

## Emerging economy entrepreneurs and open data: Decision-making for natural disaster resilience

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### ABSTRACT

The aim of this study is to examine the role of Open Data in entrepreneurial decision-making in a destination threatened by natural disasters and located in an emerging economy. The region of La Araucanía, in Chile, was chosen because it constantly faces the threat of devastating natural disasters and is also the poorest region of Chile. Primary data was collected through semi-structured interviews and awareness-building workshops, with a convenience sample of 32 entrepreneurs out of 150 registered for Federation of Tourism Businesses (FEDETUR's CET) program. The study found that local entrepreneurs are reasonably aware of the advantages and disadvantages of platforms that link supply and demand for tourism services. However, they express little interest or trust in publicly available information, and use terms like 'internet data' and 'technology' interchangeably with 'information' and 'platforms'. We conclude that in order for entrepreneurs in emerging economies to strengthen their businesses' resilience to natural disasters in the digital economy era, adjustments in their decision-making processes need to be made. Tourism-dependent places situated in emerging economies rely heavily on micro and small businesses. Greater awareness of how future economies are both 'atom-enabled' (landscape and other tourism resources) and 'bit-dependent' (digitalization of tourism) would benefit tourism entrepreneurs facing natural disaster-induced business disruptions by enabling timely and more appropriate responses. The study opens the academic debate on the role that open data could come to play in entrepreneurial decision-making within emerging economies when tourism businesses are disrupted by natural disasters.

### Introduction

Entrepreneurs functioning in emerging economies during the digital era often encounter natural, non-digital disasters. Many Chilean tourist destinations constantly face threats like earthquakes, tsunamis, volcanic eruptions, flood-related calamities, and wild forest fires (Gutiérrez-Vega, 2013). Tourism entrepreneurs at tourist destinations threatened by natural disasters must make complex business decisions. Entrepreneurs whose businesses are 'atom-enabled' (tourist attractions are mostly built around natural amenities or tangible expressions of culture) become 'bit-dependent' and draw upon the digital spaces for data, information and, thus, development of knowledge. This study addresses how tourism entrepreneurs in emerging econo-

mies view the potential for incorporating open data into their entrepreneurial decision-making in the context of a business disruption caused by a natural disaster.

In 2013, the United Nations World Tourism Organization (UN-WTO) reported a 3% growth in inbound tourism in Chile, while in 2016, Chile came closer to the Latin American average of 5%. SERNATUR (2015) reported that 43,598 businesses were providing tourism or related services, and that 96 % of them were micro (self-employed), family, or small-to-medium enterprises (based on a mix of OECD, USA, and EU classifications of businesses). Chile hosts approximately 250 tourist destinations throughout its territory, most of which are emerging and 40 of which are in the consolidation stage (SERNATUR, 2015). This study analyzes tourism entrepreneurs based in the La Araucanía region of Chile, one of the country's top 20 destinations due to the abundance of lakes, volcanoes, and national parks in the region.

Nowadays, all tourism entrepreneurs must be technologically proficient and aware of ongoing digital and technological transformations. Gretzel, Sigala, Xiang, and Koo (2015) demonstrates that data is an underlying component of 'Smart Tourism', which, aside from being a "new buzz word" (p. 179), is the "convergence of internet and communications technology (ICTs) with the tourism experience" (p. 181). However, there still is no consensus on how best to generate knowledge to help tourism entrepreneurs make business decisions in tourist destinations located in emerging economies and threatened by natural disasters.

The definition of a natural disaster, as inspired by Runyan (2006) and Monllor and Murphy (2017), is the likely, though unforeseen, onset of a spontaneous event of natural, geophysical causes, which, at least momentarily, disrupts business in the place exposed to it. For tourism entrepreneurs, natural disaster onsets lead to the loss of clients (tourists), the temporary cessation of services and activities, and the consequent reduction of income and productivity.

Previous studies of TEs, SMEs, and informal business ventures exemplify that small tourism businesses do not choose a single path towards building-up a natural disaster resilience in their ventures (Biggs, Hall, & Stoeckl, 2012; Cioccio & Michael, 2007; Dahles & Susilowati, 2015; Orchiston, 2013; Robinson & Jarvie, 2008; Xu, Chen, & Dai, 2017). However, until now, these paths have been studied by employing elements of Faulkner (1999, 2001) and Faulkner and Vikulov (2001) tourism disaster management framework despite the fact that it was developed 15-16 years ago when the information flows were different, and the technological development did not allow generation of information of current scope and scale (Žebrytė & Bustos, 2017). In addition, only four studies to date have focused on tourism entrepreneurs operating in tourist destinations located in emerging economies. Other studies refer to businesses in general, without regard to their scale or location in developed countries where resources as well as human, cultural, and social capital affecting entrepreneurial business decision-making differ substantially from those available in emerging economies. Furthermore, as evidenced by Nouri and Ahmady (2018), research is still lacking on the distinct topics related to the entrepreneur decision-making.

To understand tourism entrepreneurship, we rely on Solvoll, Alsos, and Bulanova (2015), borrowing their 'combination approach', whereby the empirical study of tourism sector entrepreneurs feeds back into mainstream entrepreneurship theory. Tourism Entrepreneurs are particularly sensitive to disasters that occur at the tourist destination where they operate their

businesses.

Moreover, entrepreneurial decision-making is a day-to-day, place-based function of a nascent tourism business venture owner-manager. For a tourism entrepreneur based in an emerging economy at a natural disaster-threatened tourist destination, being aware of and prepared for any likely natural disaster means having the tools to enact flexible patterns of action. Open Data is one of the tools that can be directed towards tourism business resilience. This study looks at the incorporation of Open Data into entrepreneurial decision-making in the context of tourist destinations constantly threatened by natural disasters.

Viewing entrepreneurial decision-making as a series of intertwined actions and reflections, we refer to real-life events, which highlight the absence of conceptual tools for understanding how tourism entrepreneurs in emerging economies incorporate the developments of the digital era, such as Open Data, into their resilience strategies.

This paper is structured as follows. First, the existing knowledge on entrepreneurial decision-making, tourism business resilience, and Open Data is summarized as it informs our qualitative case study of emerging design. Next, the research methods used in the study are detailed. Then, the findings and results are presented, followed by discussion and conclusions.

### **Conceptual Framework**

Often tourism entrepreneurs' businesses are embedded in relatively inflexible spatial, temporal, socio-cultural, and socioeconomic contexts. Entrepreneurial decision-making in the tourism sector is largely a place-based affair where localized relationships and resources (Nouri & Ahmady, 2018), such as data, play a key role. Reports from empirical research on entrepreneurial decision-making in a tourist destination threatened by natural disasters and located in an emerging economy are scarce. Thus, data analysis from the exploratory case study of a small group of tourism entrepreneurs based in La Araucanía - a region constantly threatened by natural disasters. Such as volcanic eruptions, earthquakes, floods, storms, and wild-forest fires - was informed by entrepreneurial decision-making theory (Douglas, 2005; Shepherd, Williams, & Patzelt, 2015) and Runyan's (2006) research on the practices and attributes of small business owners which help them prepare for, respond to, and recover from a natural disaster. Taken together, the ability and capacity to overcome the ambiguity and shock of a 'high consequence' natural disaster onset that directly or indirectly affects the tourist destination is what characterizes a resilient

tourism entrepreneur (loosely based on Runyan, 2006, and Hall, Malinen, Vosslander, & Wordsworth, 2016). In other words, for tourism entrepreneurs, resilience to natural disasters is the uninterrupted practice of making decisions before, during, and after a natural disaster, that allow their businesses to withstand natural disaster-related business disruptions.

Two important limitations exist within the previous studies. First, Runyan's 2006 study concerns SMEs in a general sense, not Tourism Entrepreneurs specifically. However, Solvoll et al. (2015) argue that there are distinctions to be made between the two groups. Secondly, research conducted in Australia, New Zealand, and the United States, shows that social institutions as well as private and public organizations in mature economies operate differently from those in emerging, developing, or maturing economies. However, in the absence of a more appropriate conceptual framework, it was necessary for the authors of the current study to rely on these findings as well.

### **Tourism Entrepreneur Decision-Making and Natural Disasters**

In the places where uncertainty and exposure to natural disasters is a constant threat, tourism entrepreneur resilience, rather than firm survival, is a better conceptual fit. A resilience mindset allows for the development of informed entrepreneurial decision-making prior to, during, and after the onset of a natural disaster. This latter period, in terms of information seeking for decision-making, Joshi and Anand's (2018) reasonably claim that "as perceived uncertainty increases it will be more strongly related to non-routine information search rather than the routine sources" (p. 51). However, it is exactly in the routine knowledge development for resilience building, which commences markedly earlier than *ex post*. Shepherd et al. (2015) detail three dimensions useful to the present study: "Heuristics and Biases in the Decision-making Process", "Characteristics of the Entrepreneurial Decision Maker", and "Environment as Entrepreneurial Decision Context" (p. 15-16). Although Shepherd and colleagues found that most entrepreneurial decision-making literature focuses on entrepreneurial opportunities as well as entry and exit decisions, some articles reviewed during their study looked at the factors within the three previously mentioned dimensions of decision-making.

Evidence on heuristics and biases in entrepreneurial decision-making reveals a heterogeneous group in terms of optimism, overconfidence and reliance on experience, and "a considerable number of studies have found that entrepreneurs are more biased in their deci-

sion making than non-entrepreneurs" (Shepherd et al., 2015, p. 30). Further, cultural differences (in the widest sense, including gender, ethnicity, nation, minority vs. majority, vulnerable or marginalized versus dominant, privileged vs. post-colonial etc.) effect entrepreneurial decision-making in multiple ways, including emotionally. This might further exacerbate the bias involved in entrepreneurial decision-making. Finally, the developed vs. developing (emerging) economy context has been proven to influence key practices of the ventures (Shepherd et al., 2015).

Entrepreneurial response is usually focused on mitigating the direct and indirect effects of the crisis that follows a high impact natural disaster onset (Runyan, 2006). Biases, suppositions, self-confidence, and shifting social and economic environs play an important role in both the response and anticipatory decisions made by tourism entrepreneurs. Entrepreneurial decisions are, by definition, related to risk-taking (Douglas, 2005; Shepherd et al., 2015). Runyan's (2006) research on the practices and attributes of small business owners, which help them, prepare for, respond to, and recover from a natural disaster, identifies the use of immediate post-emergency decision-making. However, what about situations where entrepreneurial decision-making is of anticipatory nature, where a tourism entrepreneur is aware of natural disasters threatening the tourist destination and is willing to prepare for future events? What if a tourism entrepreneur realizes that risk must be mitigated to ensure the continuation of a business or to overcome business disruptions with minimal negative impact? What resources are available to the tourism entrepreneurs of emerging economies to aid them in such decision-making?

### **Open Data Use in Tourism Entrepreneur Decision-Making**

Based on the European Data Portal and Hossain, Dwivedi, & Rana (2016), Open Data is a movement which encourages "mostly public organizations to release objective, factual, and nonperson-specific data [...], to anyone, with a possibility of further operation and integration, without any copyright restrictions" (p. 14-15). "Open data comprise various types of data—primary (census data) or secondary (economic trend), real-time (such as traffic or weather data) or offline (government spending), location-based (toxic waste dumps) or generic (regional healthcare costs), reports, maps, satellite photographs, pictures and paintings, the genome, medical data, scientific formula, public sector budgeting, food-safety information" and others (Hossain et al., 2016, p. 15).

This study looked at conventional tourism entrepreneurs and their understanding of the potential of Open Data use to build resilience in their businesses that function in a ND-threatened tourist destination located in an emerging economy. Immediately following the onset of a natural disaster onset, there is “pressure on decision makers to act sooner rather than later. This may mean decisions are made without all available information” (Runyan, 2006, p. 14). Natural disaster onset makes tourism entrepreneurs aware of actual and potential business disruptions, creating an opportunity for anticipatory, proactive decision-making. This is consistent with information from the European Data Portal about digital transformation trends and entrepreneurship (European Data Portal 2015; Walker & Simperl, 2018).

### **Research Context and Strategy**

This paper reports on an action-research case study with open and emerging design rooted in knowledge transfer-based intervention in the field (McDonald et al, 2015; also, see Henry and Foss (2015) on context-embedded case study to advance entrepreneurship research). By examining the Tourism Entrepreneurs of the La Araucanía region, in Chile, this study explores how entrepreneurial decision-making in the context of natural disasters could benefit from Open Data use.

### **La Araucanía, in Chile, as the Context**

According to the Comisión Nacional para la Resiliencia frente a Desastres de Origen Natural [National Commission for Chile Resilient to Disasters of Natural Origin (CREDEN, in Spanish), “[o]n average, each year between 1980 and 2011, Chile recorded losses close to 1.2% of its GDP, due to [reoccurring] natural disasters” (CREDEN, 2016). Meanwhile, Chile is growing quickly in the use of ICTs, tech startups, and digital technology development (Aravena, S., 2017; UNCTAD, 2017; WIPO, 2014). The Division of Entrepreneurship and the Division of Digital Development are both hosted under the Department of the Sub-secretary for the Economy of the Ministry of Economy, Production and Tourism.

The growth of the tourism sector in Chile is driven by thousands of entrepreneurs who are either self-employed, family, micro, or small business owners, and who operate as providers of tourism or related services. These entities and an undefined number of recently founded, informal businesses are tourism entrepreneurs functioning in an emerging economy (on Chile as an emerging economy, please see Geldes, Fel-

zensztejn, & Palacios-Fenech, 2017).

This case study used two factors to select tourism entrepreneurs in the region of La Araucanía. The first was the frequency and variety of natural disasters that affect the fast-developing tourist destination wherein tourism entrepreneurs operate their businesses. The 2010 earthquake, 2015 volcanic eruptions, and 2015-2016 wild-forest fires had recently affected the emerging international tourist destination and consolidated national tourist destination of La Araucanía. Secondly, the regional capital, the city of Temuco, has embarked on a publicly and privately funded program to become a Smart City. Additionally, in June of 2017, the town of Pucon, located near several lakes and close to the mountain range within the region, was recognized by Smart City Business America (2017) as the place with the biggest potential of becoming a ‘Smart Destination.’ Upon receipt of the award, Smart Tourism and Smart Destination concepts gained traction in local and regional politics. Tourism entrepreneurs and companies were invited to imagine how they could shift their business models towards smart tourism.

### **Method and Open Strategy**

To help tourism entrepreneurs face the challenges posed by every-day and/or emergency entrepreneurial decision-making, Chile’s FEDETUR has set up the CET program, which trains Tourism Entrepreneurs in the use of ICTs. A total of 150 tourism entrepreneurs from La Araucanía have enrolled in this program. To better assess the impact of the program, FEDETUR invited the researchers to observe the implementation of this capacity-building program. Subsequently, the researchers examined the depth and breadth of the program, in a region where the aspiration of becoming a smart destination is shared by private and public sectors, and where high intensity and high impact natural disasters onsets have and will affect the built environment, the natural surroundings, and the businesses of the destinations.

As warranted by emerging and open design several research techniques were introduced after being approved by stakeholders in the action-research project. FEDETUR turned down the idea of applying a survey to each of the 150 entrepreneurs involved in the program. Instead, the researchers decided that a convenience sample would be appropriate for this exploratory case study. The participants of the study had to be made aware of the benefits of their participating in it. Thus, given that most tourism entrepreneurs are not tech-savvy or highly digitally-skilled, the intervention had to be based not only on the practitioner men-

toring program organized by the FEDETUR, but also on awareness building by way of which the academia could directly deliver an immediate benefit.

Consequently, in addition to the FEDETUR-organized training under the CET program, in which the researchers performed non-participant overt observation, three additional opportunities were identified as points of interaction with the convenience sample of 32 tourism entrepreneurs. First, a business administration student was designated to conduct a four-month long internship with the Destination Management Organization (DMO), focusing on a Smart Destination project in which short sessions of natural disaster awareness and preparedness-building for Tourism Entrepreneurs took place as a response to the 2015 volcanic eruptions. Second, the researchers organized a “Digital Tools for Tourism Enterprise Management” workshop in September of 2017. Third, a seminar on smart destinations was organized in October of 2017, as part of a strategic competitiveness-building project (with funding by the Chilean government made available through CORFO). On all three occasions, as part of a seminar training activity and intervention, the authors applied a simplified, semi-structured interview guide, which had been informed by the tourism business resilience and entrepreneurial decision-making literature.

As for the time dimension of entrepreneurial decision-making in the context of natural disasters threat, it may be divided into a minimum of three stages: (i) before (what might be considered to be periods of normality, consisting of short, medium, or long-term intervals of general uncertainty surrounding the entrepreneurial processes in natural disaster-prone tourist destinations); (ii) during and within 72 hours of the onset of a natural disaster (immediate relief); and (iii) 72 hours and later (the business response to the event). This case study concentrated on the first and third stages, and collected data to this effect by including relevant questions in the instrument.

The brief, semi-structured interviews were applied to a convenience sample of 32 tourism entrepreneurs from La Araucanía tourist destinations. The sample of the informants consisted of men and women of Chilean nationality who consider themselves to be tourism entrepreneurs, having operated in tourism sector value chains for anywhere between 1 and 30 years. Three of the interviewed entrepreneurs provide services to stores, hotels, restaurants, or agencies in the region (B2B), while the rest declare national and international tourists whose destination is La Araucanía as their final clients (or end users).

To triangulate the data, secondary and tertiary data sources have also been included. Technical publica-

tions such as UN-WTO manuals and APEC reports on hazards and resilience, European Data Portal analytical reports on open data (European Data Portal 2015; Walker and Simperl, 2018), as well as Spain’s SE-GITTUR smart tourism and smart destination manuals (López de Ávila, Lancis, García, Alcantud, García, & Muñoz, 2015) were reviewed. Further, searches in WoS and Scopus databases with the following key words (in diverse combinations) were run: “tourism entrepreneurs” / “tourism business” AND/OR “natural disaster” AND “emerging destination” / “emerging economy” AND “resilience / preparedness / risk mitigation / response / recovery / restoration / adaptation” / AND “data” / “Big Data” / “Open Data” / “digital technology” / AND/OR “decision-making”. The literature was organized in double entry tables. First, a table was created with the titles ‘theory’ and ‘approach’ listed by row in the first vertical column, and ‘issue’, ‘problem’, and ‘phenomenon’ listed by column on the first horizontal row. This table hosted the summaries of findings and contributions of 49 studies identified as relevant to the research question. Second, bibliometric data of the said studies was organized by journal and date of publication. Studies that were published before the emergence of the contemporary understanding of Open Data (before the dot com crisis of the early 2000s) were discarded.

Thematic data analysis was carried out as co-authors gathered for in-person or telephone discussions and memo comparison. An intern iteratively tested the concepts in the field, as her internship allowed for follow-up meetings with the participants of the study. In this way, the researchers were able to test their interpretations and receive feedback from the participants of the study. Such meetings had the format of observations or brainstorming sessions on what smart tourism and smart destination building projects entail. In both cases, memo writing took place.

Finally, when developing the main instrument (the semi-structured interview questionnaire), the authors kept in mind that normal, every-day entrepreneurial decision-making takes place in two ways: (a) bearing in mind the risk presented by natural disasters for the business, or (b) ignoring natural disasters. Both types (a) and (b) influence the business after the onset of a natural disaster. Furthermore, tourism entrepreneurs may make business decisions while considering the impact of the natural disasters at a specific destination, the tourism sector in general, or the world. The latter, arguably, is too broad to realistically consider on an operative, day-to-day decision-making basis, or even at times on a strategic decision-making basis, so this research does not take it into account.

## Findings and Results

The interviewed tourism entrepreneurs were quick and clear in noting that their clients often resolve their own needs through digital technology tools. The participants of the study were aware that their clients organized their trips using technology, mainly with information found on the internet, social media, opinion pages, or blogs and other platforms. In addition, the entrepreneurs agreed that the information handled by the customers was essential when making decisions. The tourism entrepreneurs were reasonably aware of the advantages and disadvantages of platforms that link supply and demand in the tourism sector, including Booking.com, TripAdvisor, Trivago, Expedia, Kayak, Despegar.com, hotwire.com, hipmonk, skyscanner, Airbnb, AsiaTravel, Travelocity, mondotees, travelandleisure.com, bookingchick, AA.com, and JetBlue. However, they could not explain what kind of data or information (again, tourism entrepreneurs rarely distinguish between these two terms) could be harvested, either free of charge or upon payment, from these platforms or through these apps or websites.

With respect to the use of technologies in their own businesses, tourism entrepreneurs have introduced different management tools into various processes, such as service management, promotion, and direct sales, among others. The channels that tourism entrepreneurs use to obtain data relevant to their businesses are mainly the internet and social media. They consider that the information issued by public sector entities or intermediaries is of secondary importance.

Further, there was no clear differentiation in use of the terms ‘data’ and ‘information’, regardless of probing and question rephrasing by the authors. The tourism entrepreneurs are aware that they can provide information about their services, solve business-related problems, sell directly to clients, and promote their businesses through ICTs. However, they show little interest in collecting, storing, and organizing ‘small or medium data’ relevant to their businesses. They consider that to be a task for academia, local authorities, and Destination Management Organizations. But, at the same time, they confess distrust in any Chilean entity to handle their commercial data. When the TEs’ attention is drawn to the fact that the national strategy drafted by CREDEEN and approved by the Chilean government stipulates the creation of a multisectoral data center, the Tourism Entrepreneurs say that they “might” look into this new source of digital data organized into information for decision-making.

When presented with the examples of the Austra-

lian Tourism Data Warehouse [1] and the Visit Helsinki Open Data Portal [2], the participants of the study manifested a negative outlook about the prospects of both public and private tourism sector stakeholders in Chile ever contributing to similar Open Data portals or platforms. Tourism entrepreneurs responded that openness is just not a part of Chilean ‘character’ or ‘culture’. This assumption, however, is being challenged by the emerging discourse of open, public innovation, promoted by the government through programs like ‘Laboratorio de Gobierno’, CORFO, and other government agencies. Further, only the Tourism Entrepreneurs, which belong to larger tourism sector B2B networks, such as FEDETUR, and run an international operation, are familiar with the EU’s EuroStat for the tourism sector [3] and use it for looking up current patterns and trends to better cater to foreign clients. In the same vein, when asked if they know of the information (data) available from the portals listed below, the Tourism Entrepreneurs reply without hesitation that, surely, Chile is not providing trustworthy information: Open Government Data of OECD members [4] and World Bank Open Data [5].

In addition, the tourism entrepreneurs consider that comparing Chile to developed countries is counterproductive. They frequent seminars and workshops where consultants from countries such as Spain give out recipes for tourism development without regard to local and regional socioeconomic realities. “That is not how we do things in Chile” is a reoccurring phrase when a tourism entrepreneur is asked if a training or seminar was useful or if he or she will apply what they learned to better their business management.

Regardless of the lack of awareness, nation-wide Open Data generation and delivery portals exist. They provide fractioned data which is then pooled together and processed by several university-based observatories, though not in a consistent manner. Some of the Chilean Open Data portals that provide relevant information to non-digital tourism entrepreneurs who wish to develop resilience in the face of natural disasters are:

1. Servicio Meteorológico de la Armada [6];
2. Centro Sismológico Nacional, Universidad de Chile [7];
3. Observatorio (OVDAS) and Red Nacional de Vigilancia Volcánica de Chile, Sernageomin;
4. Registro Nacional de Prestadores de Servicios Turísticos, SERNATUR.

These public services use Facebook and Twitter accounts to publish data in real time. Tourism entrepreneurs cannot mine this data, but they can rely on

the Twitter alerts and Facebook posts from the related accounts.

Notably, when the tourism entrepreneurs are asked what they know about Big Data and Open Data use in the tourism sector, they declared a total absence of awareness about these terms and their functions. However, the interviewees do have a positive impression about the integration of ICTs in the management of their businesses, and they expressed a desire for free information in order to improve their decision-making, although they feel that the information should be pre-processed by an intermediary.

Kitchin (2014) argues, that “[w]hile not all forms of knowledge are firmly rooted in data – for example, conjecture, opinions, beliefs – data is clearly base material for how we make sense of the world” (p. 12). Such sense-making is an essential part of the entrepreneurial characteristics and process, and influences (i) opportunity exploring, spotting and exploiting; (ii) risk-taking, (iv) decision-making, creating, innovating etc. (Carmichael & Morrison, 2011; Olaison, 2014; Solvoll et al., 2015). These characteristics of entrepreneurial decision-making are magnified in emergency situations (Johannisson & Olaison, 2007). Periodically, a natural disaster may become a ‘high consequence event’ (Runyan, 2006) and mark a ‘before’ and ‘after’ in terms of how tourism entrepreneurs view the tools which make their businesses more resilient. The owner-manager perspective holds special relevance here as entrepreneurs in general, and Tourism Entrepreneurs specifically, generally rely on their mindsets and free resources because third party mindsets (consultancy services) and/or resources (pay-per-download data, information or *know how*) are usually outside their financial means.

Figure 1 demonstrates how Open Data becomes relevant in tourism entrepreneur decision-making as a “touristic resource” (Gretzel et al., 2015, p. 181). Both Kitchin (2014), in general, and Gretzel et al. (2015),

specifically for tourism, identify the components of the concept ‘smart’. Regardless of whether the tourism entrepreneurs in the studied tourist destinations consciously aim at creating a smart tourism ecosystem (Gretzel et al., 2015), Open Data, as a freely available and accessible resource, has one of the biggest roles to play in the wake of a natural disaster.

To explain the concept of data, the authors looked to previous studies, like Kitchin (2014), which defines data as the following:

The raw material produced by abstracting the world into categories, measures and other representational forms – numbers, characters, symbols, images, sounds, electromagnetic waves, bits – that constitute the building blocks from which information and knowledge are created. Data is usually representative in nature (e.g., measurements of a phenomena, such as a person’s age, height, weight, color, blood pressure, opinion, habits, location, etc.), but can also be implied (e.g., through an absence rather than presence) or derived (e.g., data that is produced from other data, such as percentage change over time calculated by comparing data from two time periods), and can be either recorded and stored in analogue form or encoded in digital form as bits (binary digits). (p. 1)

Information is categorized data with meaning and significance attributed to it by the tourism entrepreneur through management and processing. Knowledge is experience acquired through previous decision-making and practices developed through trial-and-error, adjustment and adaptation. For resilient businesses, information and knowledge are essential factors for entrepreneurial decision-making prior to, during, and after the onset of a natural disaster, and cannot be cultivated without access to appropriate data.

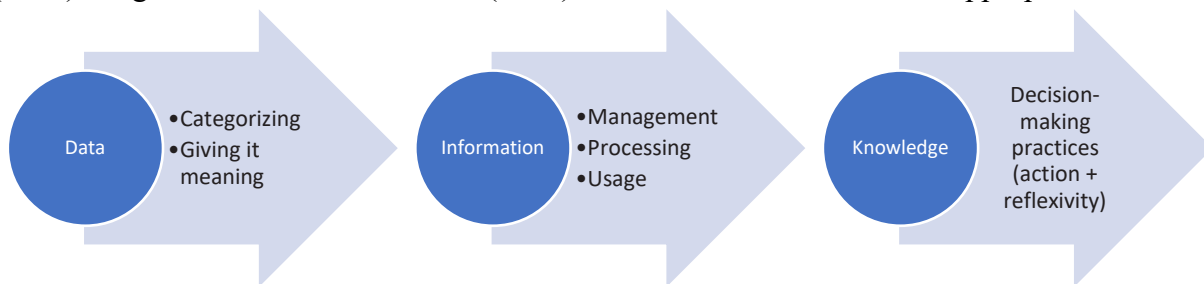


Figure 1. The Role of Data in Entrepreneurial Decision-Making  
Source: Developed by the authors based on Kitchin (2014)

During a natural disaster invoked emergency, many resources are limited or absent (Olaison, 2014). However, the range of cultural, informational, communicational, and digital resources available to tourism entrepreneurs grows by the minute. In a cost-restrictive scenario, the accessibility of Open Data poses an evident opportunity for the tourism entrepreneur. The broadest understanding of openness includes “the use and reuse, reworking, redistribution, or reselling” of information (Kitchin, 2014, p. 49). In other words, Open Data is a “valuable commodity” (see Verwayen et al., 2011, in Kitchin, 2014, p. 56), and an even more valuable asset or resource for a tourism entrepreneur. In addition to providing critical safety and disaster relief information, Open Data is relevant in an entrepreneurial setting in emerging economies because it is free and relatively easy to access.

The results of this research advance the understanding of the potential of Open Data usage by tourism entrepreneurs, specifically in regards to business decision-making. Summarizing the results, (i) the entrepreneurial ecosystems perspective has oversaturated current academic research, resulting in smaller economic units, like entrepreneurs, being overlooked by academia; (ii) the challenges are numerous for developing an Open Data-based decision-making framework; (iii) further empirical research is needed regarding Open Data usage by tourism entrepreneurs when their businesses have been disrupted by a natural disaster. The challenges indicated in point two include, for example, the size of a business venture, which can be perceived as an obstacle for process-innovation such as Open Data usage, and the lack of social capital available to entrepreneurs operating their businesses in tourist destinations located in emerging economies.

## Discussion and Conclusions

While the wider theme of the research is not new, the object and subject of this study are both original. The usage of Open Data by tourism entrepreneurs in an emerging economy to make business decisions at a tourist destination frequently affected by natural disasters has not been studied previously. This research is not singular to Chile, and can be applied to other emerging, small business-driven economies that are being re-oriented away from commodity exports and towards services, digitalization, and innovation.

General literature on the socioeconomic impacts of non-man made or (versus) natural disasters on businesses and locations is abundant, especially on supply chain disruption and marketing challenges after a natural disaster. Engineering, accounting (including

insurance costs), and risk management literature offer insight on the extent of losses and the recovery speed in various industries and sectors (López, 2010; Hall et al., 2016). Studies on risk management and firm survival include themes such as the resilience of SMEs in the context of globalization and new technologies (Gunasekaran et al., 2011) and SME recovery from natural disasters, like hurricane storms (Runyan, 2006).

Across literature, tourism resilience includes tourist destination resilience, tourism sector resilience, tourism organization resilience, and a range of other phenomena (Hall et al., 2016; Lew & Cheer, 2017). The tourism sector carries individual, personal, business, territorial, national, and international implications and is uniquely influenced by natural disasters (Farrell & Twining-Ward, 2004, 2005; Faulkner, 1999, 2000; Hall et al., 2016). Hall et al. (2016) presented a thorough review of business, organizational, sectorial (consumer demand), and destination resilience in New Zealand’s urban settings after the Christchurch earthquakes, and offered many themes regarding post-disaster business management, including but not limited to owner-manager decision-making. This seminal work broadens our understanding of tourism business resilience building in a mature economy setting.

Meanwhile, researchers such as Calgaro and Lloyd (2008), Larsen et al. (2011), Biggs et al. (2012), and Falk (2012) focused on Thailand’s emerging economy, looking at urban and coastal destinations, the tourism sector, and enterprise resilience in the aftermath of floods and tsunamis. Gutiérrez-Vega (2013) developed a tool for comparing tourist destination resilience, which was used in Chile’s emerging economy setting, after the 2010 earthquake-tsunami. However, none of the literature analyzed tourism entrepreneur resilience in an emerging economy as a consequence of a series of entrepreneurial decisions made prior to, during, and after the onset of a natural disaster.

Bringing tourism entrepreneurship studies closer to bridging the theoretical and empirical gaps would allow a more nuanced view of the ways in which tourism entrepreneurs could strengthen the natural disaster-resiliency of their businesses in an emerging economy for which the tourism sector is a top priority. These studies could then have an impact on policy-making. For example, government programs aimed at fostering entrepreneurship and the digitalization of the economy could benefit by learning how Open Data usage can be incorporated in tourism entrepreneurs’ business venture recovery models as the costs of access to other types of data are often prohibitive in the emerging economy context.

The ongoing Open Data and smart tourism move-



ments will at some point intersect. The debt, therefore, lies with the academics and practitioners who withhold or reluctantly transfer knowledge and technology to the tourism sector in a timely fashion and with necessary sensitivity to the context. Further empirical studies should investigate the broader themes of access to and use of various Open Data platforms by TEs. In this respect, language and other barriers to cognitive, interpretative, or technical skills are two pending topics on which knowledge is lacking. This claim is consistent with Sonfield and Lussier's (2014) findings about entrepreneurs' levels of education and decision-making. Even though this later study looked at levels of innovation and risk, the general take-away from their study is that levels of formal education of an entrepreneur are related to their decision-making when operating a business. Arguably, one important step for the entrepreneurs with respect to the Open Data would be 'getting your hands on the data', while another would be unlocking the information contained in that data and building up one's knowledge through information usage, processing and management.

The limitations of this research are in that (i) it focuses on a small sample of entrepreneurs from an emerging economy; (ii) it reviews previous research on tourism business recovery in a natural disaster context leaving aside man-made disasters; and (iii) it distances itself from the concepts of 'tourism disaster' and 'tourism crises', deeming them to be too general for nuanced analysis. Furthermore, the transformative nature of Open Data usage in decision-making may be duly questioned because this resource is only one of many available when responding to a natural disaster-induced business disruption.

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### **Acronyms and Abbreviations**

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APEC	Asia-Pacific Economic Cooperation
CORFO	Corporacion de Fomento de la Produccion (in Spanish) [Production Development Corporation]
CET program	Training program run by FED-ETUR and aimed at improving tourism entrepreneurs' internet and communications technology (ICT) related skills.
CREDEN	Comisión Nacional de la Estrategia Nacional de Investigación, Desarrollo e Innovación para un Chile Resiliente frente a Desastres de Origen Natural (in Spanish) [National Commission for Research, Development and Innovation for Chile Resilient to Disasters of Natural Origin]
FEDETUR	Federación de Empresas de Turismo (in Spanish) [Federation of Tourism Businesses]
SERNAGEOMIN	Servicio Nacional de Geología y Minería (in Spanish) [National Geological and Mining Service]
SERNATUR	Servicio Nacional de Turismo (in Spanish) [National Tourism Service]
SME	Small to Medium Enterprise
SubSeTurismo	Subsecretaria de Turismo del Ministerio de Economía, Fomento y Turismo (in Spanish) [Sub-Secretary of Tourism of the Ministry for the Economy, Development, and Tourism]
WIPO	World Intellectual Property Organization
UN-WTO	United Nations World Tourism Organization

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### Endnotes

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