PEAK OIL: A HIDDEN ISSUE? SOCIAL REPRESENTATIONS OF PROFESSIONAL TOURISM PERSPECTIVES

Cite as:

Becken, S. (2015). Peak Oil – a hidden issue: social representations of professional tourism perspectives. *Journal of Sustainable Tourism*, 24(1), 31-51.

Abstract

Peak Oil, the peaking of global oil production, is a collective risk highly relevant to the tourism sector. Public discourse on Peak Oil, however, is limited. To better understand what ‘sense’ tourism experts make of Peak Oil, and provide a platform for future debate and action, this research used the theory of social representation to explore core and peripheral elements that constitute Peak Oil representations and help tourism stakeholders to conceptualize and address this issue. Using free association methodology, 101 tourism experts worldwide provided up to five words and three mental images describing their thoughts and feelings about Peak Oil. The analysis highlights the importance of economic impacts and alternative energy sources, as well as anchoring effects to more established concepts such as sustainability and climate change. Notably, each of the four professional sub-groups approached (Academics, Consultants, Government and Industry representatives) had markedly different core beliefs. There was no agreement on whether Peak Oil was concerning or not, and whether action is required by the tourism sector to address negative impacts. This was particularly evident with the industry sub-group. Future research and policy implications are outlined, including the role of the media, and its responsibility to facilitate this discourse.

Keywords: Peak Oil, social representation, free association, images, tourism experts

Introduction

This 21st Century has been called the ‘Century of Declines’ (Heinberg, 2007), referring to declines in biodiversity, freshwater resources, the production of fossil fuels, and minerals. However, unlike the intensive debates about carrying capacities in the 1970s and 80s, critical discussions about finite resources and planetary limits have almost vanished from the public and scientific debates (Hall & Day, 2009; Urry, 2010). Thus, while demand for resources continues to rise, concerns about their limits have fallen into the background. This discussion gap is despite the high economic and social risks associated with finite resources, in particular “Peak Oil”. A decline in global oil production is perceived by some as the most imminent and pervasive challenge to humankind (Hall & Day, 2009). Oil is critical to the global economy and transportation systems. Ninety-five percent of all goods produced around the world depend on the input of oil, either as an energy source or as the base material of lubricants, plastics, pharmaceuticals, textiles and paints (Alekklett, 2012). Tourism is especially oil dependent.

The Peak Oil discussion goes as far back as King Hubbert in 1956. Back then, Hubbert estimated that American oil production would roughly follow a bell-shaped production curve and peak around 1970 (Deffeyes, 2001). Despite considerable controversy, Hubbert was proven right: United States of America’s oil production peaked in 1971, raising wider concerns about a global peak in oil production, especially low cost oil. That peak seemed imminent in the early 21st Century. But discussion of Peak Oil, especially in tourism circles, has been overshadowed by the risks of climate change, and more recently by the oil surplus situation at the time of writing. But there are important linkages for tourism development and sustainability between Peak Oil and climate change, and many commentators believe the exceptionally low oil prices are temporary. Even the pro-business and pro-growth *Economist* weekly takes that line, and suggests that the present situation is “a once-in-a-generation opportunity” to make major reforms to energy policies leading to “a more efficient and greener energy future” (The Economist, 2015, p.9). Hence, the value and appropriate timing of this paper, which seeks to understand the thought processes and understanding of tourism experts about Peak Oil.

Discussions about Peak Oil are convoluted by different definitions and accounting frames for oil or what should be better referred to as 'liquid fuels'. However, when explicitly focusing on conventional crude oil, there is broad agreement that production has reached its global maximum about five to seven years ago (International Energy Agency, 2010), and has been declining since. To compensate for declining production of 'cheap' oil, the focus of exploration and investment has shifted to unconventional resources, including oil sands, shale oil and deep sea oil. Unfortunately, the production of most unconventional resources is challenging and will not produce the same volumes that conventional oil delivered (Kerschner et al., 2013). It is also often associated with substantial environmental risks. A production peak of all types of oil (including condensates, biofuels and unconventional oil) is likely to be reached in this decade (de Almeida & Silva, 2009, Krumdieck et al., 2010). Given an inevitable decline in oil availability over time, and taking into account expected changes in demand, Benes et al. (2012) recently suggested that oil prices could double in the next 10 years. Short-term fluctuations, like those taking place at the time of writing, confirm the extreme volatility of recent years and reflect temporary over-supply due to rapid increases in production in America and political responses by oil-exporting countries. Price drops, such as currently experienced, also indicate decreasing demand – possibly providing early warning signals of a contracting global economy. In the medium and long-term, however, prices will increase due to the argument made above (i.e. diminishing amount of cheap oil and increasing need to exploit expensive oil).

Tourism has been found to be highly exposed to rising oil prices (Becken, 2008; 2011; Becken & Lennox, 2012). A recent estimate highlighted that tourism consumes about 10% of oil-equivalent globally (Becken, 2015). The vulnerability of aviation is a particular concern of strategic importance, because air travel is one of the most oil-exposed sectors and at the same time most inter-linked within national and global economies (Kerschner et al., 2013). As a result, discussions about tourism development have to consider future trends and challenges associated with oil supply. This is particularly critical given the ongoing and rapid growth of tourism demand (UNWTO, 2014) and expectations tied to this growth. Most tourism forecasts build on the historic relationship between Gross Domestic Product (GDP) and tourist activity, whereby tourism volumes usually grow faster than GDP (Boeing, 2013). Questions around the availability and affordability of energy are rarely addressed or relegated to sensitivity (e.g. UNWTO, 2011) or scenario analyses (Yeoman et al., 2007). Such approaches conform with the dominant framing of oil supply as an economic or political

problem rather than a supply issue (Becken, 2014; Wicker & Becken, 2013). Alternative views of the future, for example the concepts of a steady-state-economy, slow growth, or de-growth, are only explored by a small number of experts at the fringe of the dominant discourse (Daly, 2008; Hall, 2010).

The availability and price of energy, sometimes referred to as energy security, are highly political topics, intricately interwoven with wealth, political power, military conflict and terrorism (Alekklett, 2012; Strahan, 2007). As can be seen in the current environment of geopolitical tensions (influencing amongst others global oil prices) between the USA, Russia and Middle Eastern countries, Peak Oil is a precarious issue, potentially much more so even than global climate change. Some researchers have therefore noted that the problem is not so much about physical constraints, but the socio-economic systems of production and consumption (Bridge, 2010). The ‘politics of Peak Oil’ cannot be understood by simply studying geological limits, nor by empirically examining causes and effects of Peak Oil and oil prices (Becken & Lennox, 2012); instead broader questions concerning public discourse, social interpretations, values, and ethics need to be asked. In her review on tourism and oil, Becken (2011) concluded that more research on people’s perceptions and the mechanisms for dealing with oil-related risks and limits is required, similar to the body of literature that has been developing on the risk of climate change and tourism (Hopkins, 2013; Shakeela & Becken, 2014).

Peak Oil is a collective risk and it is critical that research goes beyond individual beliefs, attitudes or risk perceptions, but captures the collective understanding and sense-making of this issue. The theory of social representation provides a useful framework for researching tourism experts’ understanding, images, and ideas about Peak Oil. Thus, this research involved interviewing 101 global tourism experts, using the method of free association, to gain their thoughts on Peak Oil. The results were used to examine the social representation of this phenomenon amongst tourism experts and within different sub-groups. The two research questions were: 1) what is the social representation of Peak Oil amongst tourism experts and what are the core elements and images that constitute it; and 2) do different professional sub-groups (Academics, Consultants, Government and Industry representatives) differ in their social representation of Peak Oil? This research is important in several ways. It not only brings a much neglected risk into the tourism discourse, but the findings presented here provide useful information on where to begin in further advancing an informed debate about

Peak Oil. This is particularly important for the field of sustainable tourism, which by definition seeks to develop forms of tourism that can be sustained in the long term.

Theoretical background

Social representations theory has been used in a wide range of contexts and represents a body of theory within social psychology that is often concerned with how particular scientific concepts or expert knowledge are perceived and represented by the broader lay public (Buijs et al., 2011). Building on Emile Durkheim's "collective representation", Moscovici developed the concept of 'social representations', referring to interpretations people use in everyday life to give a meaning to reality (Moscovici, 1961, 1976). Gangl et al. (2012) summarized social representations as "shared notions, knowledge, ideas, thoughts, and myths about a relevant phenomenon in a social environment" (p. 604). They constitute a hybrid form of both scientific and life world knowledge (Bauer & Gaskell, 1999). In short, they represent "common sense" (Washer, 2004) or "folk knowledge" (Buijs et al., 2011), and they result from interactions between individuals and society (Bidjari, 2011).

Social representations are important because they help people make sense of unfamiliar information. Visual images can constitute powerful elements of social representations (Washer, 2004), whereby external images (as in media images or photographs) can be distinguished from internal ones (people's associations; mental imagery). Importantly, images are "readily absorbed in an unmediated manner" (Joffe, 2008; in O'Neill, 2013, p. 11), and as such they have the potential to carry normative statements and promote one particular view over another. Social representations can exclude particular versions of reality (Anderson et al., 2013) or even influence legislation, specify rights and obligations. As a result they can give status or power to some, legitimize certain arrangements and reinforce existing structures (Gangl et al., 2012). Thus, the function of social representations, rather than just their content, is increasingly becoming an object of research (Bauer & Gaskell, 1999).

Social representations can be seen both as a process and the result of social construction (Wagner & Hayes, 2005). Two key processes are involved in the development of social representations, namely anchoring and objectification. Anchoring relates to linking new information with existing knowledge or 'templates'. If the new ideas or knowledge fit with

existing categories or representations they can reinforce or modify them. If they do not fit or are in conflict with existing representations, objectification might occur whereby the abstract idea or concept is translated into some more concrete and comprehensible information (Bidjari, 2011). Eventually, and as a result of several objectification steps, the representation becomes a template or tool that can be readily used (almost in a habitual way; e.g. “economic growth is important”) in social interactions (Tsoukalas, 2006). Social representations are dynamic and constantly re-negotiated. Over time, and as a result of the above processes, new phenomena (e.g. genetic engineering, Bauer & Gaskell, 1999) become known and familiar parts of the social world (Gangl et al., 2012).

To understand the semi-stable nature of social representations it is useful to decompose representations into two systems, similar to Central Nucleus Theory, namely a core and a periphery. This so-called structural approach (Ernst-Vintila, 2011) suggests that the content of a social representation (i.e. its state) is characterized by a core with a small number of elements that are stable over time and common across groups. In contrast, the periphery contains elements that change more often and differ for various groups and individuals (Pereira de Sá, 1995). These peripheral elements provide operational flexibility that accommodates inter-individual variability. Should these peripheral elements become more prevalent and stable they may challenge the core over time and change the social representation.

Ontologically, the study of social representations requires a social-constructionist approach (Lupton, 1999 in Smith & Joffe, 2012). The way a particular object or idea is constructed cannot be separated from the subject and the particular contexts in which the subject operates (Bidjari, 2011). Importantly, social representations exist both within the mind of an individual and within a social group, whereby representations are inextricably linked to group membership. Thus, social representations link the individual with society in that, psychologically, people process and communicate information, from which a collective plurality emerges that can only be comprehended by referring to the group (Bauer & Gaskell, 1999). Consequently, social representations need to be distinguished from attitudes that are idiosyncratic to individuals and reflect their responses or opinions on particular issues and objects. However, attitudes held by individuals are nested within, and mediated through, broader social representations of the particular social group an individual belongs to (Anderson et al., 2013; Bidjari, 2011). Representations in turn are anchored in underlying ideologies.

How different groups make sense of a particular object or concept is likely to influence their behavior (Buijs et al., 2011), because the representations serve as guides or condition for a particular action. Representations also filter what events people react to. For example, if Peak Oil is socially represented as an irreversible risk then it is likely that high oil prices cause fundamental concern or trigger action. Importantly, plurality of representations is possible – at both the individual and social levels. This means that people can be aware of different, and maybe conflicting, representations depending on the particular context. The existence of multiple and potentially conflicting representations within one individual is referred to as polyphasia. Polyphasia allows people to apply different rationalities and sense making to different situations (Brondi et al., 2014), an important tool to conform in different social contexts.

Several scholars have criticized social representation theory as being too broad to be useful, referring to it as an analytical framework for a mixed method approach instead (Gangl et al., 2012). It has also been criticized on methodological grounds for being ambiguous in terms of key methodological considerations for measuring or analyzing social representations (Dickinson et al., 2009). Nevertheless it has been applied widely, including in the tourism context, for example to understand better how tourism communities use specific knowledge to inform decision making about tourism planning and development (Moscardo, 2011). A study on tourist transport used the theory of social representations to explore “the ideas that circulate in society and into which people tap, when considering transport options” (Dickinson et al., 2009, p. 105). This research is the first to use the theory of social representation to understand better how tourism experts perceive a major global tourism risk – Peak Oil. Insights gain will help develop paths for addressing the risk in a way that can be absorbed effectively by the social group(s) of tourism stakeholders.

Methodology

Social representations can be studied in many ways and a range of methods have been applied including ethnographic recording, focus groups, media content analysis, surveys and interviews (Wagner et al., 1999). One commonly deployed method is to use the free association approach in conjunction with a proto-typicality analysis as proposed by Vergès (1992). Free association was the approach chose in this present research because it provides an easy to administer but insightful approach that should work well with high-level experts who have limited time.

‘Free association’ method

The free association method has its roots in psychoanalysis where the elicitation of spontaneous associations helps explore unconscious content. Free association captures individual cognitions on a particular topic in a relatively simple and unbiased way (Bauer & Gaskell, 1999, Meliou & Maroudas, 2010). In this present study, the focus was on free associations with the term Peak Oil by representatives from the social group of ‘tourism experts’. Free association methodology is a word association task (Anderson et al., 2013), similar to the top-of-mind associations used in marketing and branding research. Top-of-mind memory is assumed to represent knowledge or awareness that is particularly salient, and as such unique, compared with perceptions that require less spontaneous reflection (Stepchenkova & Li, 2014).

According to the Adaptive Control of Thought Theory (Dolnicar & Gruen, 2013) memories are associative networks, comprising nodes and links, and processes that allow people to retrieve information. More specifically, a cue (e.g. a word or an image) will activate a relevant information node in the memory, and, if strong enough, the link to another node will be activated to retrieve more information. It has, therefore, been argued that the most direct associations (i.e. activated nodes) are the most salient ones when confronted with a particular cue, and also that the order of activated nodes (or evoked associations) matters (Stepchenkova & Li, 2014). As a result, the method allows examination of which elements of a social representation are core or periphery, depending on both their frequency and order of evocation (Wagner, Valencia & Elejabarrieta, 1996).

Data collection

The target population for this research was tourism experts from Academia, Consulting, Government and Industry. Research participants were recruited mainly through the personal networks of the author and two research assistants. The selection process aimed to ensure an adequate representation of the different sector sub-groups, as well as gender and age variables, and a wide range of nationalities. In addition to personal contacts, tourism leaders (e.g. managers, Chief Executives, Professors, and other thought leaders) were contacted ahead of major conferences and asked to participate in a brief interview. The conferences were: Responsible Tourism (RTD7), Barcelona, October 2013; Tourism Tribune symposium, China, October 2013; Tourism Directions conference, Canberra, October 2013; Council of

Australasian Tourism and Hospitality Education (CAUTHE) conference, Brisbane, February 2014; and the EC3 Global Inner Circle meeting, Hong Kong, March 2014.

In total, 101 experts were interviewed between October 2013 and August 2014. Interviews were introduced to participants as 'blitz interviews' and lasted between three and eight minutes. Interviews were tape recorded or manual notes were taken. Forty-three interviews were face-to-face with the remainder having been conducted via skype or the telephone. Four questions were asked to elicit word association with the terms 'future risks for tourism', 'tourism growth', 'low-carbon tourism' and 'Peak Oil'. Participants were invited to provide up to five words or phrases describing their association with each of the four phrases. This present analysis focuses on the Peak Oil associations. In addition, participants were asked to provide up to three 'visual' images that come to their mind when thinking about Peak Oil. Sample characteristics of the participants are summarized in Table 1.

Analysis

In total, 480 word or phrase associations and 229 images were collected across the 101 participants. The word associations recorded in the interviews were coded thematically (Anderson et al., 2013) in an iterative process, whereby reoccurring terms (and variations thereof) were recorded and a coding heuristic was developed to identify codes and higher-level categories. The coding scheme was revised several times until all responses were adequately captured. During this process it was important to avoid 'tendencies of social engineering' (Bauer & Gaskell, 1999, p. 179), and remain as 'uninvolved' as possible (Adler & Adler, 1988). The images were coded in a similar process but independently from the word association to allow comparison of emerging codes and categories.

Since social representation can be a) cognitive, b) normative, c) expressive/affective in nature (Buijs et al.; 2011, Fischer et al., 2012), codes reflected both factual and personal statements. The codes and categories then formed the basis of further analysis, including frequency and ranking analyses (Verges, 1992). For the purpose of analyzing the order in which associations were presented, coded answers were weighted whereby the first mention was allocated a weight of 5, second mention a weight of 4, third mention a weight of 3, up until to the 5th mention with a weight of 1. This way, average ranks were calculated and for each code and category. Codes that are both frequent and are typically mentioned first (i.e. have a high score and rank) are considered to be elements of the Central Core of a representation. Frequently

mentioned associations, but not necessarily top-of-mind, are interpreted as elements of the High Periphery. Statements that are neither frequent nor high ranking are part of the Low Periphery, and deemed less important as they are more idiosyncratic and subject to change. A fourth group is of particular interest, namely associations that are typically mentioned early, but less frequent in total. These elements reside in the Contrast Zone – a part of the social representation that indicates shifts and might challenge the core over time (Sarrica & Wachelke, 2010).

TABLE 1HERE

To further explore differences between the four sub-groups in terms of their Peak Oil associations, correspondence analysis using SPSS Statistics 21 was conducted (Gangl et al., 2012; Meliou & Maroudas, 2010). Correspondence analysis is conceptually similar to factor analysis, but uses relative frequencies of categorical variables (Weller & Romney, 1990). In this present research, the professional sub-group represents the row profiles and the 21 coded word associations were the column profiles in a two-way table. Correspondence analysis involves calculating the distances between individual row and column profiles; that is, it compares how similar or different the sub-groups are relative to each other and relative to the average profile of responses across the 21 Peak Oil codes (and vice versa). The distance is calculated using the chi-square metric, to provide a weighting mechanism for differing variances of higher or lower relative frequencies (Sourial et al., 2010). Importantly, distances are only calculated for within rows and within columns, but not across the categories.

Ultimately, correspondence analysis can be used to visualize relationships between variables, typically along two dimensions (Marcussen, 2014). As for factor analysis, correspondence analysis provides a method for decomposing the variance (in correspondence terminology it is called inertia, which is the Chi-square statistic /total N) into a small number of dimensions that explain the deviation from assumed independence of row and column variables. The first dimension represents the largest amount of inertia explained (Dickinson et al., 2009). The origins on the map indicate the centroid of each variable (the centroid is the weighted average of the profile) (Sourial et al., 2010). The more different a profile is from the average profile, the further away its point in the correspondence map from the origin. Different methods for normalizing distances can be used, and the interpretation of the resulting map differs accordingly. Since the focus here is on visualizing the relationship between sub-group and Peak Oil associations, a symmetrical normalization was chosen to split inertia equally over the row and column scores (for more detail, see Hair et al., 2006; Li et al., 2013). This means that neither the distances between row or column points are accurate reflections of their calculated chi-square distance, but appearing clusters can be interpreted for their association.

Limitations

The data collected through the free association method are qualitative in nature, but can be quantified relatively easily. However, because of the short nature of answers (e.g. just one word), the interpretation might be ambiguous (Tsoukalas, 2006). For example, a respondent stating “cars” as an association might refer to the cause of Peak Oil (i.e. excessive

consumption of oil by cars) or a solution (e.g. cars instead of aeroplanes), or refer to the risk and impacts Peak Oil will impose on car travel. The coding of the small number of ambiguous words like these relied on the subjective assessment by the researchers. In addition to the semantic challenges of analyzing individual words, several respondents advanced short sentences or phrases which had to be condensed into a single-word code. The sentence “little relevance to tourism - in the eyes of businesses”, for example, was interpreted as “limited understanding” because the person interviewed did not appear to hold this view themselves, but rather portrayed through minor cynicism in their voice that ‘other’ businesses do not understand that Peak Oil might be important. Ultimately, a limitation of any qualitative study is that personal subjectivities on the part of the researcher cannot be fully eliminated (Sipe & Ghiso, 2004).

Results

Associations with the term Peak Oil

The tourism experts’ word associations were captured in 21 codes and 7 categories (Table 2). About one quarter of responses (24%) related to the potential impacts of Peak Oil, most commonly in the form of economic impacts (N= 49) such as increases in fuel costs, economic recession, and inflation more broadly. In addition, stakeholders also specified a range of tourism-related impacts, and more specifically changes in transportation systems and service (e.g. “*aviation- area of concern and alarm*”, male, Industry, England). Political impacts were recognized as well, but were less prominent than economic risks.

The second and third most common categories of associations (70 answers in each category) related to factual comments about Peak Oil and alternative energy sources. Interestingly, a substantial 30 responses related explicitly to the recognition that there is very limited understanding about the phenomenon of Peak Oil amongst tourism experts (either generally or personally). While 19 associations were made related to unconventional oil resources (including ‘fracking’), reducing energy use as a means of addressing the Peak Oil challenge was only associated by 11 participants. ‘Doing things differently’ through broader concepts of sustainability (e.g. “*rethinking sustainability*”, male, Consulting, Spain) or specific suggestions for new transport systems were associated more frequently (N= 35 and 32, respectively).

Two categories represented a range of emotional or personal assertions about Peak Oil, whereby a clear polarization between Peak Oil believers and skeptics became apparent. About 13% of answers showed great concern about the issue and indicated a sense of urgency given that “*most exploration has happened and oil has been consumed*” (male, Academic, Germany). In contrast, 12% of responses reflected great levels of uncertainty, disbelief and often cynicism about the concept of Peak Oil. Some respondents dismissed it outright (“*not a major issue*”, male, Industry, England), whereas others were not concerned because it is “*yesterday’s term*” (female, Industry, England) and technology will enable us to delay the peak. Twenty-three stakeholders interpreted Peak Oil as a positive challenge as it “*forces us to change*” (male, Industry, Spain). There was no agreement on whether Peak Oil was an imminent (‘timing of peak soon’) or distant (‘timing of peak late’) issue.

The categories with the least answers reflected participants’ associations with initiatives that help address Peak Oil, for example through innovation and “*sensible regulation*” (female, Industry, England) or by suggesting who might be responsible (e.g. the industry or government).

The codes and categories presented in Table 2 fit into four broad themes; namely 1) impacts and changes as a result of Peak Oil, 2) solutions, 3) values and beliefs, and 4) facts and knowledge (Figure 1). The themes can be grouped along two axes that reflect a spectrum of impacts versus solutions (horizontal axis) and facts versus emotive responses on the vertical axis. The matrix in Figure 1 captures the two core dimensions that underpin the social representations of Peak Oil by tourism stakeholders.

TABLE 2 HERE

FIGURE 1 HERE

Images evoked when thinking about Peak Oil

Images were coded into three broad categories: ‘Apocalypse’, ‘New beginnings’, and ‘Energy and transport systems’. The nature of the images evoked by participants was thematically similar from the word associations, but much more dramatic and expressive in their description (Table 3). Also, it emerged that negative or fearful images were more prevalent than positive images or pictorial reflections of existing energy and transport

systems. When asked about images rather than words, peoples imagination appeared more vivid, for example in the eyes of a male Professor from the USA, Peak Oil evokes the image of “*a movie by Denzel Washington, apocalyptic, total disaster, people fighting on street...*”. Another respondent (female, Consultant, South Africa) sees an “*aircraft crashing in a fireball to the ground*”. In addition to these apocalyptic images, experts also saw pictures of destruction and standstill, including unhappy people, dysfunctional equipment, and the break down of existing systems.

On the other hand, there were scenes of paradise and joy – if ‘the end of oil’ was relieving society from a curse and freeing people to walk, cycle, and enjoy a new lifestyle. People saw “*skinny / healthy kids walking to school*” and explicitly contrasted the old life with the new (“*Pelicans and seagulls on a beach and really clean, rather than an oil slick*”) (male, Government, Australia).

TABLE 3 HERE

Social representation: core and periphery

To examine in more detail which associations constitute the core of tourism experts’ representation of Peak Oil, frequencies and mean ranks of codes were compared (Figure 2). At the core of the social representation are alternative energy sources, the belief that Peak Oil is a problem (‘affirmative’), a recognition of the limited understanding about this issue, positive changes that the end of cheap oil will bring, and better transport systems. The importance of economic impacts is evident in its frequency, but less so in its ranking. This means that economic impacts are widely recognized as intrinsically linked to oil availability and prices, but not necessarily the first association that comes to mind. In contrast, the question about whether Peak Oil is real or serious is a thought that people have either up front or not at all. As can be seen in Figure 2, ‘controversial’ is ranked highly and is located at the transition from the Contrast Zone to the Central Core, thus potentially challenging the assertion that Peak Oil is happening. This indicates that there is limited agreement amongst tourism experts as to the seriousness of this problem. This is further underpinned by the divided view on the timing of Peak Oil – both associations around later and sooner timing are situated in the Contrast Zone.

FIGURE 2 HERE

Differences between professional sub-groups

Further analysis of distinct sub-groups within the sample of 101 tourism stakeholders showed variations in the elements that constitute the core of the social representation of Peak Oil. Because of smaller sample sizes for each of the four sub-groups the comparison was made based on the seven categories discussed in Table 1. In terms of most frequently associated categories, all groups identified ‘impacts of Peak Oil’ as most important, and for all groups it was part of the High Periphery zone.

There were distinct differences between the sub-groups. Academics and Consultants were the two sub-groups that had ‘factual comments and the role of knowledge’ as the only category in their central core. For the other two groups, Government and Industry, factual and knowledge-related comments featured in the Contrast Zone, but not at the core. Instead, Government experts were more likely to frequently and top-of-mind refer to alternative energy sources – determining the core of this sub-groups representation. ‘Doing things differently’ (e.g. referring to the sustainability agenda) was also important to Government experts, evidenced in the category’s position in the High Periphery Zone. Industry representatives had two categories in the Core Zone of their social representation: ‘Peak Oil affirmative and concerned’ [Concerned] and ‘Peak Oil skeptic or not concerned’ [Unconcerned]. Once again, this highlights the unresolved agreement on whether Peak Oil is an issue or not. Factual comments and knowledge, as well as alternative energy sources, featured in the Contrast Zone for the industry sub-group.

Correspondence analysis provided a two-dimensional solution that explained 88.2% of inertia; 58.1% by dimension 1 and 30.1% by dimension 2. The Chi-square statistic of 96.63 ($p=0.02$) indicates that the total inertia value is significantly different from zero; that is there is a pattern of association between the row and column categories. For the row points (professional sub-groups) dimension 1 is defined most by Government (score -1.169), whereas dimension 2 is defined by Industry on the one side (score 0.574) and Consulting (score -0.549) and Academia (score -0.524) on the other side of the origin. Government is close to the origin of dimension 2 (score 0.006). For the column points, dimension 1 is strongly defined by ‘responsibility’ (score -2.038) and ‘better transport systems and

technology' (score -1.111). The highest scores on dimension 2 are 'reducing energy use' (-1.146) and 'limited understanding' (-1.050).

The visualization of the correspondence analysis shows the relative closeness of Academics and Consultants, and the Peak Oil association of 'limited understanding', which is part of the category 'factual comments and role of knowledge'. Also in this cluster of the two-dimensional space are references to other environmental issues and the need to reduce energy. The two codes of 'causes', 'innovation' and 'controversial' are relatively close to Academia, which was evident in the responses by Academics who often referred to technological solutions that would overcome physical constraints. On the correspondence map, Government is far away from other sub-groups but close to the codes of 'sustainability', 'responsibility' and being 'scared', all of which make intuitive sense. Government is also close to 'better transport'. Industry is closest to expressions that indicate that Peak Oil is happening ('affirmative'), and soon, but also to the idea of positive changes following Peak Oil. The notion of positive effects of Peak Oil had been grouped with the category 'Peak Oil skeptic or not concerned', explaining partly the lack of concern amongst industry experts mentioned above (Figure 3).

FIGURE 3 HERE

Discussion

This research explored the social representation of Peak Oil held by tourism experts from around the world. Research participants were asked to identify up to five word associations with the term Peak Oil, and also provide up to three images or visual elicitations that they can 'see' when they think about this phenomenon. Participants had been briefed before the interview that they would be asked a few questions about the 'future of tourism', and they capably answered the first three questions (risks, growth, and low-carbon tourism), but when it came to the last question, Peak Oil, a substantial number expressed surprise and clearly did not expect to be asked about this phenomenon. Responses, such as 'oh', laughter', or a deep breath were not uncommon. In a few instances, the researcher had to explain the term by noting that Peak Oil refers to a global peak (maximum) in oil production. All participants were able to provide a number of associations, but not all of them could identify five of them.

The word associations could be grouped into two key dimensions that separate four broad themes, namely impact and solution, and facts and emotions. The dimensions present dichotomies along which people position themselves to make sense of the Peak Oil phenomenon. As discussed in earlier research, social representations are often dialogical, whereby two contrasting perspectives are advanced, helping individuals to understand different perspectives and navigate a particular topic in various contexts (Smith & Joffe, 2012). Various types of impacts were identified, most notably economic impacts such as rising fuel costs, recession and unemployment. This is not surprising given earlier research that indicated that much knowledge about tourism and oil is of an economic nature (Becken, 2011) and grounded in a neoliberal ideology which promotes economic growth and trade liberalization (Becken, 2014). At the other end of the impact-solution dimension were a wide range of associations that proposed some kind of response to the Peak Oil challenge, including alternative energy sources (both renewable and fossil), more sustainable systems in general, new technology and transport systems, innovation and discussions around who is responsible.

A similar dichotomy was found for associations that represented factual comments, for example about the link between Peak Oil and global climate change, versus value-laden responses. The latter included emotional statements (e.g. referring to feelings such as panic and fear), values or beliefs. Images of war, conflict, and destroyed environments underpinned some of the negative connotations. Interestingly, these were counterbalanced by strong associations around a new way of life, one that depends less on fossil fuel and provides new opportunities for healthy people. While these reflect in some way personal assessments of the Peak Oil problem, they are also likely to be nested in the wider social representation as people advance their views in discussions with their peer groups. It therefore is particularly interesting that views either supporting or rejecting the Peak Oil hypothesis were almost equally balanced, including statements about the timing of a maximum in global oil production. Normative dimensions (Fisher et al., 2012) of the representation were evident in that experts advanced thoughts that related to the ‘good’ (e.g. “*more traditional way of life*”, male, Academia, China) and ‘bad’ developments (“*Air pollution bigger problem than cost, but industry fault*”, male, Industry, Germany) that cause Peak Oil or influence how we address it (e.g. comments about responsibility). As such, the representations also revealed some underpinning ideologies, for example related to neo-liberalism or egalitarianism.

Social representations are dynamic and constantly renegotiated (Anderson et al., 2013). However, a relatively stable core of elements exists, made up of a small number of key elements. Based on Verges (1992), and employed in a range of research contexts (Meliou & Maroudas, 2010; Mouret et al., 2013; Sarrica & Wachelke, 2010), one way of identifying the core is by measuring both the frequency and ranking of associations put forward by respondents. For the phenomenon of Peak Oil and the social group of tourism experts, the core of the social representation consisted of three key elements: alternative energy sources, acknowledgement of the limited understanding people have about Peak Oil, and affirmative comments made with respects to peaking of oil production being real and a problem. The element of affirmation is challenged by the number of associations that reflect the controversial nature of Peak Oil in the Contrast Zone (higher-than-average ranked associations).

Peak Oil is not a firmly established term or phenomenon amongst tourism experts, and processes of both anchoring and objectifications were evident in the responses. Anchoring relates to the process of linking a new idea with existing ones. In this present study, the phenomenon of Peak Oil was often linked to more established ideas or concepts, including renewable energy sources, sustainability, and climate change. Whilst renewable energy is clearly linked to a declining global oil production, the other two concepts are only related in a more indirect manner. This indicates that tourism experts use them as ‘placeholders’ or ‘anchors’ to make sense of what Peak Oil might mean, for example an unsustainable use of a finite resource or the emissions of greenhouse gases associated with the combustion of oil.

Objectification is a necessary process that helps convert abstract ideas into more concrete ones. As noted by Moscovici (1984) objectification transforms an image into reality by removing the abstract character and developing a tangible and almost physical nature that over time may even become reality itself. Often, objectification involves the creation of a new icon (or a figurative nucleus) that in itself epitomises the phenomenon (Wagner et al., 1999). Several such icons or metaphors were identified in this research, including the picture of long queues at petrol stations. If a sequence of (short-term) supply shocks were to happen, as experienced in the oil crises in the 1970s, it is possible that the visual element of queues and standstill increasingly epitomises the social representation of Peak Oil. Other strong icons included solar panels on roofs and windfarms, and people using unmotorised transport such as walking and biking. As these iconic images cement (compare the polar bear as a metaphor of climate change, Manzo, 2010), the social representation will provide a common

denominator for different groups that can then associate with the phenomenon and form effective discourse coalitions, for example to develop strategies for coping with Peak Oil.

As Ernst-Vintila et al. (2011) observed, social representations are not necessarily underpinned by formal logic or scientific accuracy. Thus, rather than being valid on scientific or epistemological grounds, they have social validity. They represent lay thinking that is accepted as the 'truth' in a particular social group. Objectification also depends on the social group as it reflects images and metaphors that resonate with the experiential and ideological world of a segment (e.g. pro-development, or anti-fossil fuel etc.) (Wagner et al., 1999). New representations emerge when a group is threatened with change, especially when this change is threatening existing systems and practices. This is clearly the case for Peak Oil and its potential impacts on tourism, and this research is likely being undertaken at the emerging phase of a new representation. Therefore, it is timely to provide more information on Peak Oil to the tourism sector to shape the social representation in a way that reflects actual risks as stated by scientists (e.g. Aleklett, 2012).

Tourism experts are not a homogenous group and different sub-groups have different views and discourses about Peak Oil, leading to variations in the social representation. This research investigated potential differences between four sub-groups, namely Academics, Consultants, Government and Industry representatives. Both the proto-typicality and the correspondence analysis showed the relative closeness of Academics and Consultants, although minor differences existed as well, for example the relative lack of concern by academic experts compared with representatives from the consulting sub-group. Government experts were different from the other sub-groups in that they placed a greater emphasis on the broader sustainability agenda, and on addressing Peak Oil. Industry was the most divided group in terms of being concerned or unconcerned about Peak Oil.

It is such contrasting representations between sub-groups (but also within groups as represented through elements in the Contrast Zones), that provide ongoing stimulus for modifications of the social representation, and possibly attempts by particular interest groups to gain dominance through particular views (Brondi et al., 2014). Further, since representations are specific to a particular group, the object itself (here the phenomenon of Peak Oil) becomes characteristic of this group. Thus, for Academics, for example, Peak Oil becomes a problem that needs to be understood and solved with knowledge and innovation; whereas for industry Peak Oil is a risk that one is either concerned about or not. As a result,

the slightly differing representations are likely to lead to different responses and actions (Wagner et al., 1999). Such information is important for those who wish to increase awareness of Peak Oil and its associated risks within the tourism sector: different messages will be required for different sub-groups to enhance or complement the existing social representations.

The method of free association proved a useful approach to elicit spontaneous thoughts about Peak Oil – a phenomenon that experts clearly had not thought about much, but were nevertheless able to advance some words or phrases about it. These are likely to be relatively ‘pure’ and unbiased and therefore valid for the purpose of this research. Importantly, the method allows collection of qualitative data (which can be used for semantic analyses) that can also be quantified relatively easily through coding analysis. In the words of several participants the interview was ‘fun’ and ‘thought provoking’ and it did not impinge substantially on participants’ time. It can, therefore, be recommended. In addition, this research collected image associations, because the literature highlighted the importance of visual associations and icons as key elements of social representations (O’Neil, 2013). This research confirms that the collection of mental images enhances the word associations greatly. In particular, emotional and expressive elements of the social representation (e.g. both fear and hope) were provided in much greater detail and with creativity that was not obtained from the somewhat more matter-of-fact verbal encapsulations. It is therefore recommended that future research continues to advance ways of capturing imagery.

A number of important avenues for future investigations are highlighted. This research focused on the social representation of Peak Oil, including differences amongst professional sub-groups. Further differences could be explored, including cultural backgrounds (e.g. see Mouret et al. (2013) on the social representation of wine in France and New Zealand), age and gender. Moreover, the link amongst different social representations could be examined (Sarrica & Wachelke, 2010). This research also collected data on tourism experts’ free associations with related phenomena, namely future risks for tourism, economic growth, and low-carbon tourism. Similarities and differences between these phenomena will be the subject of subsequent analysis. Finally, it is of great interest to consider the function of social representations, especially the normative components (e.g. resource exploitation is ‘bad’; or economic growth ‘is necessary’) of the Peak Oil representation, and whether particular groups emphasise some aspects more than others because of their particular interests. Such critical research should extend beyond tourism experts and include other sources that shape

the Peak Oil representation, including oil companies, governments, and the media (Washer, 2004).

Conclusion

This research used the method of free association – both for generating word and image associations – to examine what sense tourism experts make of the phenomenon of Peak Oil. Overall, experts were able to provide associations on this topic, but it became clear that in many cases this was the first time they explicitly considered this issue. In this sense there is a need or opportunity to provide more material to tourism experts to help familiarize themselves, individually and collectively, with Peak Oil as an environmental and socio-economic risk. Information can be factual (e.g. provision of data relating to global oil resources, the cost of fracking, or the geopolitical risks associated with exploitation), or it could appeal to emotional predispositions. Academics could enhance this debate by providing objective input, but there is also an opportunity for concerned industry leaders to engage their colleagues and business partners to consider the risk of Peak Oil more proactively. The role of media, including specific trade publications, must not be underestimated in this context, especially when providing powerful images that convey the challenges associated with Peak Oil. Tourism journalists could take some responsibility in facilitating the evolving discourse on Peak Oil, and clarify how it relates to other – maybe more familiar – discourses, such as climate change or sustainability. As this research has shown, different messages are required for different tourism sub-sector groups.

The most prominent associations identified in this research related to the economic impacts of Peak Oil, including severe disruption to tourism systems. Images of standstill and queues at petrol station conveyed this association powerfully. Associations around alternative energy sources, most prominently solar and wind energy, were also prevalent, evoking images of solar-panel covered roofs and large wind farms in the countryside. It is this positive view of the opportunities associated with Peak Oil that provides a fruitful pathway for advancing sustainable tourism. Powerful and iconic images that instill feelings of hope and aspirations (‘walking children’, solar energy etc.) can be included more purposefully into the sustainable tourism discourse to simultaneously drive the social representation of Peak Oil and sustainable tourism. Advancing the Peak Oil debate is important to the sustainability of the tourism sector that depends so inherently on the availability of cheap oil. Ultimately,

reducing tourism's oil requirements is a win-win approach in reducing the sectors' exposure to high oil prices, and improving its environmental performance, for example in relation to greenhouse gas emissions resulting from fuel combustion.

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