a mixed methods approach to analyzing the web-based marketing activity of the DMO by assessing website dimensionality factors associated with the DMO home page. This essay joins the field of web page evaluation by triangulating both subjective and objective measures to evaluate performance. The study is designed to evaluate web page appeal, and introduces the factor of time. Importantly, the concept of change, previously mentioned as critical to the learning dimension of innovation, serves as an indicator of the ability of the DMO to acquire and exploit new knowledge for innovative outcomes. These outcomes are measured not in terms of individual units of change, but in keeping with innovation theory (Van de Ven, 1986) measured as the overall change over time.

Theoretical Overview

DMOs and Destination Marketing Activities

The role of destination management organizations (DMOs) may be viewed as one of 'steward' or caretaker of the destination's resources (e.g., Morgan, Hastings & Pritchard, 2012; Davis, Schoorman & Donaldson, 1997). As stewards of destination resources, the attitudes and behaviors of DMOs are motivated by collective action (Olson 1965) wherein destination performance objectives are aligned to government, business, and social interests within the destination. DMOs are entrusted with public and private resources to act on behalf of stakeholders. This relationship is premised on the expectation that the DMO is acting in the best interest of the collective. As it relates to inter-organization and inter-sectoral relationships, DMOs are expected to engage tourism actors by building relationships through trust and communication. Earning the trust of tourism actors requires leadership on the part of the DMO. Moreover, as it relates to innovation output, DMOs that promote trust, commitment and reciprocity among members are expected to achieve higher levels of firm- and network-level innovation output within and across destinations. These factors collectively relate to the primary role of the DMO which is to engage in destination marketing activities, effectively acting as a mediating mechanism between the tourism destination and potential visitors to the destination.

Through varying levels of stakeholder engagement, DMOs can improve their (the DMO's) ability to manage destination marketing and related innovation activities, though this is contingent on the nature and location of the innovation (Milwood & Roehl 2014a). In the case of marketing innovations for example, DMOs are central during early-stage,

goal *formulation* processes which establish legitimacy (Dhanaraj & Parkhe, 2006) for the new innovation, as well as facilitate greater buy-in and support across diverse stakeholders. DMOs are also important for engaging and elevating internal and external actors in the network (e.g., through executive or service appointments) to increase the likelihood of maintaining support for the innovation in the later stages of goal *development* and goal *implementation* (Milwood & Roehl, 2014b).

In the case of strategic marketing and communication activity, the DMO's role becomes even more critical, as it is the role of the DMO to successfully translate the destination's offering, which comprise a diverse mix of supply-side actors' goods and services, into a single tourism experience. To effectively market and promote the destination requires that the DMO design and promote platforms and media through which a creative and appealing display of the destination and its constituents are represented. Examples of the platforms and media used by contemporary destination management organizations include social online platforms (e.g., *Twitter, Pinterest, Facebook, and Instagram*) and the World Wide Web. To this end, a number of tourism scholars have focused on success factors associated with the online behaviours and activities of DMOs, including use of official destination websites.

Evaluation of DMO websites

The tourism literature exhibits no dearth of studies which have utilized website evaluation foci. Weber and Roehl (1999) identified among tourism website evaluation success factors such as user-friendly and easy-to-understand system, speed of

transactions, availability of help functions such as toll-free numbers, secure payment methods, virtual tours and the ability to view pictures of the destination. Using the context of the New Zealand regional tourism organization websites, Doolin, Burgess and Cooper (2002) evaluate the use of the Internet and Web technology in the promotion and marketing of destinations. The authors use the extended Model of Internet Commerce Adoption (eMICA) to benchmark the relative maturity of Web sites used in the tourism industry. Key metrics involved the measurement of information ability, interactivity, and functionality. Douglas and Mills (2004) identify similar factors to Weber & Roehl (1999) and include factors such as web mobility, web interface, marketing information, and 'glocalization' factors. Kaplanidou and Vogt (2006) measure functionality and visuals, and also include accessibility such as download speed. Using data from state tourism websites, Roehl (2007) used 18 web site features and customer relationship management (CRM) content measures to understand the importance of each feature to the performance of state tourism websites. Measures included primarily information ability related to attractions, restaurants, tour operators and supporting agencies. Sigala and Sakellaridis (2004) suggest that e-quality in tourism is tied to factors such as task fit, trust, interactivity, responsiveness, design and visual appeal, integrated communications, and is one of the few studies to include innovativeness as part of the overall evaluation of the quality of a website. Ornelas, Valdovinos, and Calderon (2014) studied the performance of Mexico's websites factor of competitiveness, using Google page ranks, speed, and other secondary data similar to those explored in this study to rate performance.

Focusing on government role in promoting culinary tourism, Horng and Tsai (2010) studied government tourism websites of six East Asian countries: Hong Kong,

Japan, Korea, Singapore, Taiwan and Thailand. Similar to the two previous studies, this third study focused on website dimensions of food culture, local cuisines, and culinary tourism marketing strategies. The study employed qualitative investigations into the culinary content posted on the government websites, and found both differences and similarities among the approach of these sites in supporting and promoting culinary tourism.

Park and Gretzel (2007) employed a meta-analysis to establish a unified framework of commonly used Website success factors used by DMOs in their destination marketing effort. The authors found nine factors commonly employed: (1) information quality, (2) ease of use, (3) responsiveness, (4) security/privacy, (5) visual appearance, (6) trust, (7) interactivity, (8) personalization, and (9) fulfillment. While highlighting that these nine factors throughout the tourism literature represent a diverse mix of success factors, after nearly a decade and a half of research, it remains unclear as to which of these success factors are hygiene factors in that they only inhibit customer interactions when absent and which factors are the true catalysts for changes in consumer attitudes and behaviors (Kim & Fesenmaier, 2005; Zhang and von Dran, 2001).

From this brief overview, it is substantiated that much has been researched on the topic of web site quality and web marketing effectiveness. It is for this reason that the present study is focused on re-purposing rather than re-inventing additional factors of website quality, web success and effectiveness. The focus of this study is related to exploitation rather than exploration of the existing factors, that is to garner a richer, more in-depth and qualitative understanding of the factors associated with the quality and success of tourism destination websites which are effectively run by destination

management organizations. However, and more specific to the focus of the study, is the DMO web home page, as the portal through which most to all, of the previous studies have neglected to direct exclusive focus on.

Dimensionality and the DMO home page

Information systems and advertising and communication literatures refer to web site dimensionality as the overall appearance of a web page and comprises the web page's *content, form* and *function* (Ryan, Field, & Olfman, 2002). A web page's *content* dimension of appearance includes texts, images, or graphics; *form* dimensions of appearance include the overall layout (e.g., look and feel of the homepage); and *function* dimensions include the interactive or task-oriented features (e.g., page links, uniform resource locators (URLs). Dimensionality factors from the information systems and tourism literatures were used to compare measures of the DMO's perceived (internal) effectiveness of new and/or significantly improved web marketing activities and measures of DMO web homepage appearance as perceived by online consumers. A fourth dimension, *emotion*, or entertainment (Kim & Stoel, 2004), refers to the feelings associated with use and interaction with the web page.

Singh and Dalal (1999) assessed the 'home page as an ad' research question whereby the authors assessed the conceptual, physical, and functional attributes of the web home page which could liken the homepage to an advertisement. These authors argued that conceptually, the home page has sponsored content made available via mass media (the Internet); physically, the home page has the appearance of a traditional ad with enticing graphics and hyperlinks; and functionally, the home page meets the criteria

of a fundamental communication message: to *inform* and *persuade.* Taken together, the authors concluded that indeed, the home page possesses attributes of an advertisement, acting as an "entry point to a Web site," suggesting that the differences between home pages and traditional ads merely "reflect the unique advantages of the Web medium" but that fundamentally, the web home page is a communications message. To fully utilize the potential of a web page, means providing rich user experience.

Other research on web home pages has coined the term 'cybergenre' (Yates & Orlikowski, 1992) to refer to genres of electronic communication in organizations. According to Dillon and Gushrowski (2000) web home pages are a type of cybergenre which serve as institutionalized templates for social interaction and for organizing communication between readers and writers, who reproduce them together (Orlikowski, Yates, Okamura, & Fujimoto, 1995). Moreover, Ryan, Field, and Olfman (2002) suggest that cybergenres change as access to information and communication technologies (ICTs) change, allowing communicators (such as DMOs) to adopt innovative techniques for media use as older genres disappear through selection, and new genres become preferred. An example of this is the gradual shift from paper brochure marketing to online web based marketing of destinations; or the adoption of online visitor check-in and feedback media.

The focus on the DMO web home page is distinctly related to the fact that the DMO and its web presence act as a mediating mechanism between the potential visitor and the travel destination. The home page serves as the first impression of the DMO and of the travel destination, determining in part the extent to which the online visitor or user of the page will decide whether or not to proceed to other sub-aspects of the page. To this

end, the present study seeks to employ both qualitative and quantitative methods towards understanding the presence and extent of homepage dimensionality, and to do so from the perspective of the DMO and online visitors to the DMO's web page.

For this reason, DMO web home page deserves special attention as it is the front door to the entire web site, and to the tourism destination. Geissler, Zinkhan, and Watson (2001) argue that the web home page has the power to entice or drive away visitors to the web page, and in the case of the DMO web site, to the destination. Moreover, Zhang et al. (2000) argue that the home page is usually the first page which is designed. As such, this study assumes that the DMO home page represents the rest of the web site, as a flagship page and the rest of the destination. Arguably, the experience of new and/or returning visitor experience with a destination begins with the "click" to the DMO home page—a precise moment for enticement or for chasing the visitor away. It is for this reason that the DMO home page is the focus of this study instead of the DMO web site.

Taken together, and in the context of the present study, two research questions are posed in Essay 3:

RQ1: *To what extent do online users' evaluations of the three dimensions of content, form and emotion in DMO home pages change over time?*

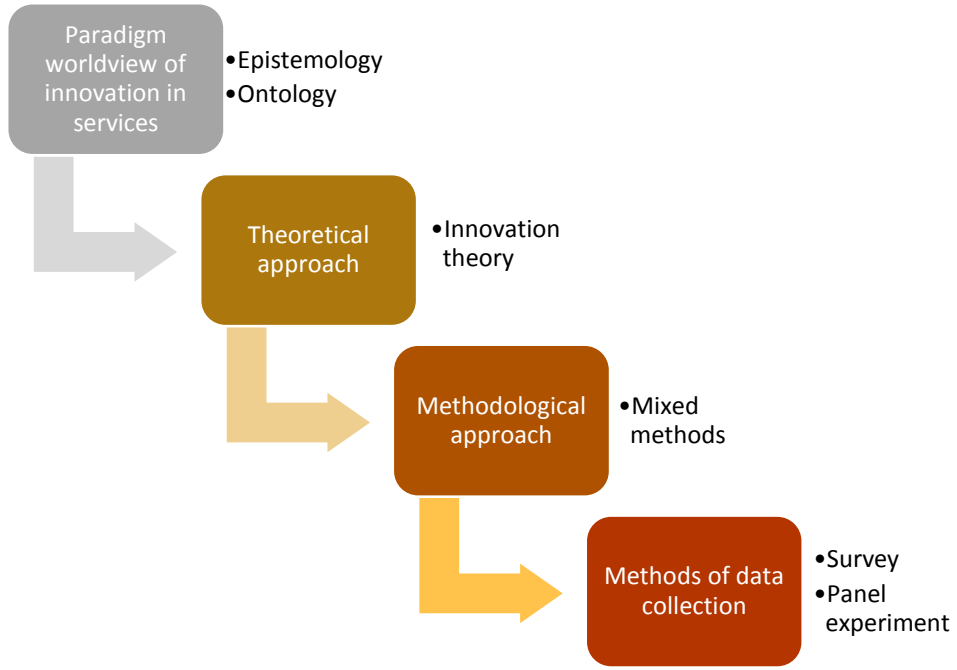
RQ2: *What factors do online users associate with innovative web home pages?*

The Research Study

Crotty (1998) contends that there exist four levels on which the research study may be developed: (1) paradigm worldview, (2) theoretical lens, (3) methodological

approach, and (4) data collection methods. Guided by Illustration 1, each is discussed within the context of the present study.

Illustration 1: Four Levels Of The Research Study



(Crotty, 1998 Adapted)

Philosophical Assumptions

Philosophical assumptions in mixed methods research consist of a basic set of beliefs or assumptions that guide inquiries (Lincoln, Lynham, & Guba, 2011), and occupy the first, top-most level in Illustration 1. As the researcher, I bring to a pragmatic worldview to this inquiry of the study of innovation activity in services, and more specifically, to the study of innovative marketing activities within a specific type of tourism organization, the DMO. This pragmatic worldview or paradigm (Kuhn, 1970),

informs the view that innovation in services may be studied from both the process and outcome perspectives; that innovation is both the means, and the end. In the context of the present study for example, the process of increased attention and constant updates and refreshing of the web home page is a form of incremental innovation activity related to the marketing of the destination. Further, DMOs who focus on incremental innovation activity as normative behaviors within their organizations and destinations contribute to more innovative web marketing strategies.

The ontological approach associated with this pragmatic view of innovation suggests that the nature of the innovation being studied is of positive benefit or value, to the entity being studied—the DMO, the destination, and/or its constituent stakeholders. To this end, hypothesized positions which are embedded in 'multiple realties' will be tested in order to understand the nature of innovative activity in the context of the web-based destination marketing web home pages. This contrasts with post-positivist viewpoint or example, for example, and is evidenced in the mixed methods approach being employed. For example, the study assumes that evidence of innovative activity should be measured understood not only from subjective perspectives of the DMO, but also from the perspectives of visitors to the DMO's web homepage. This in turn informs the theoretical lens upon which the study is premised.

Theoretical Approach

The second level in Illustration 1 Crotty relates to the theoretical approach corresponding to the epistemological and ontological views above, and which have been

expounded on in the above discussions on dimensionality and the social science theory of (incremental) innovation. Building on the definition of marketing innovation activity as the implementation of a new or significantly improved, marketing strategy or communication strategy over a period of time, the study combines measures of DMO web marketing activities for thirty North American DMOs with simulated visitors' ratings of the DMO's web homepage. The underlying objective is the search for convergence (or divergence) among these 'opposing' perspectives to provide a more complete understanding of the effectiveness of DMO web marketing activities. As previously articulated, a key concept relates to incremental innovations (e.g., web updates, changes) that eventually produce new and or significantly improves marketing outcomes. Siguaw, Simpson, and Enz (2006) have suggested that on their one, incremental innovations are almost imperceptible. Over time, however, small, incremental changes accumulate to become increasingly more manifest in their significance.

In sum, based on the philosophical and theoretical lens through which the author approaches the concept of innovation in services, focusing on the web marketing activities associated with the DMO home page, a mixed methodology approach is employed to understand the extent to which dimensionality exists in DMO web home pages, and change over time; and the extent to which convergence (or divergence) exists between DMO perceptions of innovative activities as part of their web marketing strategy on behalf of the destination and the views of visitors to their web page. This in turn informs the design and methodology discussed next.

Research Design and Methodology

Since the advocacy of multimethod/multitrait method (Campbell & Fiske, 1959) far-reaching efforts have been made to overcome the weaknesses of single method studies with mixing methods, the methodological approach represented in level 3 of Illustration 1. There is wide consensus that mixing methods can strengthen a study in the social sciences, largely because social phenomena are so complex, they require different methods to understand these complexities (Greene & Caracelli 1997).

The overarching objective of this study is to understand the extent to which online users' evaluations of the three dimensions of content, form and emotion in DMO home pages change over time, and the factors which online users associate with innovative web pages. To achieve this objective, the study employed a convergent parallel mixed methods approach (Creswell & Plano-Clark 2011), in which elements of survey and case data are analyzed separately, then together. The choice of the convergent parallel design is considered appropriate given there exists in the literature a need to develop a more complete understanding of the underlying behaviors associated with the role of DMOs in destination marketing activities from not only the DMO's perceptions of their innovative activities, but also from the perception of the visitors to the web homepage as well. A key contribution of this essay is the convergent, parallel approach which combines evaluative measures of DMO home page dimensions from different sources (i.e., surveys of 30 DMO executives and simulated online panel of visitors to the DMO home pages) to better understand the success factors associated with the DMO web homepage web marketing activities.

The Convergent Parallel Mixed Methods Design

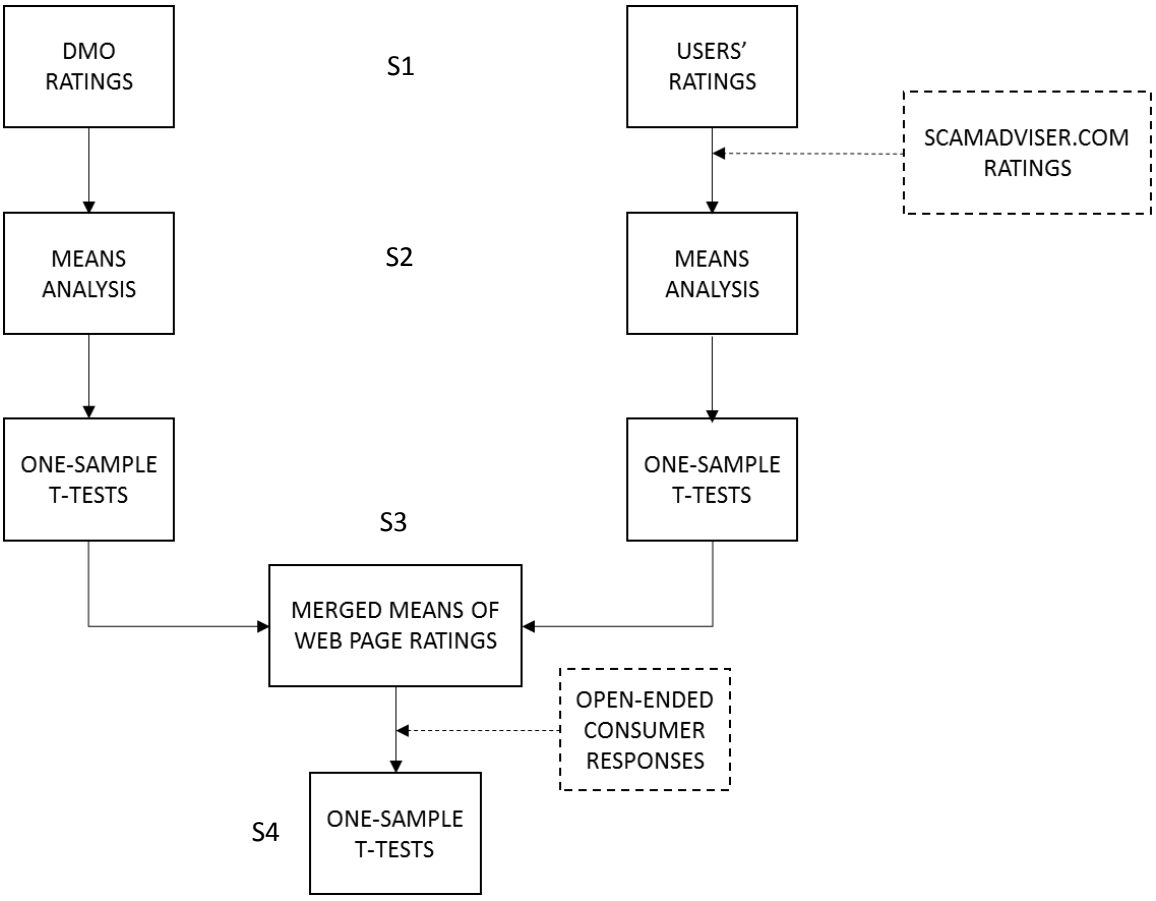
The study combines survey data collected from a sample frame of 125 U.S. DMO Executives (most of whom the researcher made contact with at the March 2015 Destination Management Association International (DMAI) Showcase), with simulated online rating panels of the DMO (cases) which represent a subsample (Wittink, Barg & Gallo 2006) of the surveyed DMOs. The survey and panel rating data are collected separately, analyzed separately, and them merged. This is in keeping with the convergent parallel mixed methods design.

The third leg of data collection uses scamadviser.com to obtain secondary characteristic measures namely *trust, popularity, speed* and *domain age.* In addition, Internet Archive's Wayback Machine (IAWM) to screen capture the homepages of the (n=30) subsample of DMOs into interactive PDF file formats for transfer into NCapture—an Nvivo database for Web content—at two time points. The IAWM is a library archive of web, video and other Internet content. With a database of nearly 460 billion web pages, the IAWM is able to capture the DMO's homepage (texts, images, hyperlinks, and layout) as it previously appeared. The first and second time points were randomly selected dates that the IAWM crawled the homepage in 2010 and the corresponding time point in 2015. The selection of these dates reflected the five year period corresponding to the questions on web dimensionality updates and overall marketing effectiveness asked of the DMO executives in the Qualtrics survey.

Figure 15 outlines the four steps taken in the convergent parallel design. In the first step survey data is gathered from DMO Executives and consumers separately. In the second step, the data is analyzed separately using means comparison testing. In the third

phase, data is combined based on corresponding identifiers (similarities or differences) between the two streams of data. In the fourth step the data is analyzed using means comparison testing.

Figure 15: Convergent Parallel Mixed Methods Design



Participants and design

i. Survey of DMO Executives

Data was collected via an online Qualtrics survey from a sampling frame of 450 destination management organizations (DMOs) representing destinations across North

America. Survey items related to the DMO's web marketing activities of the DMO were adapted from Roehl (2008). Contacts were obtained through face-to-face introductions to DMOs, CVBs, chambers of commerce, economic development agencies, tourism boards and similar entities attending Destination Management Association International's (DMAI's) 2015 Annual Destinations Showcase. The contact lists were combined, checked for duplicates, and the first invitation to participate in the survey sent on April 2015. First and second reminders were sent two and seventeen days following the first invitation. A final reminder was sent twenty-four days following the first invitation via an announcement in DMAI's weekly e-Newsletter. Thirty days from the initial invitation, all data collected to date was downloaded for analysis. All invitations and reminders were addressed to 'The Director'. A total of ninety responses were obtained, seventeen of which contained zero responses. These responses were considered evidence that a respondent may have only opened but did not begin the survey, and were subsequently discarded. This resulted in a final data set of 73 DMO-level responses. From these 73 responses, 30 DMOs were randomly selected for the present study. All participants indicated "yes" to a survey question that they operated an organization web site. The uniform resource locators (URLs) for these 30 DMOs were therefore obtained and used for the second leg of data collection: the consumer panel rating experiment.

ii. Consumer panel ratings

A second stream of data representing consumer ratings of cases was collected using Amazon's MTurk, an online crowdsourcing system where researchers may post tasks which can be completed via a computer (e.g., surveys, experiments). MTurk is

increasing in popularity among behavioral scientists, especially given the wide and diverse number of potential respondents and the low compensation levels.

MTurk has been used throughout the marketing field, and is becoming popular in tourism research. Shim, Vargas and Santos (2014) for example, used MTurk to conduct an exploratory study on oriental imagery and American attitudes towards Asia. A widely-recognized benefit of MTurk, as touted by some researchers (e.g., Berinsky et al., 2012; Simons & Chabris, 2012) as providing greater representativeness of samples, when compared with typical colleges samples. The MTurk platform functions as a one-stop shop for getting work done, and is compatible with online survey platforms such as *SurveyMonkey* and *Qualtrics.* Workers can browse available tasks and receive payment once the task has been successfully completed. Requesters create and post any human intelligence task or HIT, which may be done at a computer.

Buhrmester, Kwang and Gosling (2011) assert that MTurk is a new source of inexpensive, yet high-quality data. In a comparison of MTurk samples and standard Internet samples for example, the authors found that MTurk participants are slightly more demographically diverse than are standard Internet samples and are significantly more diverse than typical American college samples. Eriksson and Simpson (2010) suggest that MTurk samples allow generalizability to a broader population while Paolacci, Chandler, and Ipeirotis (2010) and Horton, Rand, and Zeckhauser (2010) suggest that MTurk is more comparable to the behaviour of laboratory subjects in more traditional experiments.

Procedure and Stimuli

Using the URLs for the 30 DMOs for whom Executives' survey responses were obtained, two images of the DMO's web page were obtained via the page's URL which was posted on the DMAI Showcase website. One image represented time=0, and represented a March 2010 image of the web page found in the Internet Archive Wayback Machine (IAWM). The second image represented time=1, and represented a 2015 image of the web page. This resulted in a total of 60 images (2 per DMO) which needed to be rated. Randomization was programmed so that (i) each image had the opportunity to be rated a minimum of 8-12 times, (ii) each rater was presented with no more than 12 images, and (iii) the order time=0 and time=1 images were randomized. Illustrations 1.0 and 2.0 provide examples of time=0 and time=1 images shown to a raters. These images provide sample screenshot images of the Greater Phoenix CVB used in the consumer ratings panel. Images 1.0 and 2.0 show screenshots of the Greater Phoenix CVB at time=0 (2010) and time=1 (2015). The five year window was chosen to ensure a corresponding time frame between consumer ratings and the DMO executives' ratings. For example, DMO executives were asked, "In the past five years, how often did you update content?" This step satisfied the convergent parallel design which requires a 'common identifier' upon which to merge different data (Creswell 2011), and upon which use of a 5-year window to compare time=0 and time=1 images was based.

Illustration 2: Sample Image of DMO Web Home Page at time t=0

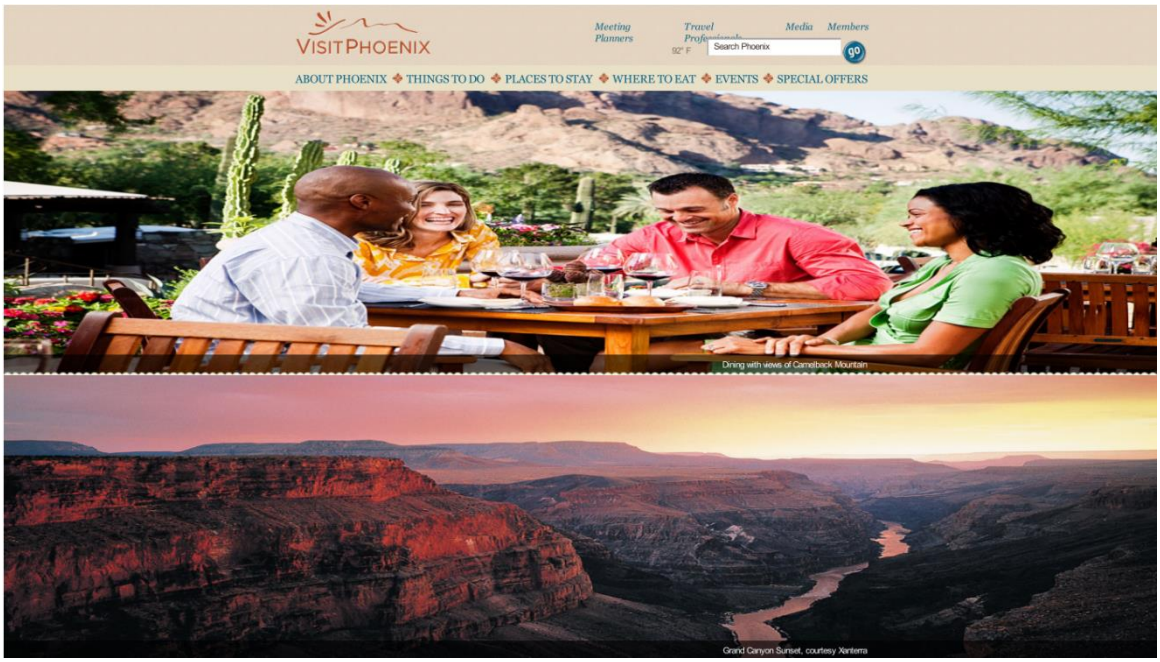
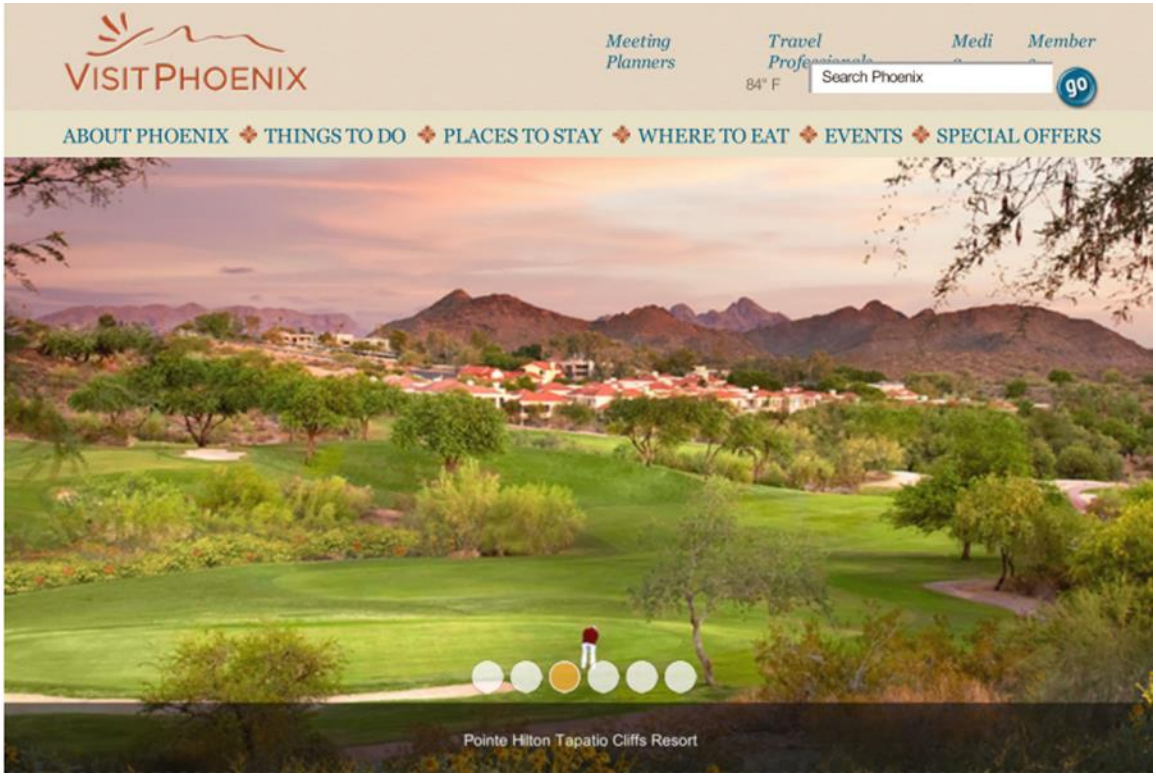


Illustration 3: Sample Image of DMO web Home Page at time t=1



Participants were asked a filter question about whether they had previously visited a DMO or destination web site for travel information about a destination. Participants who selected "No" were automatically filtered out of the survey. Subjects were randomly assigned twelve (12) images from any of the two time=0 or time=1 time points.

Measures for consumer rating panel

Table 9 shows the web dimensionality measures which were adapted from Kim and Stoel (2004) used to rate DMO home pages. Similar measures have been used to measure tourism and related websites within the tourism literature. For example, Lee, Cai and O'Leary (2005) used Morrison's (2003) website evaluation guide in their branding analysis of tourism websites. Yuan, Gretzel, and Fesenmaier (2006) employed a 2x2 matrix of DMO website performance measures, and suggest that web applications which were both important and in use by the DMO represented effective use of the web application to the DMO's web marketing strategy. A third widely used measure of website performance is contained in Stepchenkova, Tang, Jang, Kirilenko and Morrison's (2010) WebEVAL questionnaire of marketing effectiveness and destination effectiveness measures. However, it was decided to use the scale provided by Kim and Stoel (2004) for two reasons. First, this scale had previously been used in tourism research (e.g., Hashim, Murphy & Law, 2007; Law, Qi, & Buhalis, 2010). Secondly, the tourism website studies carry heavy emphasis on the functionality of the website, rather than the DMO homepage which is the focus of the present study.

The unit of analysis in this study is the DMO web home page, and not the web site. The importance of understanding the DMO home page relates to prior literature which argues that visitors to a home page make the decision to stay and/or search the site or new page based on "favorable impressions" (e.g., Singh & Dalal 1999) during those first few moments on the site's home page. If the home page fails to entice the user to stay, the dynamism of subsequent pages, deeper content is of little value, as it will not be seen by the visitor. In order to test the above research questions DMO web homepage dimensionality factors of *content, form,* and *emotion* were adapted from Ryan, Field and Olfman (2002). Measures of *trust, popularity, speed* and *domain age* measured using Scamadviser.com. It is important to point out here that, while DMOs have moved away from static to highly interactive pages, the study was not designed to facilitate rater's opportunity to interact with the page e.g., click through, scroll, or go to second- and lower levels of the web page, if necessary. Given the static nature of the stimulus therefore, it was decided to substitute "function" measures for "emotion" measures.

Table 9: Measures of DMO Web Home Page Dimensionality

Content-related measures	The destination web page is creative The destination web page is colorful. The destination web page is innovative.
Form-related measures	The destination web page is visually pleasing. The destination web page is easy to read. The destination web page is **not** inviting.
Entertainment-related measures	I feel cheerful when I look at the destination web page. I feel unhappy when I look at the destination web page. I feel sociable when I look at the destination web page.
Overall appeal	After seeing this destination web page, I would visit the destination.

(Kim & Stoel 2004, Adapted)

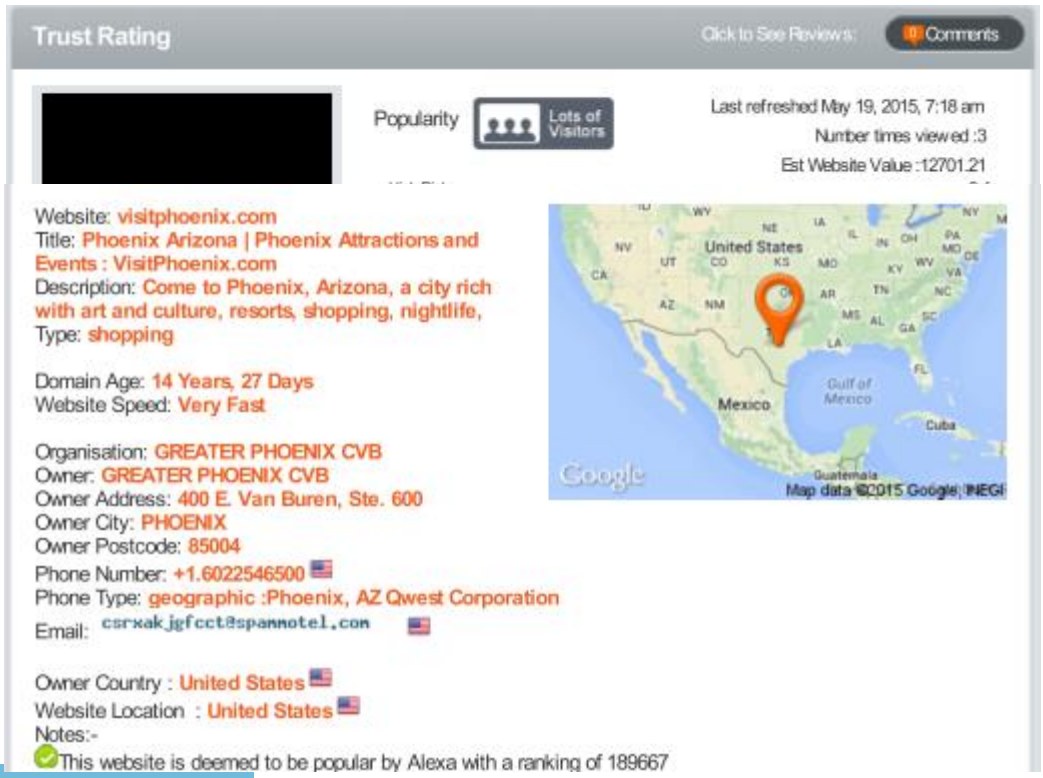
Content measures are shown in Table 9 and asked respondents to rate each page shown based on how creative, colorful, and innovative they thought the destination home page image was. *Form* measures asked respondents to rate the web page according to how visually pleasing the web page they found the web page, how easy to read, and whether or not they found the web page inviting. *Emotion* measures asked respondents to rate how cheerful, (un)happy, and sociable the web page image made them feel. Function, which is a factor of dimensionality, was not included given that participants were asked only to evaluate an image of the homepage—not to interact with the homepage. It was decided to replace this factor with emotion given that emotion would be able to provide a more representative measure of the nature of the static image of the DMO homepage. Each dimension comprised three items. An overall measure asked the respondent to All measures were presented on a 7-point Likert scale from 1=Strongly Disagree to 7=Strongly Agree. The key aspect of the convergent parallel design requires the researcher to merge the results of both case and survey data analysis for joint analysis using 'content areas' common to both data and data collection methods. For this reason, the third leg of data was collected from scamadviser.com at the focal unit of analysis: DMO home page level.

iii. Scamadviser.com website ratings

The third leg of website performance data was collected via www.scamadviser.com, a free, Internet-based website which allows any user to check a website they are about to make a purchase from. Information provided by the site includes owner, administrator and server information and other site details for a given website. Data gathered from www.scamadviser.com included website description, type,

domain age, owner, city location and *Alexa* popularity rankings. A single tourism Masters student was assigned the task of collecting data for each DMO homepage from the scamadviser.com site. The student was provided with information of thirty DMOs which represented a subset of the DMOs from whom survey data on web based marketing activities had been collected. Information provided to the student included the name of the DMO, city and state location, and the uniform resource locator (URL) reference address for the DMO's home page. For each DMO, the student inputted the URL into the scamadviser.com search information window, and entered the following data which was returned from the search: *website title, description, domain age, website speed, website trust rating, website popularity, associated organization, website owner, owner country, website administrator and website location*. Illustration 4 shows a screen capture of the scamadviser.com user site.

Illustration 4: Sample Screenshot of Scamadviser.com search: Greater Phoenix



Domain age was provided as the total number of days that the domain was in existence. Website speed was rated as one of four categories ranging from 1="very slow" to 4="very fast". Website trust was rated on a 0=100% percentile from "high risk" to "looks safe". All other data was obtained as provided by the scamadviser.com site.

Data Analysis and Results

In order to proceed to the next stream of analysis, a number of steps had to be followed to identify and confirm DMOs' identity from the survey data. In order to protect anonymity, survey were not asked to identify their DMO by name. Respondents were not asked to self-identify in order to prevent attrition on survey items which asked for confidential or poor performance results, e.g., asked to identify poor quality or negative outcomes of organization process.

The procedure for identifying the organization followed three steps. In the first step, internet protocol (IP) address were used to locate city/state level information. Cross checks were done between two geolocation sites: JSON and whoisicann.com. Where IP addresses brought up organization names, checks were carried out to ensure that these were the actual names of the DMOs and not the internet service providers. Addresses were then re-entered into a third database, DB-IP which contains IPv4 addresses. The second step involved using the latitude and longitude data from Qualtrics to cross-reference city/state information. This brought up city and street location using Google maps. Street names were searched in Google maps using the filters "tourism" "cvb" or "dmo" or "chamber". This produced the names of DMOs or CVBs in the panel used to

distribute the survey. Where more than one CVB was identified, there was a third step involving elimination of competing possibilities. The names of organizations and industry partners were used in this stage to cross-check the names of the DMOs. For example, if Greater Madison and Madison CVB were both in the sampling panel, partner names were used to triangulate and identify the focal DMO. This included telephone calls to the CVB to locate street names and checks of partners. An example includes the Corning Museum of Glass, NY & Co. identified as partners of one CVB. Once it was ascertained that the city/state/organization information was reasonably accurate, scamadviser.com was used to identify organization name using the URL from the DMAI website. Taken together, these three steps allowed to researcher to be reasonably certain that the correct identification had been made for the 73 DMOs.

Results of DMO executive surveys

Web marketing services

Of the 30 cases selected from the survey of DMO Executives, 76.7% thought that the innovation performance of their organization was good to excellent, while 73.3% thought that the innovation performance of their destination was good to excellent. As it relates to the location of service providers for the organization's website marketing activities, 63.3% of respondents indicated that website content is provided in-house, 30% in-house and outsourced, and 6.7% outsourced only. With respect to website design, 50% said these services are outsourced, 40% in-house and outsourced, and 10% in-house only.

Of total respondents, 53.3% indicated that website maintenance is provided by both in-house and outsourced providers, 30% in-house only, and 16.7% outsourced only.

Web marketing activities

As it relates to how often the dimensions content, form, and function were updated, 46.7% of DMOs update their websites content daily, 30% update their web site content between one and three times per week, 10% update their website content two to three times per month, and 13.3% monthly or less. As it relates to website form (layout), 6.6% update daily or two to three times per week; 10% two to three times per month; 13.3% monthly; 60% update less than once monthly; and 10% indicated that they never update their website layout. As it related to website function, 10 % update daily; 16.7% one to three time per week; 10% two to three times per month; 16.7% once per month; and 467% less than once monthly. As it relates to the overall effectiveness of their web marketing strategy, the majority of respondents (80%) regard their web marketing strategy as effective, 6.7% as very effective; and 13.3% were neutral. The pool of respondents represented executive directors (16.7%) with the remainder holding president or chief executive officer, vice president or other "C" suite titles of the DMO/CVB.

Results of consumer rating panel experiment

Respondent demographics

A total of 120 responses were obtained, 66 of which were filtered out via the filter question. This left a total of 54 completed responses. Of these responses, 63% were female and 37% male. The mean respondent age was between twenty-six and thirty years, with mostly employed in community and social services. Most respondents indicated that they were completing the HIT on a laptop computer (59%) while the second highest response indicated that the respondent was completing the HIT on a desktop computer (35%). All respondents were located in the US, a limit introduced by the research in designing the experiment.

Reliability analysis

Reliability analysis was conducted on each of the dimensionality measures of content, form, and emotion at t=1 and t=0 respectively to determine the internal consistency of the measures. For the t=1 measure of dimensionality, the Cronbach's alpha was (α = .886), and for the t=0 measure of dimensionality the Cronbach's alpha was (α = .882).

To address the first research question, to what extent do online users' evaluations of the three dimensions of content, form and emotion in DMO home pages change over time, means were calculated for each of the thirty DMOs as time=1 and time=0. A one-sample t-test was then run to test the significance of the difference in means for all n=30 DMOs between time=1 and time=0. The results suggest that the difference in

dimensionality between time t=1 and t=0 is statistically significantly different from zero, t = 4.948, df = 29, $p < .0001$. The first research question is therefore answered that dimensionality factors associated with DMO web pages do change over time, and further, the change is statistically significantly different from zero.

Table 10: Mean Ratings For DMO Home Page Dimensionality

State	DMO/CVB	t=1		t=0		t=1 - t=0
		Mean	SD	Mean	SD	Mean
OK	Oklahoma City CVB	5.1	1.502	3.36	1.832	1.74
IL	Choose Chicago	4.48	1.362	2.78	0.924	1.7
VA	Virginia Beach CVB	5.36	1.443	3.88	1.109	1.48
LA	New Orleans CVB	5.32	0.832	4.04	1.629	1.28
MA	Cape Cod CVB	4.56	1.449	3.46	1.578	1.1
MI	Detroit Metro CVB	4.09	1.635	3.05	1.348	1.04
NY	Visit Buffalo Niagara	5.07	1.732	4.1	1.301	0.97
SC	Myrtle Beach CVB	5.38	1.328	4.41	1.414	0.97
IA	Cedar Rapids Area CVB	4.85	1.695	3.95	1.549	0.9
PA	Valley Forge Tourism	5.07	1.687	4.24	1.398	0.83
NE	Omaha CVB	5.3	0.688	4.56	0.688	0.74
DC	Destination DC	4.33	1.629	3.59	1.453	0.74
MN	Meet Minneapolis	4.69	1.267	3.96	1.240	0.73
CO	Colorado Springs CVB	4.62	1.136	3.98	1.753	0.64
MD	Howard County Tourism Council	5.16	1.093	4.58	1.703	0.58
OR	Travel Portland	4.52	1.165	4.11	1.737	0.41
CO	Boulder CVB	5.12	1.165	4.74	2.003	0.38
MO	Visit Kansas City	4.51	1.138	4.18	0.820	0.33
PA	Philadelphia CVB	4.8	1.214	4.49	1.729	0.31
WI	Greater Madison CVB	4.81	1.231	4.51	1.662	0.3
NY	Westchester County Tourism & Film	4.99	1.202	4.77	0.715	0.22
TX	Frisco Texas CVB	4.63	1.776	4.52	1.422	0.11
PA	Pocono Mountains CVB	4.92	1.236	4.82	0.707	0.1
DE	Southern Delaware Tourism	4.03	2.011	3.94	1.362	0.09
LA	Visit Baton Rouge	4.58	1.084	4.56	1.489	0.02
LA	Louisville CVB	3.88	1.509	3.9	1.563	-0.02
IN	Visit Indy	4.73	1.311	4.99	1.288	-0.26
MI	Experience Grand Rapids	4.72	1.64	5.02	1.348	-0.3
CA	Sonoma County Tourism Bureau	4.42	1.422	4.77	1.342	-0.35
AZ	Greater Phoenix CVB	3.84	1.864	4.43	1.619	-0.59

Table 11: Mean Ratings For DMO Home Page Appeal

		Mean	Mean	Mean
State	**DMO/CVB**	**t=1**	**t=0**	**t=1 - t=0**
OK	Oklahoma City CVB	5.42	2.73	2.69
IL	Choose Chicago	4.78	2.18	2.60
VA	Virginia Beach CVB	5.08	3.31	1.77
MA	Cape Cod CVB	4.45	2.80	1.65
DC	Destination DC	4.36	2.89	1.47
SC	Myrtle Beach CVB	5.83	4.42	1.41
LA	New Orleans CVB	5.77	4.36	1.41
NY	Visit Buffalo Niagara	5.00	3.77	1.23
MI	Detroit Metro CVB	3.45	2.27	1.18
MD	Howard County Tourism Council	5.78	4.70	1.08
CO	Boulder CVB	5.45	4.55	0.90
NE	Omaha CVB	5.56	4.67	0.89
OR	Travel Portland	5.08	4.27	0.81
PA	Valley Forge Tourism	5.42	4.70	0.72
IA	Cedar Rapids Area CVB	5.18	4.50	0.68
LA	Visit Baton Rouge	4.44	3.78	0.66
MN	Meet Minneapolis	4.40	3.75	0.65
AZ	Greater Phoenix CVB	4.43	3.84	0.59
CO	Colorado Springs CVB	4.33	3.82	0.51
PA	Philadelphia CVB	5.10	4.60	0.50
MO	Visit Kansas City	4.55	4.10	0.45
PA	Pocono Mountains CVB	5.09	4.75	0.34
IN	Visit Indy	5.08	4.75	0.33
WI	Greater Madison CVB	4.75	4.45	0.30
TX	Frisco Texas CVB	4.64	4.42	0.22
LA	Louisville CVB	3.64	3.64	0.00
NY	Westchester County Tourism & Film	4.80	4.88	-0.08
DE	Southern Delaware Tourism	3.40	3.64	-0.24
CA	Sonoma County Tourism Bureau	4.25	5.00	-0.75
MI	Experience Grand Rapids	4.09	5.27	-1.18

Tables 10 and 11 show mean ratings for the 30 DMO/CVBs rated on home page dimensionality factors and home page appeal respectively. In the case of Table 10, home page dimensionality is the sum of all nine dimensionality items. In the case of Table 11,

home page appeal is the measure of a single measurement item which asked the rater the extent to which they would visit the destination, having viewed the image of the destination. Ordered from highest mean difference between time t=1 and t=0 to lowest mean difference between time=1 and time=0, the general pattern of differences show that most respondents rated home pages at time t=1 higher than at time t=0.

To address the second research question, what factors do online users associate with innovative web home pages, word queries were run in Nvivo 10 software on a set of open-ended questions asked of consumers, what makes a web page innovative? Weighted percentages were calculated and significant words are shown in the graphic in Illustration 5 below.

Illustration 5: Word Cloud Frequency of Responses to Open-ended Question, "What do you think makes a destination home page innovative?

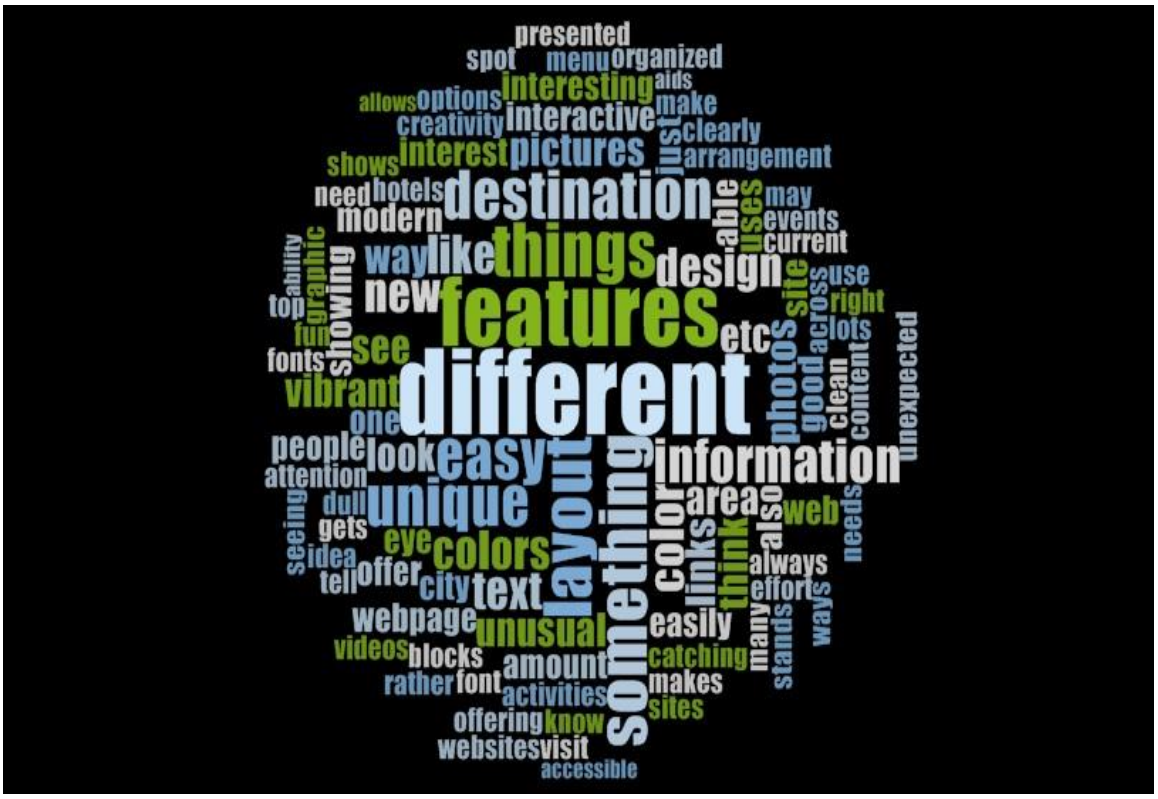


Illustration 5 shows a word cloud of the top 100 most frequently used words in response to the open-ended question. The word frequency criteria used for this search included the 100 most frequent words, with a minimum length of three letters, and with innovative stop listed in the search. As is seen from Illustration 5, key words which consumers associated with innovative web pages include “different”, “features”, “colors”, “layout”, “unique”, “interesting”, “design” and “information”. Words of the largest size carry a weighted percentage of greater than or .9% of total word coverage. Table 12 provides a list format of this data.

Table 12: Word Frequency Of Responses To Open-ended Question

Word	Length	Count	Weighted Percentage (%)
different	9	14	2.63
features	8	11	2.07
layout	6	8	1.50
destination	11	7	1.32
easy	4	7	1.32
unique	6	7	1.32
information	11	6	1.13
colors	6	6	0.94
design	6	5	0.94
new	3	5	0.94
text	4	5	0.94

Select responses to the open-ended question are provided in Table 13. From the responses to the open-ended question, "What do you think makes a web page innovative?" shown in Table 13, words and phrases such as "out of the box", "exotic and uncommon", "images or layout... unique", "unusual", "distinctive to that location... striking", "easily imagine being there in your mind", "solves a problem or need", and "photos that look like art" relate to the content and form measures of dimensionality.

Table 13: Selected Responses to Open-ended Question

Responses to open ended question	Respondent location by state
"...when there is out of the box thinking and uses photography that stands out and something you could see on the cover of National Geographic or something very exotic and uncommon."	OR
"Having images or layout that are unique. Offering services ore resources you don't typically see can make it innovative too."	MI
"An eye catching, unusual, yet easy to read layout, a photo that is distinctive to that location from a striking angle, color combinations that are both bright and harmonious, its ability to both energize and calm."	FL
"It allows you to experience a little piece of the destination. The webpage is structured so that the views can easily imagine being there in their mind."	IL
"Honestly, I don't know. It's very hard to be innovative; lots of things have already been done and if I had a concrete idea of what would be innovative I probably wouldn't tell. Generally though, if something solves a problem or need where there wasn't a solution before, I'd consider that innovative."	FL
"A unique spot that is featured or individual people doing different things around the city, real people, not models. I like the	TX

photos that look like art also. I think it needs to be modern and clean but vibrant and straightforward."

It may be therefore reasonable to conceive a theoretical and/or practical link between dimensionality and innovative marketing activities related to marketing and the DMO web home page.

Table 14: Pearson Correlations for DMO Home Page Dimensionality and Web Updates

		content_t1	form_t1	emotion_t1	During the past five years, how often were the following updated?- Website content (image, text, graphics, color)	During the past five years, how often were the following updated?- Website form (layout)	During the past five years, how often were the following updated?- Website function (links, scroll overs)
content_t1	Pearson Correlation	1	.823**	.711**	-.166	-.425*	-.354
	Sig. (2-tailed)		.000	.000	.380	.019	.055
	N	30	30	30	30	30	30
form_t1	Pearson Correlation	.823**	1	.629**	-.311	-.363*	-.283
	Sig. (2-tailed)	.000		.000	.095	.049	.130
	N	30	30	30	30	30	30
emotion_t1	Pearson Correlation	.711**	.629**	1	-.125	-.260	-.269
	Sig. (2-tailed)	.000	.000		.512	.165	.150
	N	30	30	30	30	30	30
During the past five years, how often were the following updated?- Website content (image, text, graphics, color)	Pearson Correlation	-.166	-.311	-.125	1	.379*	.390*
	Sig. (2-tailed)	.380	.095	.512		.039	.033
	N	30	30	30	30	30	30
During the past five years, how often were the following updated?- Website form (layout)	Pearson Correlation	-.425*	-.363*	-.260	.379*	1	.547**
	Sig. (2-tailed)	.019	.049	.165	.039		.002
	N	30	30	30	30	30	30
During the past five years, how often were the following updated?- Website function (links, scroll overs)	Pearson Correlation	-.354	-.283	-.269	.390*	.547**	1
	Sig. (2-tailed)	.055	.130	.150	.033	.002	
	N	30	30	30	30	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Conversely, correlation analysis of DMO home page dimensionality and updates depict negative and significant associations between content and form dimensions and DMO frequency of updates, as shown in Table 14 above. Given that frequency of updates

was coded from less frequent to most frequent, lower frequency of updates is associated with higher content ratings and higher form ratings.

Discussion and Conclusions

The focus of this study is on the DMO web home page, and is important for a number of reasons. First, existing research on tourism web presence and effectiveness tends to focus on the destination marketing organization's (DMO's) web site as a whole, rather than on the web home page. This has left the tourism literature awash with studies on the DMO web site, with a dearth of literature on the home page, the latter being considered the single most important page of any web site.

Most studies on DMO web site effectiveness incorporate either the tourism organization's self-evaluation of their own marketing activities from a managerial perspective, or from experimental investigations which simulate online user experience and activities. This study uses a convergent parallel mixed methods approach to incorporate both DMOs' and consumers' perspectives to gain insight into web marketing and related innovative activities, and ratings of web home page. Consequently, a key aspect of the study is the search for the extent of correspondence (or divergence) among i. data collected from DMO executives via online surveys, ii. data collected from users in a rating panel, and iii. data collected from secondary, online web site rating sources. Invoking a pragmatic approach understanding DMO web page activities, the study used common participant identifiers from each of the three data sources to understand the extent to which ratings of DMO web homepages could be better understood within the

context of innovation and change. Building on the definition of marketing innovation as the implementation of a new or significantly improved marketing strategy or communication strategy, the objective of the study was to provide a more complete understanding of the effectiveness of DMO web marketing activities from the triangulation of different types and sources of data. A key component of this is incremental innovations (e.g., web updates, web page innovation and change) that eventually produce new and or significantly improved marketing outcomes. A comparison of consumer ratings suggest that over time, consumer ratings of the dimensionality factors of the DMO web home page change over time. More specifically, content, form, and emotion, as well as appeal ratings showed positive overall change over time, as mean dimensionality ratings generally increased over time.

The basis on which the study sought to establish such convergence stems from the innovation literature. Specifically, DMOs which exhibited higher levels of incremental innovation activity (i.e., more frequent web updates) were expected to experience higher performance ratings related to content, form, and function metrics. While previous research has used either an internal evaluation of a web-based activity by the organization member, or an external evaluation from visitors to the website (e.g., Kaplanidou & Vogt, 2007; Kim & Fesenmaier, 2005) this study proposes to use a mixed methods approach to analyzing the web-based marketing activity of the DMO by way of assessing for convergence (or divergence) between both internal and external evaluations. Correlation analysis however showed no positive and significant association between dimensionality factors content, form, and function, and DMO executive responses to frequency of updates. In fact, a negative and significant correlation was found between content and

form dimensions and frequency of web updates of form. Form refers to the general layout of a web page, and are expressed in terms of location of page links (vertical, horizontal), information tabs, and other aspects of the design of where things are located on the page. These findings suggest that more frequent updates to form or layout is negatively associated with users' perception of content and form.

A possible explanation might be that users develop a sense of familiarity and favorability with view web pages (consciously or subconsciously) according to where they anticipate buttons, links, or icons to be located. For example, social media icons, contact information, and other related help resources may generally be located at the top of the page, and if radical change seeks to change the location of these items, it may not be to the benefit of improving the user's experience with the page. This is likely linked to the word "information" provided in the open-ended responses to what makes a web page innovative. On the other hand, qualitative responses by users suggest that they do favor change which can enhance the experience. Taken together, this might suggest that there may exist hygiene factors which must maintain a sense of consistency with basic user experience for say, information, but that other more hedonic dimensions which work favorably with innovation and change to entice the user to continue the experience of using the web home page and web site. Both hygiene and hedonic dimensions therefore exist as part of the web page experience. DMOs and destinations able to distinguish between these, and effectively implement change while balancing familiarity are likely to have higher levels of satisfaction associated with the DMO web page.

A second finding of the study relates to factors which online users associate with innovative web pages. Dimensionality factors of "color" and "layout" were among words

most frequently associated with what makes a web home page innovative. This suggests that DMOs who focus efforts on successfully implementing marketing and related innovation activities by appropriate use of color associated with the destination are likely to achieve higher ratings on the innovativeness of their web page. This supports prior research from the literatures related to color theory and destination branding.

Colors have associated meanings that can vary from person to person or be almost universal. For example, in western cultures the color black is associated with immorality, dirtiness and contamination while the color white is associated with morality, cleanliness and purity since moral cognition is embedded in our everyday experiences with the colors (Sherman and Clore 2009). As brightness is the white-to-black property of color, manipulating the brightness of advertisement colors from light to dark for tourist destinations should impact individual attitudes and perceptions of the destination. This effect may mediate the perceptions of businesses within the destination, with unfamiliar business brands affected more than familiar brands as unfamiliar brands are not part of an evoked set of alternatives (Baker et al., 1986) and do not carry previously established associations.

Communicating the brand message involves the use of images, color, logos, text, symbols and other related brand elements (Urry 2002). These elements represent communication of the macro-level destination, as well as the various business components of the destination, and include operational-level details such as dining, nightlife, shopping, attractions, entertainment and air/ground transport infrastructure. DMOs and their related tourism partners should therefore seek to represent the macro- and operational-levels of the destination experience through the effective use of text,

images, color, and symbols in a manner that appeals to the target visitor. Collectively, these images not only project a particular brand message, but are received and perceived through the visitor's cognitive and affective media as interpersonal imagery related to what Urry (2002) refers to as the *tourist gaze*.

An additional point which should be made in interpretation of these results is that older sites might appear old-fashioned, and not in keeping with current tastes and preferences. Given that tastes and preferences do change over time, it might be that older sites continuously receive lower ratings because the appearance is simply not in keeping with current tastes and fashion. This explanation does provide an opportunity for further testing.

Limitations and further research

As with almost all research studies, there are limitations inherent to aspects of the study, some of which create opportunities for further research. The reliance on global testing of means is a limitation to understanding specific in-depth case factors specific to a particular CVB/DMO. There is need to improve on this study with individual, in-depth case analysis (e.g., structured interviews) to understand DMOs on an individual basis. By employing additional in-depth inquiry, academicians and practitioners are able to better understand innovative behavior in the context of a DMO web page and more specifically, the extent to which DMOs' and users' perceptions of effective web pages converge (or diverge).

A second limitation of the study relates to the use of static web pages to conduct panel experiment. Most contemporary DMO web home pages are not static. Indeed, a home page is likely to scroll through three or more pages in order to feature various aspects of the destination. The focus on a static image of the first page of each of the web pages used in this study was primarily driven by the need on the part of the researcher to measure and assess dimensionality and innovative factors on a single, more manageable page, instead of an entire web site. The decision was also driven by the fact that DMO web home pages have been largely understudied in the tourism field. As an initial step this is both reasonable and adequate. However, by limiting the study to a static page, the experimental manipulation is absent of the dynamic trends of motion, sound, and other dimensions of the home page such as 'click through' ability. Future studies may seek to build on this by including multiple pages of the web home page. Further analysis may extend beyond the DMO home page, and to the entire DMO web site.

Additionally, further case research could compare how degrees of incremental change in one DMO's web marketing activities are associated with consumer ratings of the DMO's website. This might involve measuring DMO executive's and user and user perceptions at more than two points in time so as to conduct longitudinal analysis on how these perceptions change over time.

OVERALL CONTRIBUTION OF DISSERTATION RESEARCH

The three papers contained in this dissertation research make valuable contributions to the field of innovation in services, and more specifically to understanding innovation in the tourism domain. By incorporating a number of theories and perspectives from various fields of business, strategy, information systems and tourism, the set of essays in the dissertation analyses the innovation concept from multiple perspectives and multiple theories.

Important contributions are made to service innovation measurement by the use of longitudinal hypothesis testing and use of latent growth modeling (LGM) techniques, which are still in its nascent stages. Latent growth analysis is suggested to be a superior approach to longitudinal analysis, as it is able to overcome a number of the limitations associated with alternative methods such as repeated measures ANOVA and hierarchical linear modeling. The use of the technique in testing longitudinal hypothesis in the services context represent a cutting-edge approach to testing, building, and strengthening longitudinal theory in the services domain, and moreover, in the context of tourism.

Secondly, essay 1 assesses the use of indirect measures of innovative activity in manufacturing and service sectors, thereby contributing to both service theory and empirics. Service attributes have persuaded some economists to determine that innovation in services lacks attendant productivity and growth and as such, the domain has been relegated to low-intensity innovation activities. While the innovation concept may have its roots in the technology-manufacturing field, increasingly, economies are finding a growing number of establishments self-classifying as service sector entities. In light of this shift, services and non-technological innovation activities can no longer be

relegated to the 'back bench' of non-importance. Instead, studies such as that conducted in essay 1 which identified no significant difference between service sector firms ought to establish far-reaching innovation research for services including tourism, recreation, banking and finance, and other related service-oriented sectors.

The second essay represents an initial and important disaggregation of the network orchestration construct. The network orchestration lends much potential to studying innovation across the theoretical domains of networks, knowledge and innovation. As such, the construct represents a possible shift towards the synthesis approach to measurement of innovation processes and outcomes.

Essay 2 also lends key insight into the role of the destination management organization in innovation settings. The essay shifts the decades long conversation away from the strict notion of destination 'marketing or management' towards the context of innovation development, and the employ of a systems approach to better inform theoretical and practical innovation outcomes. The moderating role of ICT in essay 2 also contributes a theoretical an empirical link between essay 1 and the focus of essay 3.

By focusing on a particular type of innovation activity, essay 3 helps to shape the conversation on marketing innovation, and includes the notion that users of the DMO web homepage also form part of the innovation mechanism. This is done by way of the mixed methods paradigm to measure change over time, and moreover to better understand the factors which users associate with innovative web home pages.

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APPENDIX A
TWO-DIGIT NAICS INDUSTRY

NAICS 2-DIGIT CODE	INDUSTRY
113-115	Forestry, fishing, and agricultural services
21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale trade
44-45	Retail trade
48-49	Transportation and warehousing
51	Information
52	Finance and insurance
53	Real estate and rental and leasing
54	Professional, scientific, and technical services
55	Management of companies and enterprises
56	Administrative and support and waste management
61	Educational services
62	Health care and social assistance
71	Arts, entertainment, and recreation
72	Accommodation and food services
81	Other services (except public administration)
00	Multiple industries

APPENDIX B-i

SAMPLE MEANS

Variable	*Means*
$ICTEXP_{09}$	51.107
$ICTEXP_{10}$	51.447
$ICTEXP_{11}$	51.942
$ICTEXP_{13}$	51.359
$ANNPAY_{09}$	64.700
$ANNPAY_{10}$	61.403
$ANNPAY_{11}$	61.678
$ANNPAY_{13}$	56.545
$NUMEST_{09}$	96.071
$NUMEST_{10}$	85.910
$NUMEST_{11}$	87.230
$NUMEST_{13}$	72.909
IND_DUM	0.641

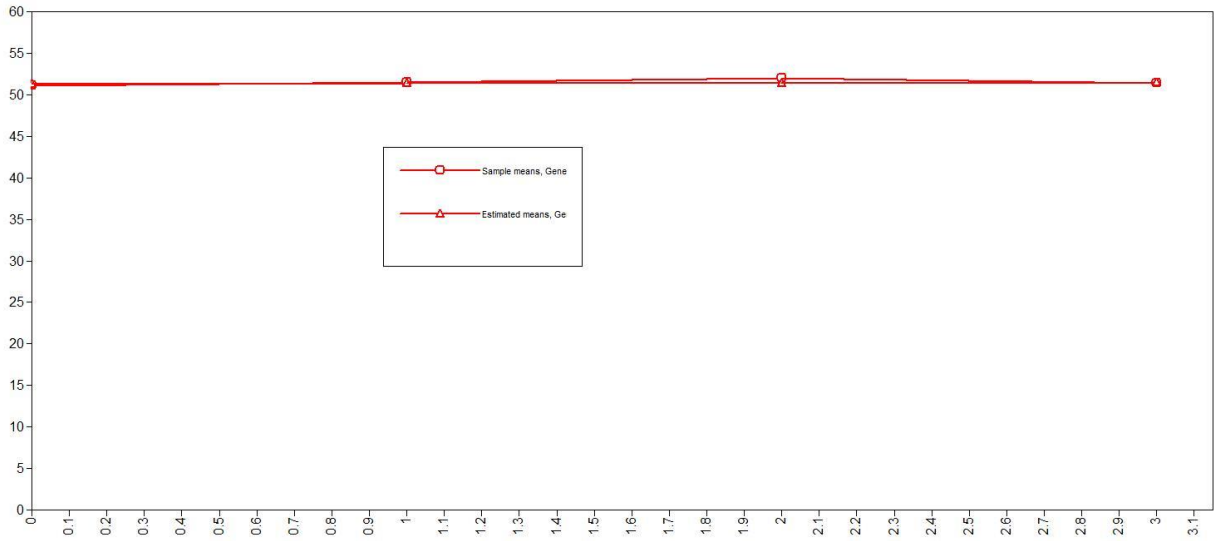
APPENDIX B-ii

SAMPLE CORRELATIONS (---, p<.001; --, p<.01; -, p<.05)

		ictexp09	ictexp10	ictexp11	ictexp13	annpay09	annpay10	annpay11	annpay13	numest09	numest10	numest11	numest13	tps_dum	ind_dum
ictexp09	Pearson Correlation	1													
	Sig. (2-tailed)														
	N	103													
ictexp10	Pearson Correlation	.826**	1												
	Sig. (2-tailed)	0													
	N	101	101												
ictexp11	Pearson Correlation	.765**	.858**	1											
	Sig. (2-tailed)	0	0												
	N	103	101	103											
ictexp13	Pearson Correlation	.763**	.778**	.814**	1										
	Sig. (2-tailed)	0	0	0											
	N	103	101	103	103										
annpay09	Pearson Correlation	-0.125	0.028	-0.024	0.033	1									
	Sig. (2-tailed)	0.211	0.781	0.812	0.745										
	N	102	100	102	102	102									
annpay10	Pearson Correlation	-0.081	0.01	-0.02	0.028	.942**	1								
	Sig. (2-tailed)	0.42	0.921	0.846	0.783	0									
	N	100	100	100	100	100	100								
annpay11	Pearson Correlation	-0.05	0.041	-0.024	0.026	.928**	.955**	1							
	Sig. (2-tailed)	0.616	0.682	0.813	0.797	0	0								
	N	102	100	102	102	102	100	102							
annpay13	Pearson Correlation	-0.039	0.061	0.016	-0.039	.869**	.873**	.922**	1						
	Sig. (2-tailed)	0.694	0.544	0.876	0.7	0	0	0							
	N	102	100	102	102	102	100	102	102						
numest09	Pearson Correlation	0.062	.215*	0.174	.213*	.588**	.538**	.559**	.442**	1					
	Sig. (2-tailed)	0.534	0.031	0.078	0.03	0	0	0	0						
	N	103	101	103	103	102	100	102	102	103					
numest10	Pearson Correlation	0.103	0.188	0.126	.201*	.543**	.546**	.521**	.401**	.970**	1				
	Sig. (2-tailed)	0.307	0.061	0.212	0.045	0	0	0	0	0					
	N	100	100	100	100	100	100	100	100	100	100				
numest11	Pearson Correlation	0.093	.211*	0.183	0.191	.521**	.536**	.589**	.466**	.946**	.978**	1			
	Sig. (2-tailed)	0.351	0.035	0.066	0.054	0	0	0	0	0	0				
	N	102	100	102	102	102	100	102	102	102	100	102			
numest13	Pearson Correlation	0.112	.235*	.201*	0.134	.504**	.492**	.567**	.575**	.863**	.845**	.915**	1		
	Sig. (2-tailed)	0.261	0.018	0.043	0.179	0	0	0	0	0	0	0			
	N	102	100	102	102	102	100	102	102	102	100	102	102		
tps_dum	Pearson Correlation	0.129	0.112	0.123	0.043	0.109	0.124	0.121	0.175	.260**	.245*	.280**	.334**	1	
	Sig. (2-tailed)	0.195	0.265	0.214	0.666	0.274	0.22	0.228	0.079	0.008	0.014	0.004	0.001		
	N	103	101	103	103	102	100	102	102	103	100	102	102	103	
ind_dum	Pearson Correlation	.323**	.362**	.350**	.229*	-0.007	-0.013	0.022	0.089	.258**	.262**	.281**	.341**	.368**	1
	Sig. (2-tailed)	0.001	0	0	0.02	0.94	0.9	0.823	0.371	0.008	0.008	0.004	0	0	
	N	103	101	103	103	102	100	102	102	103	100	102	102	103	103

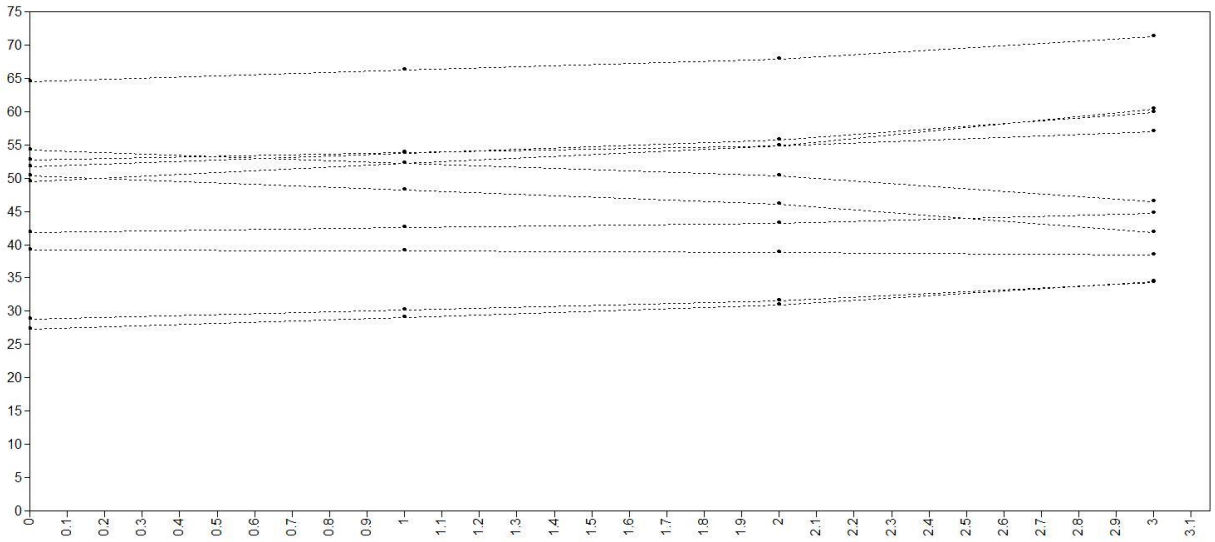
APPENDIX C-i

SAMPLE AND ESTIMATED MEANS: T1-ICTEXP THROUGH T4-ICTEXP



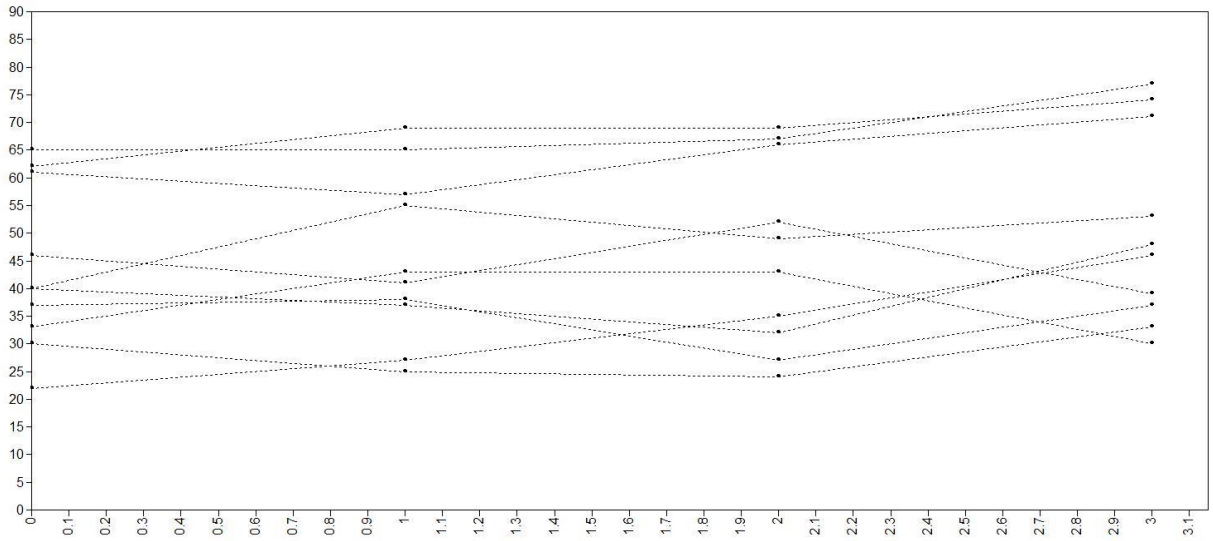
APPENDIX C-ii

ESTIMATED INDIVIDUAL VALUES: T1-ICTEXP THROUGH T4-ICTEXP



APPENDIX C-iii

OBERVED INDIVIDUAL VALUES: T1-ICTEXP THROUGH T4-ICTEXP



APPENDIX D
RESPONDENT CHARACTERISTICS*

ITEM	CHARACTERISTIC	FREQUENCY (%)
Organization Location	*West*	23.3
	Midwest	27.4
	North-East	28.8
	South	20.5
Organization Type	*DMO/CVB*	86.3
	Chamber of Commerce	5.5
	Part of city, county, state government	4.1
	Hotel, Accommodations, Lodging	2.7
	Other	1.4
Legal Form of Organization	*Non-profit organization*	74.0
	Government	17.8
	Corporation	4.1
	Other (Trust, JV, Estate, Cooperative)	2.7
	Partnership	1.4
Organization Age	*Number of years in operation*	
	1-2	1.4
	3-5	1.4
	6-10	5.5
	11-15	16.4
	16-20	13.7
	21-49	49.3
	50 or more	12.3
Organization Size	*Number of employees*	*(full-time / part-time)*
	0	9.6 / 27.4
	1-5	46.6 / 54.8
	6-10	16.4 / 6.8
	11-15	6.8 / 5.5
	16-20	9.6 / 1.4
	21-49	5.5 / 1.4
	50-99	5.4 / 1.4
	500 or more	11.4 / 0
	Annual R&D budget (US$)	
	100,000 or less	74.0
	100,001-250,000	13.7
	250,001-500,000	5.5
	500,001-750,000	1.4
	750,001-1,000,000	1.4
	1,000,001-2,000,000	2.7
	10,000,000-15,000,000	1.4
	Annual ICT budget (US$)	
	100,000 or less	79.5
	100,001-250,000	5.5
	250,001-500,000	6.8
	500,001-750,000	2.7
	750,001-1,000,000	2.7
	1,000,001-2,000,000	1.4
	10,000,000-15,000,000	1.4

*n=73

APPENDIX E
INNOVATION CHARACTERISTICS*

ITEM	CHARACTERISTIC	FREQUENCY (%)
Product Innovation Activities	***Organization***	
	New or significantly improved **goods**	
	0	11.0
	1	8.2
	2-4	19.2
	5-7	8.2
	8 or more	2.7
	New or significantly improved **services**	
	0	2.7
	1	5.5
	2-4	30.1
	5-7	5.5
	8 or more	5.5
	Destination	
	New or significantly improved **goods**	
	0	2.7
	1	13.7
	2-4	23.3
	5-7	5.5
	8 or more	4.1
	New or significantly improved **services**	
	0	5.5
	1	5.5
	2-4	27.4
	5-7	4.1
	8 or more	4.1
Process Innovation Activities	***Organization***	
	New or significantly improved **delivery method**	
	0	1.4
	1	6.8
	2-4	9.6
	5-7	1.4
	8 or more	2.7
	New or significantly improved **distribution system**	
	0	1.4
	1	6.8
	2-4	11.0
	5-7	1.4
	8 or more	1.4
	Destination	
	New or significantly improved **delivery method**	
	0	2.7
	1	5.5
	2-4	9.6
	5-7	1.4
	8 or more	0
	New or significantly improved **distribution system**	
	0	0
	1	9.6

	2-4	8.2
	5-7	1.4
	8 or more	0
Marketing Innovation Activities	***Organization***	
	New or significantly improved **communication strategy**	
	0	1.4
	1	15.1
	2-4	19.2
	5-7	2.7
	8 or more	4.1
	Destination	
	New or significantly improved **marketing strategy**	
	0	2.7
	1	6.8
	2-4	24.7
	5-7	4.1
	8 or more	4.1

*****n=73

APPENDIX F

FINAL SET OF MEASUREMENT ITEMS

Item	Measurement Items	Mean/(SD)
	Innovation Orientation (Cronbach's α = .878)	
IO_1	Our organization pays close attention to innovation.	4.00 / .816
IO_2	Our organization emphasizes the need for innovation for development.	3.97 / .797
IO_3	Our organization promotes the need for innovation development and utilization of new destination resources.	3.82 / .904
IO_4	Management embraces technological change.	4.18 / .834
IO_5	Management actively seeks innovative ideas.	3.91 / 1.026
IO_6	People are encouraged for new ideas even if they don't work.	3.29 / .719
	ICT Capability (Cronbach's α = .823)	
ICT_2	Our organization shares ICT platforms and databases with destination partners.	2.97 / 1.058
ICT_3	Our organization can access visitor information through shared systems with destination partners.	2.97 / 1.141
	Knowledge Mobility (Cronbach's α = .889)	
KM_1	We learn new ideas quickly.	3.50 / .663
KM_2	We frequently share new ideas with industry partners.	4.00 / .816
KM_3	We acquire external knowledge through informal means.	4.03 / .521
KM_4	Our organization is not responsible for ensuring knowledge is shared among partners.^{R}	3.88 / .686
KM_6	We periodically organize special meetings to share ideas with non-tourism partners.	3.44 / 1.186
KM_7	We constantly consider how to better exploit knowledge for innovation outcomes	3.85 / .892
	Innovation Appropriability (Cronbach's α = .705)	
IA_1	There is a high level of trust among industry partners.	3.76 / .741
IA_2	The costs of new projects are shared fairly among industry partners.	2.97 / .870
IA_3	The benefits from new projects are shared fairly among industry partners.	3.53 / .662
IA_4	Destination partners rely on city, state, or regional tourism organizations to enhance trust for resource collaborations.	3.50 / .961
IA_5	Destination partners rely on city, state, or regional tourism organizations to implement systems that enhance transparency.	3.35 / .917
	Network Stability (Cronbach's α = .874)	
NS_5	Destination partners rely on city, state, or regional tourism organizations to communicate destination vision.	3.71 / .938
NS_6	Destination partners rely on city, state, or regional tourism organizations to enhance destination reputation.	3.91 / .830
	Organization Process Innovation (OPI) Performance (Cronbach's α = .761) (N=15)	
$OPIP_2$	The new process innovations have extended goods/services within the main market.	4.07 / .884
$OPIP_3$	The new process innovations have extended goods/services outside the main market.	4.00 / .845
$OPIP_4$	The new process innovations resulted in environmentally-friendly and sustainable outcomes.	3.60 / .632
$OPIP_5$	The new process innovations created new domestic markets.	4.00 / 1.000
$OPIP_6$	The new process innovations created new overseas markets.	3.27 / 1.486
$OPIP_7$	Compared with other organizations, our new process innovations have been far more successful.	3.47 / .640
$OPIP_8$	Compared with other organizations, our new process innovation development cycle time has been shorter.	3.47 / .743
$OPIP_9$	Compared with other organizations, our delivery and distribution lines are much broader.	3.67 / .724
$OPIP_0$	From an overall profitability standpoint, our organizations process innovations have been successful.	4.20 / .561

	Organization Marketing Innovation (OMI) Performance (Cronbach's α = .744) (N=30)	
$OMIP_1$	The new marketing innovation replaced marketing/communication strategy being phased out.	3.10 / .995
$OMIP_2$	The new marketing innovations have extended goods/services within the main market.	3.90 / .712
$OMIP_3$	The new marketing innovations have extended goods/services outside the main market.	3.80 / .761
$OMIP_4$	The new marketing innovations resulted in environmentally-friendly and sustainable outcomes.	3.30 / .794
$OMIP_5$	The new marketing innovations created new domestic markets.	3.67 / .758
$OMIP_6$	The new marketing innovations created new overseas markets.	3.10 / .885
$OMIP_7$	Compared with other organizations, our new marketing innovations have been far more successful.	3.40 / .498
$OMIP_8$	Compared with other organizations, our new mkt innovation development cycle time has been shorter.	3.00 / .788
$OMIP_9$	Compared with other organizations, our product and service lines are much broader.	3.37 / .765
$OMIP_0$	From an overall profitability standpoint, our organizations marketing innovations have been successful.	3.87 / .730
	Destination Process Innovation (DPI) Performance (Cronbach's α = .773) (N=12)	
$DPIP_1$	The new process innovations have extended goods/services within the main market.	3.58 / .793
$DPIP_2$	The new process innovations have extended goods/services within the main market.	3.92 / .515
$DPIP_3$	The new process innovations have extended goods/services outside the main market.	4.08 / .793
$DPIP_4$	The new process innovations resulted in environmentally-friendly and sustainable outcomes.	3.58 / .669
$DPIP_5$	The new process innovations created new domestic markets.	3.92 / .669
$DPIP_6$	The new marketing innovations created new overseas markets.	3.50 / 1.243
$DPIP_7$	Compared with other destinations, our new process innovations have been far more successful.	3.67 / .778
$DPIP_8$	Compared with other destinations, our new mkt innovation development cycle time has been shorter.	3.42 / .793
$DPIP_9$	Compared with other destinations our delivery/distribution lines are much broader.	3.42 / .669
$DPIP_0$	From an overall profitability standpoint, our destination's process innovations have been successful.	4.00 / .603
	Destination Marketing Innovation (DMI) Performance (Cronbach's α = .771) (N=21)	
$DMIP_2$	The new marketing innovations have extended goods/services within the main market.	4.20 / .551
$DMIP_3$	The new marketing innovations have extended goods/services outside the main market.	3.97 / .556
$DMIP_4$	The new marketing innovations resulted in environmentally-friendly and sustainable outcomes.	3.53 / .900
$DMIP_5$	The new marketing innovations created new domestic markets.	3.63 / .928
$DMIP_6$	The new marketing innovations created new overseas markets.	2.93 / 1.285
$DMIP_7$	Compared with other destinations, our new marketing innovations have been far more successful.	3.43 / .679
$DMIP_8$	Compared with other destinations, our new mkt innovation development cycle time has been shorter.	3.40 / .814
$DMIP_9$	Compared with other destinations our product and service lines are much broader.	3.37 / .890
$DMIP_0$	From an overall profitability standpoint, our destination's marketing innovations have been successful.	4.10 / .712

APPENDIX G

DECISION-TREE FOR ESTABLISHING TYPES OF MEDIATION AND NON-MEDIATION

DECISION TREE FOR ESTABLISHING AND UNDERSTANDING TYPES OF MEDIATION AND NONMEDIATION

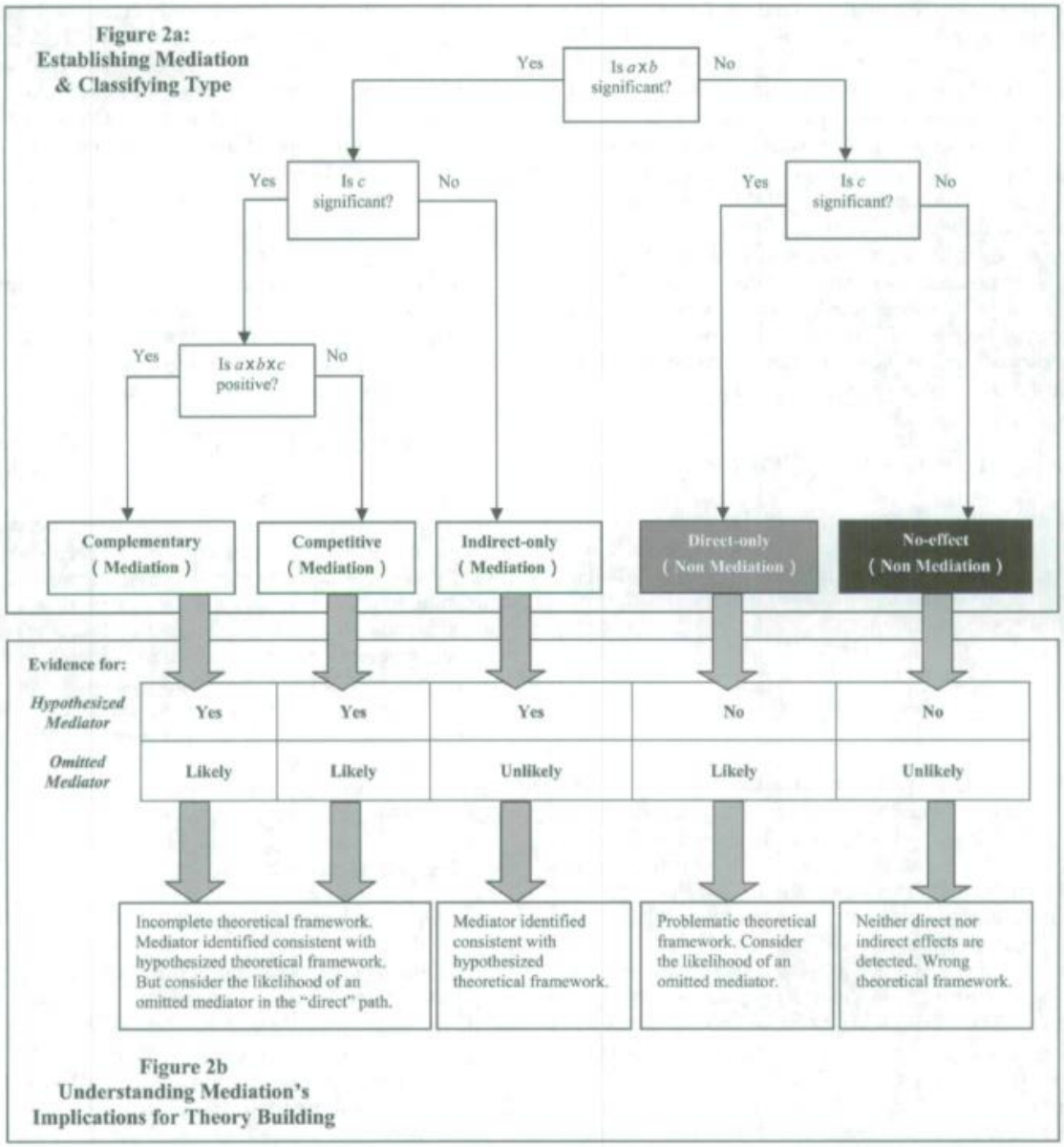


Figure 2b
Understanding Mediation's Implications for Theory Building