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Environment and Natural Resources

Economic Impact of National Parks in Iceland; Case Study of Snæfellsjökull National Park

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Faculty of Economics

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HÁSKÓLI ÍSLANDS

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60 ECTS thesis submitted in partial fulfillment of a

Magister Scientiarum Degree in Environment and Natural Resources

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Abstract

National parks in Iceland are currently faced with an increasing number of visitors, straining the sustainability and natural quality of the parks; and calling for significant investments in park infrastructure and human resources to handle the environmental pressures from booming tourism. However, for the state which funds such investments from tax revenues, national parks and other protected areas are often seen as costs with no economic returns. This study aimed to develop and test a methodology for determining the economic impact of visitor spending in the Icelandic national parks on regional and national economies and subsequently, to calculate the economic impact to cost ratio for taxes invested in the national parks.

The outcomes of this study will provide a foundation for informed discussion between stakeholders and other interested parties, e.g. authorities, managing institutions, NGOs, researchers and local communities about the costs and economic impacts of national parks. A case study of Snæfellsjökull National Park was used to develop the methodology which then later can be applied to other national parks and protected areas as well. The results also provide a reference for interesting comparisons between the economic impacts of developing protected areas for tourism vs. energy production in the 3rd phase of the Master Plan framework.

The Money Generation Model 2 methodology was adapted and used for the Icelandic context to calculate the economic impact of Snæfellsjökull National Park, which proved to be very high at 3.9 billion ISK annually. Visitor spending in connection to park visits generates over 700 indicative full-time and part-time jobs, and over 900 million ISK in direct taxes. Overall economic impact to cost ratio is 58:1, and generated tax revenue is 14 times the budget of the national park. The results indicate that nature protection and nature-based tourism are economically strong alternatives to natural resource utilization, and there is a clear opportunity to develop the park services on a economically self-sustaining basis.

Titill:

Efnahagsleg áhrif þjóðgarða á Íslandi; Tilviksathugun á Þjóðgarðinum Snæfellsjökli

Ágrip:

Þjóðgarðar á Íslandi standa nú frammi fyrir fjölgun á gestum, sem eykur álag á náttúruleg gæði garðanna og grefur undan sjálfbærni þreirra. Verulegra fjárfestinga er þröfr í bæði innviðum og mannauði í þeim til að takast á við umhverfisþrýsting vegna uppbyggingar á ferðaþjónustu. Fyrir stjórnvöld sem fjármagna slíkar fjárfestingar með skatttekjum eru þjóðgarðar og önnur verndarsvæði oft talinn kostnaður án efnahagslegrar ávöxtunar. Þessi rannsókn miðar að því að þróa og prófa aðferðafræði til að ákvarða efnahagsleg áhrif af heimsóknum ferðamanna í íslenskum þjóðgörðum á svæðisbundnum, innlendum hagkerfum og, í framhaldi af því, að reikna út efnahagsleg áhrif og skatttekjur ríkisins sem fjárfestar eru í þjóðgörðum.

Niðurstöðurrannsóknarinnar munu veita grundvöll fyrir upplýsta umræðu milli mismunandi hagsmunaaðila, svo sem yfirvöld, opinberar stofnanir, frjáls félagasamtök, vísindamenn og sveitarfélög, um kostnað og efnahagsleg áhrif þjóðgarða. Þjóðgarðurinn Snæfellsjökull var notaður sem dæmi í þessari rannsókn til þess að þróa aðferðafræði sem síðan má heimfæra upp á aðra þjóðgarða og náttúruverndarsvæði. Niðurstöðurnar veita einnig ákveðið viðmið fyrir samanburð á efnahagslegum áhrifum þróunar verndarsvæða fyrir ferðaþjónustu annars vegar og orkuframleiðslu í 3. áfanga rammaáætlunarinnar hins vegar.

Money Generation Model 2 aðferðafræðin var aðlöguð að íslenskum aðstæðum og notuð til að reikna út efnahagsleg áhrif Þjóðgarðsins Snæfellsjökuls, sem reyndist vera 3,9 milljarðar íslenska króna á ári. Tengja má 700 störf og yfir 900 milljónir í beinum sköttum við eyðslu gesta í tengslum við heimsóknir í garðinn. Hlutfall efnahagslegra áhrifa miðað við kostnað er 58:1 og tekjuskatturinn sem skapast er 14 sinnum meiri en rekstrarkostnaður þjóðgarðsins. Niðurstöðurnar benda til þess að náttúruvernd og náttúrumiðuð ferðaþjónusta séu efnahagslega sterkir valkostir við nýtingu náttúruauðlinda og það sé skýrt tækifæri til að þróa þjónustu í þjóðgarðinum á efnahagslega sjálfbærum grundvelli.

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1 Introduction

Iceland has experienced a tremendous tourism boom in recent years. The annual increase in visitor numbers has been over 20 % each year since 2010 and over 30 % in the last couple of years. In 2016 nearly 1.8 million visitors[1] visited Iceland; four times more than ten years ago. The tourism boom has also changed the economic landscape in Iceland, which used to be dominated by fisheries and aluminium production. Since 2013, tourism has become the largest export sector, in 2016 accounting for 41 % of foreign exchange with fisheries at 19 % and energy-intensive sectors (mainly aluminium) at 15 %. (OECD, 2017b)

The majority of visitors travel to Iceland to experience its unique nature as Figure 1 shows (OECD, 2017b) and Iceland's three national parks - Þingvellir, Vatnajökull and Snæfellsjökull - are among country's top attractions by visitor numbers. Nearly 1.2 million people visited Thingvellir National Park (NP) (2017a) in 2016, ca. 639.000 people visited Skaftafell - Vatnajökull NP's most popular site - and ca. 133.000 people visited Snæfellsjökull NP (Þórhallsdóttir, Ólafsson & Rögnvaldsdóttir, 2017). These areas have been deemed to possess unique natural and historical qualities worthy of national park status and protection (Thingvellir National Park, 2017b; Umhverfisstofnun, 2017a & 2017b). According to the International Union for Conservation of Nature (IUCN), a national park status (category II protected area) typically entails large-scale conservation and protection efforts together with scientific, educational, recreational and visitation opportunities; and protection categories (such as national park) can also be used as basis for annual budgets in protected area management in determining the importance of different protected areas (Dudley, 2008).

[1] Icelandic Tourist Board has recently challenged these numbers by showing how the visitor counting method at the Keflavik international airport overestimates the total number of foreign visitors up to 14 % by including foreign residents in Iceland, and transit passengers who exit the international area. This discrepancy in total visitor numbers does not, however, affect this study as it employs local visitor counters. See https://www.ferdamalastofa.is/is/um-ferdamalastofu/frettir/nidurstodur-ur-konnun-a-fjolda-sjalftengifarthega.

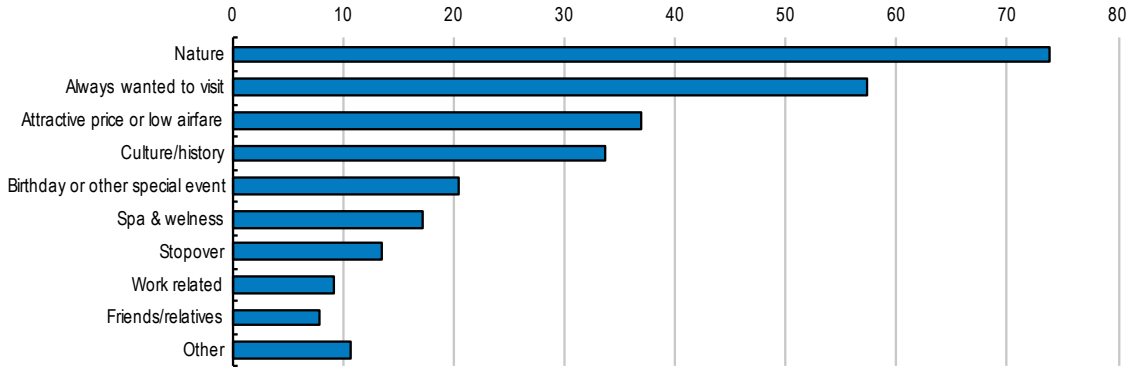

Figure 1. Reasons why visitors want to visit Iceland (%).

Establishing and maintaining services of national parks involve considerable investments and operational costs which are typically covered by the state. Many countries have gone through difficult economic periods in the last decade and as a result, in effort to cut budgetary spending, national parks and environmental conservation have been under consideration in many places. For example, the economic crisis in 2008 severely affected the resources for environmental programmes and infrastructure investments in Iceland (OECD, 2014). In such situations, the challenge for sites of natural value and recreation is to show the value and impact of investments in comparable economic terms as other lines in the budget – without means to do that, they may appear as costs without any tangible benefits. Economic analysis provides a framework and set of tools for addressing these issues (Stynes, 2005).

There are several approaches to assessing the economic value of park systems according to the American National Recreation and Park Association (NRPA, 2015). The most common is generally termed as an economic impact analysis. Economic impact analyses provide estimates of the value of spending, as money for goods and services moves through the economy. Economic impact analyses provide information to allocate resources among competing projects, assess the potential returns to public or private investments and policies, and put 'hard numbers' to political strategies.

In the Icelandic context, the recent tourism boom and subsequent increase in its economic significance has also made comparisons between power development projects and development of nature conservation highly relevant. The question from an economic perspective is which one produces more economic value over a timespan of decades or even hundreds of years? Investments in nature-based tourism and power industries are

not easy to weigh against each other as they take advantage of Iceland's natural resources in different and often incompatible ways. Available research on the economic impacts of these investments in comparable terms is also very limited.

Different methodologies for evaluating the economic impact of national parks and other protected areas have been researched in this thesis and a variant of the Money Generation Model (MGM) methodology chosen to be used in the case study. The MGM model was developed originally for the U.S. National Park Service, and it has recently been applied to national parks in Finland where the results showed a 10-to-1 benefit-cost ratio for each euro invested in national parks (Kajala, 2012). There have been some informal talks between the local stakeholders and Metsähallitus Parks & Wildlife Finland regarding the adoption and customization of the Finnish economic impact analysis tool for Iceland, and this study provides an evaluation of whether this idea is feasible based on the context and availability of compatible datasets.

According to Stynes, Propst, Chang and Sun (2000) the MGM model yields reasonable estimates of economic impact of national parks and protected areas at a low data collection cost by forming an aggregate figure based on number of visits, average spending per visitor and economic multipliers. Economic impacts are measured in terms of sales, income, jobs, tax receipts and value added. A distinction between direct, indirect and induced effects of visitor spending can also be made. Direct effects are composed of goods and services purchased by visitors. Indirect effects are comprised of goods and services bought by tourism companies from their suppliers. Induced effects represent the spending of employees and companies in the tourism sector through wages and profits from tourism businesses.

This thesis presents a case study of the MGM methodology adapted for the Icelandic context in estimating direct and indirect economic impacts of Snæfellsjökull National Park. Implications for future research concerning the application of the methodology and total economic impact of Iceland's national parks will be discussed.

2 Theoretical background

2.1 Objectives of the study

To create a relevant framework for evaluating the economic impact of visitor spending in national parks and other protected areas in Iceland, this study focuses on the following research objectives:

1) Research currently available data regarding visits and visitor spending in Icelandic national parks, and data available on input-output tables and economic multipliers.
2) Based on the available data and desired detail of the results, propose an economic impact model to be used in the initial practical study. Define the variables used in the study and how the data will be captured.
3) Implement a proof-of-concept study based on one national park to provide initial reference figures and experience on the use of the chosen economic impact model in an Icelandic context, which can act as a base for further revision and scaling up the assessment to the national level. Provide an estimate of the regional and national (total) economic impact of the chosen national park, and compare the impact to the national investments, to establish a return-of-investment ratio.

In the context of this study the terms ‘tourism’ and ‘visitors’ include domestic tourism.

2.2 Scope of the study

Before focusing on the economic impact analysis, it should be recognized that national parks, protected areas and other sites of nature-based recreation generate value, services and benefits of many different types, and that it may be impossible to determine an economic value for all of them.

In terms of use or application, Barbier (1994) distinguishes values from the natural environment in three main categories:

1) Direct use values; derived from direct interaction with natural resources
2) Indirect use values; described as the ecosystem services from the natural environment
3) Non-use values; representing the remaining non-direct or indirect values from a natural environment, such as the value in our minds that an area 'exists'.

National parks and protected areas often provide value in all these three categories. Visitors gain *direct use value* by exploring the parks by car, hiking, camping, visiting the visitor centres and exhibitions etc. Parks and protected areas provide *indirect use value* for example by providing living and breeding areas for various species and supplying the region with a variety of ecosystem services. National parks and protected areas also often provide *non-use value* by conserving area 'for future generations', highlighting our needs to protect the existence of places of historical, cultural or natural significance.

Costanza et al. (1997) have estimated the value of world's ecosystem services and natural capital, intertwining with Barbier's use-categories. They identified 17 ecosystem services globally, accounting for 125 trillion US dollars per year (Costanza et al., 2014). Examples of the 17 ecosystem services are gas-, climate- and water regulation, water supply, soil formation and erosion control, waste treatment, pollination, food production, raw materials, recreation and cultural ecosystem services. Ecosystem services related to power development are mainly raw materials and water supply, while ecosystem services related to tourism development are recreational and cultural (including aesthetic, educational and spiritual experiences).

Driver, Brown and Peterson (1991) divide the benefits of protected areas and nature-based recreation into four categories: personal, social, economic and environmental. *Personal benefits* are tied to issues of health and psychological well-being, self-image, and self-satisfaction. *Social benefits* include family stability, community pride, and cultural identity. *Environmental benefits* result from environmental health and protection, attitudes, and investment in natural areas. Finally, *economic benefits* are tied to productivity, tourism and recreational goods.

Barbier (1994), Costanza et al. (2014) and Driver et al. (1991) all base their analyses on an anthropocentric view of nature; its value and utility to people. All the values, services and benefits presented above can be seen from a human perspective. An opposing approach to this utilitarianism is the deontological view that nature has value in its own right and that "some acts are morally obligatory regardless of their consequence to human happiness" (D'Amato & Eberle, 1983). The deontological view is reflected in strict nature conservation approaches; protecting the natural environment from human impact and exploitation for its own sake at the potential cost of lost utility or value to people. The deontological view manifests also in the debate about the intrinsic (non-anthropogenic) value of nature. Batavia & Nelson (2017) have written a comprehensive overview of this discourse, offering logical, practical and moral reasons why the concept of intrinsic value should remain in the conservation debate.

Whether our view on the environment is economic or reflects its intrinsic value, attempting to convert different uses and benefits of nature to monetary terms can give us a useful tool for decision-making and policy guidance (Carson, 2012). Similarly, according to Stynes (2005), a common numeraire allows for comparing benefits and costs across widely varying management alternatives, outputs, and publics. Measures of economic significance can be used both internally in resource allocation decisions and externally to demonstrate the contributions of programs to social welfare and regional economic development.

Economic impact analyses like the one conducted in this study focus on the direct and indirect economic impact of recreational use of national parks and protected areas by measuring and estimating visitor contributions to sales, profits, jobs, tax revenues and income in the area (Stynes, 1999a). As such, economic impact analyses mainly capture recreational direct use values and the personal benefits people derive from the visitation areas in market values, omitting other types of value, most ecosystem services and the deontological value of natural areas. Despite these limitations, assessing the economic impact of recreational activities can still provide useful data for comparisons with other equally well-defined areas such as budgetary benefit-cost analysis and comparisons to other natural resource utilization methods.

2.2.1 Economic valuation vs. economic impact of natural resources

The terms economic valuation and economic impact are often confused as they both discuss economic 'benefits'. *Economic valuation* is the process of converting natural environment resources to monetary values, by inferring the value of environmental attributes and services from associated changes in human welfare. Direct use values often have an observable market value to begin with and several different valuation methodologies attempt to convert indirect use and non-use values into markets terms to produce total economic value. After economic valuation is completed, different kinds of economic analyses can be carried out. (Stynes, 1999a & 2005; Lee, Springborn, Handy, Quinn & Shilling, 2010)

Economic impact studies determine the effects of specific activities in a given geographic area on the income, wealth and employment of that area's residents, traced through household or personal activity, and the business and government sectors serving the area (Frechtling, 1994). In the context of national parks and protected areas, economic impact analyses determine the contribution of inbound tourism activity to the economy of the region by answering the following questions (Stynes 1999a):

- How much tourists spend in the area?
- What portion of sales by local businesses is due to tourism?
- How much income does tourism generate for households and businesses in the area?
- How many jobs in the area does tourism support?
- How much tax revenue is generated from tourism?

Typical applications of economic impact analysis to tourism are (Stynes, 1999a):

- To evaluate the economic impacts of changes in the supply of recreation and tourism opportunities.
- To evaluate the economic impacts of changes in tourism demand.
- To evaluate the effects of policies and actions which affect tourism activity.
- To understand the economic structure and interdependencies of different sectors of the economy.

- To argue for a favourable allocation of resources or taxes, zoning or other policy decisions; and to compare different alternatives in resource allocation and policy, management or development proposals.

In comparison, *cost-benefit analysis* (CBA) - a common method in economic studies and project analyses - identifies the most efficient policies from the perspective of net social welfare, including market and non-market values. In the context of tourism-related cost-benefit analysis, the net welfare benefit is often modest as tourism-based income in destination is often offset by corresponding losses in the origin regions; an issue that is out-of-scope for the economic impact analysis due to its regional nature (Stynes, 1999a).

By focusing only on the regional market impacts, Stynes (1999a) warns that economic impact studies by themselves have a rather narrow and one-sided view, and a tendency to emphasize the positive impacts of tourism. They do not assess economic efficiency nor environmental, social or fiscal impacts or costs in the area. Thus, environmental, social and fiscal impacts should be assessed as well for a complete impact assessment in a baseline study or for a given action or change in a region.

2.2.2 Methodologies for assessing the direct use economic value of natural resources

Although economic analyses (such as CBA) and economic impact analysis answer different research questions, both typically start with various valuation techniques. Examples of methods to estimate the economic value of different uses of natural resources are market analysis, travel cost method (TCM), hedonic pricing, contingent valuation (CVM) and replacement cost method (Stynes, 2005; Lee et al, 2010).

These methods can be classified into two categories (Stynes, 2005):

- 'revealed preference' approaches based on actual choices by consumers in a market setting (e.g. TCM)
- 'stated preference' approaches measuring preferences for environmental qualities and alternatives not directly observable in market behaviours (e.g. CVM).

Many economists prefer revealed preference approaches as they are based on actual spending decisions and behaviour by subjects, compared to estimates and conditional expenditure figures employed by other methods such as contingent valuation. Values for

recreational activities in parks can vary wildly between different valuation methods; for example, the per-day average for a camping activity has varied between $1.69 - $187 in different valuation studies, thus being able to base analyses in actual realized visitor behaviour is valuable for reliable results (Stynes, 2005).

The contingent valuation method has been used in Iceland (Bothe, 2003; Lienhoop, 2004) to estimate willingness-to-pay and willingness-to-accept costs and benefits of hydropower developments in wilderness areas. The Lienhoop study, conducted in 2003, suggested that overall people preferred the preservation of the area over the hydropower scheme but at the same time researchers noted that the sample of people interviewed was small and not necessarily representative of the general public.

In the context of this study, a valuation method is needed to determine the cost of the national park visit to a single visitor in order to estimate the economic impact of the national park (or other protected recreational area). The travel cost method derives an economic value based on observed spending behaviour to reach the park, and augmented with other visitor spending in collection with the national park visit, it provides an empirical base figure for the economic impact analysis, which will be further discussed in the next chapter.

2.3 Concepts for economic impact analysis of recreational spending

Economic impact analyses estimate the changes in economic activity within a region resulting from some action (Stynes et al., 2000). To understand the impact of investing in national parks and recreational areas, we need focus on individual visitors and the effects their spending creates. It is important to note that only valuation methods based on surveying actual spending apply here (e.g. TCM or other on-site spending surveys), since only real money used in the context will create economic impacts, not estimates of what people would be willing-to-pay (e.g. CVM). Once the valuation has been carried out, analysing the economic impact to the regional economy is more straightforward and general models of regional economic development have been generally accepted as applicable to recreation and tourism (Stynes, 2005). Economic impact of recreation usually follows the process illustrated in Figure 2.

Action
(e.g. establishment of national park or protected area, investments into an area, etc.)
↡
Changes in recreation activity
(e.g. attraction of more domestic and international visitors, etc.)
↡
Changes in spending
(e.g. hotel and other accommodation nights, eating out in the area, tours within the area, etc.)
↡
Direct economic impacts
(e.g. new capital in the area, tax receipts, new jobs needed to supply the demand, etc.)
↡
Secondary economic impacts
(production of services further down the value chain as associated impacts)

Figure 2. Tracing economic impacts of recreation activity (Stynes, 2005), augmented with context-specific examples.

Economic impacts can be measured in terms of sales, income, jobs, tax receipts and value added. Sales data can be collected from firms' tax reports or visitor spending surveys; jobs from employer reports, employee taxes and social security payments; income from payrolls and profits of businesses; and taxes from tax authorities. Value added adds up all the different contributions of an activity to the regional or national product. Distinction between direct, indirect and induced effects of tourism or recreational spending can also be made. Direct effects are composed of goods and services purchased by visitors and tourists. Indirect effects are comprised of goods and services bought by 'backward' tourism services and companies from their suppliers. Induced effects represent the spending by employees and companies in the tourism sector from wages and profits generated by tourism. Indirect and induced effects are included in the secondary economic impacts. (Stynes, 2005)

Economic impact analysis is completed with *input-output* (I-O) models, which capture the structure of the local, regional or national economy in each sector by describing the sale and purchase relationships between producers and consumers within an economy, and illustrating flows of money between different actors, sectors and regions (OECD, 2017a). According to Stynes (2005), the models describe what each sector must purchase from other sectors to produce one monetary unit of goods and services. I-O models provide a foundation for deriving multipliers, which are needed to estimate the secondary impacts of visitor spending through the economy. Multipliers represent the

secondary effects as a ratio of the total change in economic activity relative to the direct change, and express how different sectors relate to the economy of the region (Stynes, 2005). Two main types of multipliers are used economic impact analysis of recreational spending: sales and employment multipliers.

2.4 Methodologies for economic impact analysis of recreational spending

Based on the concepts and principles introduced in previous chapters, the U.S. National Park Service (USDI, NPS, 1990) created the original Money Generation Model (MGM) to estimate the economic impacts of national parks by forming an aggregate figure based on number of visits, average spending per visitor and an aggregate sales multiplier through the following equation:

*Economic impact = Number of visitors * Average spending per visitor * Economic multiplier.*

By carefully researching the parameters, the original MGM model was expected to yield reasonable estimates at minimal data collection cost; however, since it doesn't account for the type of spending, it gives little information on the sectors benefiting from the activity or about the secondary effects (Stynes et al., 2000). To address the limitations of the original model, Stynes et al. (2000) developed the MGM2 model to estimate the economic impact of recreational spending in more detail in four different areas compared to a single aggregate number:

1) Distinction between direct and secondary economic effects
2) Reporting economic impact in sales, jobs, personal income and value added
3) Handling the margin for retail purchases, since only the margin is retained in the local economy for products produced elsewhere
4) More accuracy on the defined local or regional area of impact

To achieve these detailed outputs, the MGM2 model also requires considerably more detailed data for the analysis, while the principle behind the economic impact equation remains essentially the same. Stynes (2005) provide a detailed comparison between the MGM and MGM2 models, and descriptions of the sources of information in Table 1. Input variables will be further discussed in the methodology chapter of this study, but a short overview of the MGM2 variables is provided here for background:

1. Park visits as person or party per days/nights spent in the area
2. Visitor spending on party/day (day trips) or party/night (overnight) basis categorized by the type of spending
3. Sector-specific direct and total effect multipliers converting the spending data into income and jobs in the defined area

Table 1. Comparison of the different MGM methodologies (Stynes, 2005)

Level	Recreation use (visits)	Spending	Multipliers
Judgment	Expert judgment to estimate recreation activity.	Expert judgment or an 'engineering approach'.	Expert judgment to estimate multipliers.
MGM	Existing visit counts for a particular facility or area.	Spending averages from studies of a similar market.	Aggregate tourism spending multipliers from a similar study.
MGM2	Break visitors into distinct segments based on trip types or activities.	Adjust spending averages that disaggregated by spending categories and segments.	Use sector-specific multipliers from published sources.
Primary data + I/O model	Visitor survey or demand model to estimate number of visitors by segment.	Survey a random sample of visitors to estimate average spending by segment within spending categories.	Use an input-output model of the region's economy.

The MGM2 model (Stynes et al., 2000) suggests making the calculations by visitor segments to capture the differences in spending by visitor types. Spending averages of different segments may also be used with certain reservations across different national parks without having to repeat the entire visitor spending survey in each park. Default segments by lodging-type are presented in Table 2. Visitor segments can be adapted to the visitor profiles of different national parks; for example, Stynes and Sun (2003) also used a more compact version with four categories in some later studies: local visitors, non-local day trip visitors, 'hotel' (indoor accommodation) visitors and camping visitors.

Table 2. Visitor segmentation by lodging type in the original MGM2 model

General visitor type	Default segmentation
Day visitors to the area	1. Local day users
	2. Non-local day users
Overnight visitors staying inside the park	3. Motel, cabin, etc.
	4. Developed campground
	5. Backcountry
Overnight visitors staying outside the park in the area	6. Motel, cabin, etc.
	7. Campground
	8. In private homes (owned seasonal homes or stays with friends or relatives)

In 2012, the U.S. National Park Service revised the MGM2 model to become the Visitor Spending Effects (VSE) model, which further increases the accuracy of the model by using unique I-O multipliers for each park, defining local gateway regions using GIS to capture a greater portion of the secondary spending, and using park profile specific visitor spending surveys and data (Thomas, Huber & Koontz, 2014). Thus, results from the VSE model are not directly compatible to MGM2-based assessments.

The Tourism Satellite Accounts (TSA) is a "method of measuring the direct economic contributions of tourism consumption to a national economy" that draws its data from the System of National Accounts (Frechtling, 2010, p. 136). TSA is concerned with direct effects of tourism demand (or spending), and does not attempt to elicit indirect or induced effects. However, Vellas (2011) has suggested that indirect effects could also be calculated from TSA data, at least on a rudimentary level.

TSA methodology has been used in a similar, although not protected area–specific, context in Iceland (Lilja Berglind Rögnvaldsdóttir, 2014 & 2016) and has been adopted as a reporting standard on the national level by Statistics Iceland (2015). Due to a lack of regional economic input-output data, the TSA analysis is currently only published on the national level. The TSA data collection makes no distinction for protected areas. If it was possible to augment the national TSA data collection with some context-specific questions, it could potentially be used as a methodology for estimating the economic impact of national parks and protected areas, or at least as a centralized way for data collection for protected area specific analyses. Stynes (2001a) compared satellite accounts (such as TSA) and survey/I-O (such as MGM) approaches and summarized that in the comparison both models yielded similar results and could be used to verify each

other. Frenţ (2016) has recommended to avoid using TSA for economic impact analysis, suggesting it should rather be used as a tool for evaluating the macroeconomic importance of the tourism.

This study aims to provide a relevant methodological framework for evaluating the economic impact of visitor spending in the national parks and other protected areas in the Icelandic context. As a reference, the following chapter briefly outlines the experiences and results of applying the MGM2 model in Finland, another sparsely populated Nordic country with an extensive nature-based tourism industry.

2.4.1 Application of the MGM2 model in Finnish National Parks

Metsähallitus Parks & Wildlife Finland and the Finnish Forest Research Institute (Metla) carried out the first assessment of the economic impact of Finland's 37 national parks, seven state-owned hiking areas and some other protected areas deemed important for tourism in 2009 (Vatanen & Kajala, 2015). The assessment was based on the MGM2 model. Visitor data was collected as part of the assessment by visitor surveys; the initial regional sector-specific I-O multipliers were based on data from 2002 and employment data for the regions near protected areas from 2006, both produced and published by Statistics Finland.

The results published as part of The Economics of Ecosystems and Biodiversity (TEEB) process in 2011 (Kajala, 2012) showed that input-output ratio of investments into Finnish national parks and recreational protected areas was very favourable: each 1 euro investment returned 10 euros to the local economy in the surrounding municipalities. At the time, the assessment convinced decision-makers that public investments in protected areas were highly cost-effective, and Metsähallitus Parks & Wildlife Finland avoided severe budget cuts. The study also alerted the tourism sector and regional developers and administrators to the potential of nature-based tourism (Kajala, 2012).

After the initial study, Metsähallitus Parks & Wildlife Finland developed an automated database application called ASTA to produce annual reports on the economic impacts of national parks and other projected areas (Kajala, 2012). There have been informal talks between some Icelandic stakeholders and Metsähallitus Parks & Wildlife Finland whether the adoption and customization of the ASTA database would be possible for Iceland, and

Chapter 5.5 in this study discusses if the idea is feasible based on the context and availability of compatible datasets.

In comparison to this study, it is worth noting that in Finland all assessments about the economic impact of national parks have been conducted with a regional focus, using local economic multipliers and concerning only local spending within the national park in question and its surroundings – the context and patterns of travel around Iceland's national parks are however somewhat different as described in the methodology-chapter.

2.5 Existing research on the economic impact of protected areas in Iceland

Research published so far in Iceland related to the economic impact of protected areas is very limited and focuses on Vatnajökull National Park. During the process of establishing Vatnajökull NP, it was estimated that the regional and national economic impacts of the national park would be around 3-4 billion ISK per year, based on visitor projections (Rögnvaldur Guðmundsson, 2006).

In connection with the opening of Vatnajökull NP, Welling (2008) reviewed and recommended suitable indicators to follow the long-term social and economic impacts of the park in the surrounding communities. Welling recommended the MGM2 methodology to follow the employment, business output and local income impacts of the park; and collecting the necessary expenditure data by suitable visitor surveys. Sigrún Inga Sigurgeirsdóttir & Þorvarður Árnason (2008) carried out an extensive study on Vatnajökull NP visitors during the first summer it was officially open. In this survey, visitors were asked about their intended expenditures during the visit to the national park and its surrounding areas using expenditure brackets. The economic impact of the visitor spending was, however, not analysed in the 2008 report. Although the method used is not fully compatible to the visitor expenditure survey used in this study, the results can potentially be used as an interesting point of reference for the time before the current tourism boom.

Gyða Þórhallsdóttir, Rögnvaldur Ólafsson & Auður Þórunn Rögnvaldsdóttir (2017) have published up-to-date visitor count data for Vatnajökull NP, and this data could be

very useful also in the context of this study, but no economic analyses have yet been done based on the data from Vatnajökull NP.

The Icelandic Tourism Board has recently published research on the economic effect of tourism in Þingeyjarsýslur region (Lilja Berglind Rögnvaldsdóttir, 2016). This study used the Tourism Satellite Account (TSA) approach with a spending survey and tourism-related companies' turnovers as proxy data to assess economic impact of tourist spending. TSA is the recommended method by the World Tourism Organization (UNWTO, 2010) for capturing the economic impact of tourism on the national level. There are still too many gaps in the tourism data in Iceland to fully comply with TSA guidelines; Frenţ (2014) has compiled an extensive list of recommendations for Iceland to comply with the TSA guidelines. Similar to Frenţ (2016), Lilja Berglind Rögnvaldsdóttir (2016) points out that as a national level methodology, TSA is not applicable to many regional issues, nor does it attempt to capture the secondary economic effects.

2.6 Growth of tourism tax revenue in Iceland

While the economic impacts of visitor spending in national parks are received by a multitude of actors (hotel and restaurant owners, shop and service station keepers, tour and rental companies, suppliers, subcontractors, manufacturers, etc.), the part that directly concerns state funding of national parks is the value-added tax (VAT) revenue generated by visitor spending. Iceland's Ministry of Finance has published (OECD, 2017b) a chart showing how this revenue has grown in recent years and associated changes in the shares of different tourism activities (see Figure 3). Especially notable is the increase of tax revenue from travel agencies in 2016, due to removal of tax exemptions and broadening of the tax base in 2015 reforms. Reduction of the standard VAT rate from 25.5 % to 24 % and increase of reduced VAT rate that applies to food and accommodation from 7 % to 11 % from January 1st 2015 onwards has also had recent impact in the VAT turnover (Iceland - VAT Rate Changes…, 2017).

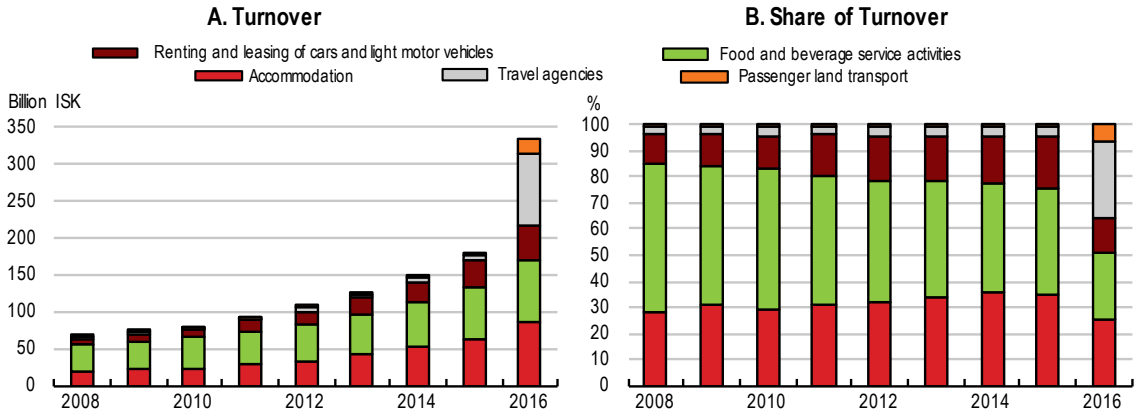

Figure 3. Share of VAT revenue generated by different tourism sources in Iceland.

In addition to VAT, the state also receives income tax from the salaries of people employed or linked to the tourism industry value chains, as well as capital tax on the profits of companies associated with this value chain.

2.7 Comparisons between the value of nature conservation and power development in Iceland

Changes in the shares of Iceland's major export sectors and sources of foreign revenue have been dramatic in the last few years. As Figure 4 by OECD (2017b) shows, tourism that used to account for approximately 10 % of Iceland's foreign revenue now accounts for over 40 %, and the shares of fisheries and energy intensive sectors have fallen under 20 %. Apart from the steady decline in the share of the fisheries, all changes have taken place in just a few years since 2008. An important consideration that is not evident from Figure 4 is that the energy intensive sectors rely on imported raw materials, while fisheries and tourism rely mainly on domestic resources (apart from fossil fuels used in transport) so a higher share of the revenues is captured in Iceland for those sectors.

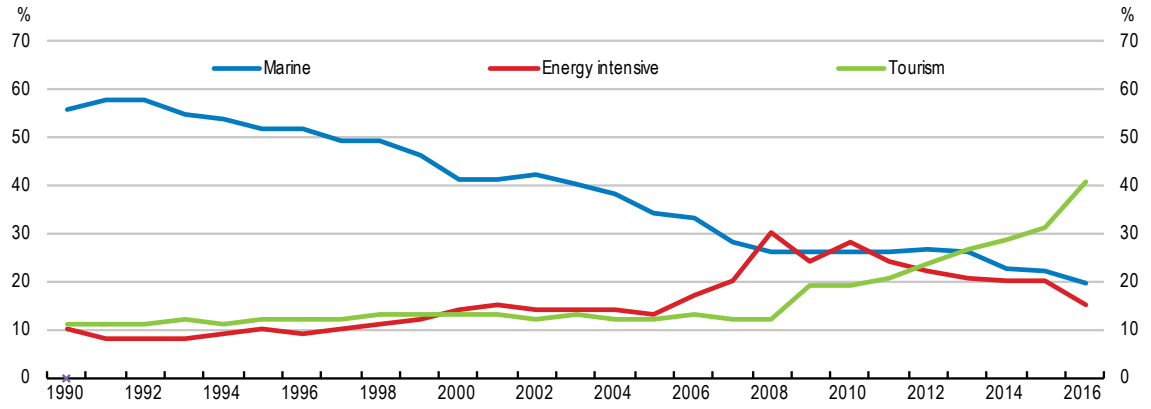

Figure 4. Changes in major export sectors in Iceland (OECD, 2017b)

One of the questions this development has raised is whether efforts should be directed at developing sustainable tourism and expanding protected nature areas for recreational, environmental and/or tourism purposes; or harnessing some of the remaining potential from Iceland's rivers and geothermal areas for power generation.

The main challenge between the two opportunities lies in the perception of the 'untouched' Icelandic nature, which is threatened by power development. According to visitor surveys by the Icelandic Tourist Board (2014), ca. 80 % of foreign visitors come to Iceland primarily for the nature, and 51 % mention beauty, unspoilt, untouched, landscape, scenery or wilderness as the reason why they came to experience the nature. Anna Dóra Sæþórsdóttir and Jarkko Saarinen (2015) studied visitors' attitudes towards power development in the Icelandic Central Highland and found that the majority of visitors were against power plants (73 %) and power lines (60 %), considering that these would diminish the quality their wilderness experience. The authors note that the interviews (n=85) were conducted in Highland hiking areas and susceptible to bias due to the type of visitors frequenting those areas. It is also important to note that power development or tourism (Anna Dóra Sæþórsdóttir, 2013) are not the only challenges to the 'untouched' Icelandic nature. Also reforestation with non-native trees (Fries, 2017), widespread erosion and invasive plant and animal species have caused irreversible changes in the Icelandic nature.

From a utilitarian standpoint, there is little difference between the tourism industry compared to other industries in efforts to convert the natural environment to serve the

market economy with maximum returns. In practise however, there seems to be a more synergistic relationship between tourism and nature conservation; and together they can form an alternative policy option to direct exploitation of natural resources.

A good example of such synergy is presented by Saarinen (1998) concerning the establishment of the Urho Kekkonen National Park in the Saariselkä region in Finnish Lapland in the 1980s. The forest and pulp industry was growing quickly in the 70s, and initial calculations were made that felling the old-growth forests of this wilderness area would exceed tourism income three-fold. This area was already at the time one of the last extensive wilderness areas left in Europe and popular with hikers. Further calculations considering the nature conservation aspect indicated that for 25 years forest felling would provide the estimated economic impacts but afterwards it would not yield income for 150-170 years due to the slow forest growth above the Arctic Circle. Conservation and nature-based tourism would provide returns during this entire time and in the long run be more profitable in terms of income and jobs.

This example is relevant to the current discussion concerning plans to harness Iceland's natural resources. Glacial rivers and high temperature geothermal areas represent options for hydropower and geothermal plants in the same way forests have represented wealth to Finland. Both countries still exhibit large expanses of the few remaining wilderness areas in Europe, and many of the potential resources are located in these wilderness areas.

Even though this is a sensitive topic in Iceland, it has generated a lot of public discussion and some studies into the costs and benefits of natural resource utilization and conservation. The debate has been officially handled in the 'The Master Plan for Nature Protection and Energy Utilization' or *Rammaáætlun* process, which is evaluating 81 potential power development options in Iceland, and attempts to "reconcile the often-competing interests of nature conservation and energy utilization on a national scale" (Power options…, 2017). Currently *Rammaáætlun* is in its 3rd phase, having so far placed 29 options in 'utilization' and 'protection' categories, 23 in 'waiting' category, and is yet to take a position on 29 options (Power options…, 2017).

While *Rammaáætlun* has considered the nature conservation values of the designated potential power development sites, it has not been able to compare the economic

impacts of nature-based tourism in the different areas to the economic impacts of the power development projects. The methodology presented in this paper could be interesting for the sites placed in the 'utilization' or 'waiting' category because it would allow comparisons of long-term economic impacts between power development and tourism, if the visitor numbers and spending was surveyed in the areas or sites in question. Beyond *Rammaáætlun*, the development of the economic impact assessment methodology could also be utilized as an ongoing part of public land management, guiding decision-making related to tourism development by different government institutions, non-governmental organizations and stakeholders in the tourism industry (Stynes, 2005).

3 Methodology

3.1 National parks in Iceland as research locations

According to the Environment Agency of Iceland (Umhverfisstofnun, 2017a), there are currently 3 national parks, 34 national monuments, 13 country parks, 37 nature reserves and 2 other protected areas in Iceland. This study will focus on the national parks as they are the most well-known destinations among protected areas in Iceland, and thus have the most significant recreational and tourism impact. National parks also have a legal mandate by their Acts to provide public access, information, visitor services and infrastructure such as park centres, toilets, trails and employment of rangers, with the result that national parks take up much of the state budget for protected area management. Investments to the national parks by the state and municipalities, and to the visitor services by tourism operators, make them interesting starting points for research into the economic impacts of recreational use. However, in general, the methodologies reviewed and presented in this study can be used in connection with any protected recreational area.

Iceland's three national parks are Þingvellir, Snæfellsjökull and Vatnajökull. They are all markedly different in size, location and character. Table 3 summarizes some of the key features of these national parks as potential locations for the proof-of-concept study. To find out the total economic impact of national parks in Iceland, surveys would need to be conducted in each national park. Due to differences in size, location and visitor travel habits, any one national park is unlikely to be representative of the other two. For example, visitors to Þingvellir NP typically take a day tour or rental car from Reykjavik and have few opportunities to spend money in the park or its surrounding region. On the other hand, visitors to Vatnajökull NP can spend several days around or within the park in different locations (Gyða Þórhallsdóttir et al., 2017) in a variety of activities and accommodation options.

Table 3. Comparison of Icelandic National Parks as research locations for proof-of-concept study.

Feature	**Þingvellir NP**	**Snæfellsjökull NP**	**Vatnajökull NP**
Size and location	237 km², 50 km from Reykjavik, Bláskógabyggð municipality in Southern Iceland.	170 km², 200 km from Reykjavik, Snæfellsbær municipality in Western Iceland.	14,141 km², covers large areas in Southern, Eastern, Northern and Central Iceland.
Prominent feature	Historical parliament site, valley between tectonic plates. World Heritage site.	Snæfellsjökull glacier and volcano.	Europe's largest glacier.
Region of economic impact	Mainly capital region as generally accessed from Reykjavik. Some accommodation services around national park.	Snæfellsbær municipality (and other municipalities in the peninsula), also capital region is it can be reached on a day tour.	Multiple municipalities and regions, also capital region for tours and trips originating from capital.
Available visitor counter data	One visitor counter in the park (Rögnvaldur Ólafsson & Gyða Þórhallsdóttir, 2015)	At Djúpalónssandur since May 2014, on main road since summer 2016 (Rögnvaldur Ólafsson & Gyða Þórhallsdóttir, 2015 & 2017, July)	Visitor counters at 29 different locations (Gyða Þórhallsdóttir et al., 2017)
Role as destination	Typically one of three main stops on the popular Golden Circle tour.	Main destination on the peninsula, but other popular destinations also nearby outside the park.	Depends on the part of the NP. Many visitor centres and attractions, popular sites near the ring road.

Additional sources: Thingvellir National Park (2016), Umhverfisstofnun (2017b, 2017c).

Another distinctive feature of tourism in Iceland is that visitors often visit several locations and destinations during one day, some related to the national parks and others not. Models such as the MGM2 don't traditionally account for this, because they're based on the assumption that visitors spend the entire day (or days) within the park. While this assumption may hold in USA and Finland where national parks are often remote 'sole' destinations, in Iceland the potential skewing effect of other non-protected area or non-NP destinations needs to be removed from the visitor spending on a particular day. These considerations are highlighted in Table 3 under heading 'Role as destination'. This is especially true for Þingvellir NP, which is most often visited as part of the Golden Circle tour, and also typical for Vatnajökull NP, where visitors visit different locations within and around the park as they are driving around the country on National Road nr. 1 (Ring road). Snæfellsjökull NP is perhaps less affected by this, being at the end of the Snæfellsnes peninsula and typically the main destination of visits to the peninsula, but many visitors still visit other nearby sites such as the Arnarstapi-Hellnar cliffs, Kirkjufell mountain and

towns on the peninsula in addition the national park, so the issue needs to be accounted for.

The Icelandic Tourism Research Centre has been working closely with the national parks over the last few years in installing vehicle counters on the roads leading to different locations in the national parks, as well as publishing the visitor data. As a result, all parks now have at least one vehicle counter and accurate year-round data on the visitor numbers, which is extremely useful for this study and for extending the scope of this study later to all national parks. The vehicle counters count vehicles on the road, and the results are calibrated to number of visitors by manually counting the people in the cars or buses during one week (Gyða Þórhallsdóttir & Rögnvaldur Ólafsson, 2017), and then extrapolating the ratios to the entire period. Radars have also been installed in some locations this year, which allow more precise results by recognizing the size of the vehicle or bus. Some locations (e.g. Eldgjá) also have visitor counters on the trails. (Rögnvaldur Ólafsson & Gyða Þórhallsdóttir, 2015; Gyða Þórhallsdóttir, interview, November 8th 2016)

Vehicle counters have allowed in-depth analysis on the seasonality of tourism in Iceland, which used to be based on high numbers of visitors in the summer and very few in the winter. A recent study by Gyða Þórhallsdóttir & Rögnvaldur Ólafsson (2017) shows that while seasonality of tourism in general shows a downward trend with more visitors now arriving throughout the year, this trend is mainly focused on the capital region and most rural areas still experience high seasonality. During off-peak season visitors typically stay overnight in the Reykjavik area, and take day tours to destinations in South and West Iceland, including Snæfellsjökull NP. Gyða Þórhallsdóttir and Rögnvaldur Ólafsson (2017) remark that such travel behaviour generates revenues mainly in the capital area and does not contribute to solving infrastructure and funding issues in the destinations – an issue that this study will also attempt to provide new information on.

Based on the features and available data presented here, Snæfellsjökull NP was chosen for the location of the proof-of-concept study. It has a relatively clear geographically defined economic impact zone – the Snæfellsnes peninsula – and it also receives a steady flow of day visitors from the capital region, which is useful for testing how to account for local and non-local economic impacts in the proof-of-concept study.

Snæfellsjökull NP is located off the popular circle routes like the Golden Circle or Ring Road, so it visitors don't generally end up there by just driving by. It's defined strongly in the context of nature-based tourism, though Katrín Anna Lund (2013) contests that it defies such artificial classifications. The size of Snæfellsjökull NP makes it a manageable location for the proof-of-concept study compared to Vatnajökull NP. It has also had a visitor counter since May 2014 at Djúpalónssandur. Þingvellir NP would be comparable in size and equipped with a visitor counter for the case study, but it would be difficult to discern its economic effects from other locations on the Golden Circle, or the regional economic effects since Þingvellir is so close to the capital region.

3.1.1 Description of the research site

Snæfellsjökull National Park was established in 2001 protect and conserve the area's unique landscape, indigenous plant and animal life as well as important historical relics (Umhverfisstofnun, 2017b). The main attraction in the park is Snæfellsjökull, a glacier-capped active volcano that has moulded the surrounding landscape with moss covered lava fields, craters, caves, sea cliffs and black sand beaches (Umhverfisstofnun, 2017b).

Figure 5 presents a general map of the Snæfellsnes peninsula with the national park boundary, and the main towns and attractions. The park is easily accessible by a well-maintained paved road circling Snæfellsjökull around the end of the peninsula, and most attractions within the park are located along the road or a short distance from it. A mountain road suitable for 4-wheel-drive vehicles leads to the glacier but is only accessible in the summer season. The national park has ca. 30 marked hiking trails, and hikers can camp along the routes, but there are no campsite services within the park itself. The Snæfellsjökull NP visitor centre is currently located in Malarrif; originally it was in Hellnar a few kilometres from the park boundary. The main attractions on the Snæfellsnes peninsula are generally within a 50-kilometre radius from the park, making the peninsula accessible for relatively short trips.

Two locations in Snæfellsjökull NP were selected for the collection of visitor spending surveys: Malarrif visitor centre and Djúpalónssandur parking area. The choice of two different survey locations was both scientific and pragmatic; it was considered possible that visitors to Malarrif would be different in their travel and spending habits compared to the more self-guided visitors who only stopped at Djúpalónssandur and not at the

visitor centre in Malarrif. According to an interview with the head ranger of the Snæfellsjökull NP, approximately 15-30 % of the visitors to the national park visit the Malarrif visitor centre (J. Björnsson, interview, July 17th 2017). Additionally, as surveys were collected from the visitors on paper sheets, surveying was not possible in windy or rainy weather at Djúpalónssandur where there is no shelter, so Malarrif provided a practical option for surveying in adverse weather.

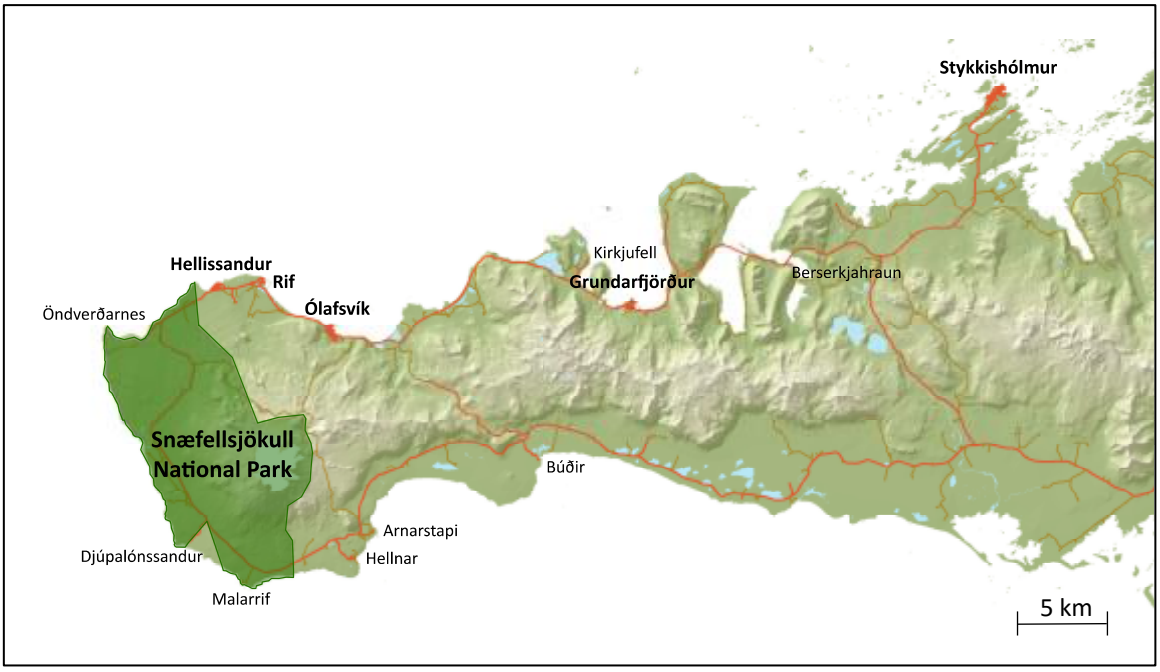

Figure 5. Map of Snæfellsnes peninsula and the national park

3.2 Selection of the economic impact model

Based on the review of methodologies to estimate the economic impact of recreational use of protected areas in Chapter 2, the Money Generation Model 2 (MGM2) has been selected as the methodology for this study. It represents a good balance of available data and detail of results. The original MGM model didn't discern the types of spending (accommodation, services, food, transport, etc.), which can be very useful information for the local communities, entrepreneurs and people in the tourism industry in Iceland. The original MGM model also couldn't account for the indirect economic impacts that may have a substantial economic effect. The VSE (or "MGM3") model employs park-specific input-output multipliers, which would potentially increase the accuracy of the results further, but since such detailed data is not available in Iceland, it is not an option at this point. Tourism Satellite Accounts (TSA) was also considered but recommendations

against using it for economic impact analysis and its lack of scope for indirect or induced effects raised MGM2 above it in comparison. Recent experiences of using and developing the methodology in the Finnish National Parks, and associated interest in Iceland to consider adapting the Finnish integrated evaluation system, reinforced this decision.

3.3 Data collection

3.3.1 Visitor count data

The visitor counter at Djúpalónssandur in Snæfellsjökull NP has been collecting passing vehicle data since May 2014. The data has been calibrated into visitor numbers by hand-counting the people in the cars and buses over a period of a week (Gyða Þórhallsdóttir & Rögnvaldur Ólafsson, 2017). A new vehicle counter and vehicle size radar were installed on the main road within the park area in the beginning of summer 2016. Figure 6 presents the most recent data (until end of June 2017) from the Djúpalónssandur counter and shows how visits to the park are clearly concentrated around the summer months, but especially the winter and spring months of 2016 and 2017 show significant proportional increases compared to previous winters. Total number of visitors at Djúpalónssandur in 2015 was 92.665 and in 2016 it had risen to 132.555, an increase of 43 % (Rögnvaldur Ólafsson & Gyða Þórhallsdóttir; 2017, July).

Since Djúpalónssandur is on a dead-end road to the sea shore from the main road, it may not represent the total amount of visitors to the Snæfellsjökull NP as not every visitor stops there. However, it is the most popular site for visits in the park and receives more visitors compared, for example, to the visitor centre in Malarrif (J. Björnsson, interview, July 17th 2017). The new vehicle counter on the main road would give an interesting reference and verification for the numbers from the Djúpalónssandur counter, but the vehicle counts from the main road have not yet been calibrated into reliable visitor numbers and thus can't be used in this study. Overall, the Djúpalónssandur counter is likely to give an underestimation and conservative estimate of the visitor numbers concerning the whole national park as every visitor or vehicle passing through the park is not expected to visit Djúpalónssandur.

The aforementioned challenges highlight the fact that a single standardized methodology for visitor counting hasn't been established, and counter locations, frequency of calibration and generalizability of the results all depend on expert opinions,

funding and location-specific attributes. Schägner, Maes, Brander, Paracchini, Hartje and Dubois (2017) have recently concluded a large meta-study on visitor counting in European nature areas, and made recommendations for a European visitor reporting standard. If implemented, it would make results of studies relying on visitor count data more comparable.

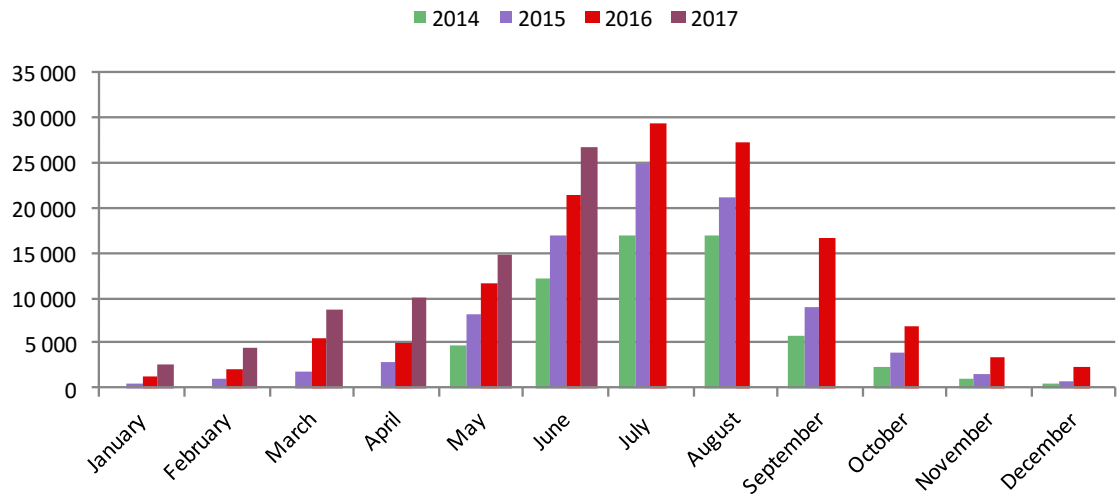

Figure 6. Visitors per month at Djúpalónssandur in Snæfellsjökull NP (Rögnvaldur Ólafsson & Gyða Þórhallsdóttir; 2017, July)

Visitor count data so far suggests that while there has been a significant overall increase of visitors to the national park, the winter season is developing at a much higher pace than the summer season. Visitor patterns and spending habits are expected to vary between the summer and winter seasons as campsites are closed in the winter and most hiking trails are also inaccessible. This leads to an assumption that in the winter visitors spend less time (fewer nights) and possibly different amounts of money in the park and its surroundings, such assumptions need to be verified by conducting visitor spending surveys in both seasons.

3.3.2 Visitor spending surveys

As discussed in Chapter 3.3.1, it was deemed necessary to collect separate visitor spending datasets from winter and summer periods, due to possible differences in visitor travel patterns and spending. Kajala (2007) suggests a target sample size of 300-500 observations when conducting visitor surveys in the Nordic and Baltic nature areas; preferred minimum size for sub-samples would be 50 observations and minimum for statistical conclusions 30 observations. However, a minimum per-segment sample size of

10 was used by Huhtala, Kajala & Vatanen (2010) in the Finnish study. An initial target of 600 responses for the visitor spending surveys was set for this study, as there are further subcategories of visitor types in the MGM2 methodology apart from the winter and summer visitor division.

As outlined in Chapter 2, the MGM2 model uses visitor spending data based on categorized spending by party/day (for day trips) or party/night (overnight stays). Figure 7 represents a typical visitor spending survey form currently used by Parks and Wildlife Finland in its annual surveys. Different categories of spending link the spending to the sectoral input-output tables and multipliers. As Park and Wildlife Finland uses a multiple sheet visitor survey form also concerning other issues, to find out if the visitors are spending multiple days/nights in the park, the following question was added to the beginning of the survey form used in this study "*How many nights in total you are planning to spend in the area related to visiting the park*." This approach (and the model) assumes that the day of the survey is representative of the spending on other days, e.g. that spending on accommodation, food etc. will be in a similar range.

National parks in Iceland are often part of multi-destination tours as discussed in Chapter 3.1. In this situation, Stynes et al. (2000) recommend separating effects of other destinations to avoid double-accounting. Depending on the context this can be done in different ways. For example, if the ratio of national park vs. other visited destinations per day is known, the percentage of destinations visited in the national park can represent also the share of the spending accrued to the national park.

To accommodate the effect of multiple destinations in the calculations in Finland, Huhtala et al. (2010) initially suggested to multiply spending by 0.5 for those visitors who had other destinations the same day, and by 0.25 for those visitors who had ended up visiting the national park unplanned. However, in the final analysis, spending data was used only for those visitors who stated that the national park was 'the only or the most important destination' for the day(s) in question, and all other visitors were excluded. This approach was considered to represent the minimum impact of the park, whereas including all visitor spending would indicate its maximum impact (Huhtala et al., 2010).

13. Spending

Have you spent/Will you spend money on various activities in the national park or its environs while on this trip (see area on map)?

○ yes (→ please answer the following questions)
○ no (→ move on to question 14)

Please tick the box that indicates whether you are estimating

○ your personal expenses and your share of your group's joint expenses

OR

○ the total expenses of your family or group.

Indicate below (points A–G) your total expenses for this trip **in the national park and its environs**. (Write 0 (zero) in the column if you have not spent any money on the activity in question)

A fuel or other purchases from service stations	_____ €
B costs for local transportation (for example local bus or taxi trips)	_____ €
C food and other retail shopping	_____ €
D café and restaurant purchases	_____ €
E accommodation	_____ €
F organised programme and recreational services (eg. guided tours, entry fees and exhibitions)	_____ €
G other expenses (e.g. fishing, hunting or snowmobiling permits, equipment hire, etc.)	_____ €

Figure 7. Latest version of the MGM2 visitor spending survey form used by Parks & Wildlife Finland (Huhtala, Kajala & Vatanen, 2010)

To account for the multi-destination nature of visitor travel in Iceland, two additional questions to the survey form were added: *1) Is the National park the only or the most important destination on your trip to this area?* and *2) What is your total number of planned visit destinations today? Please specify them in the space below.* As nearly all tours in Iceland visit multiple sites, excluding all multi-destination responses may be too conservative in the Icelandic context. The second question allows the calculation of the ratio of NP / non-NP destinations and the distribution of associated spending appropriately, while requesting the respondents to name the locations eliminates the potential source of error in respondents not knowing which destinations belong to the national park.

The initial visitor spending survey form used in this study can be found in Appendix 1. It was used during the first fieldwork period in Snæfellsjökull NP in February 2017 and the idea was to use it as a prototype to see if the survey design worked. It was based on the

spending questionnaire of Figure 7 but it became immediately apparent during the survey collection that much of the visitor spending took place outside the national park and the Snæfellsnes peninsula (rental car, accommodation, groceries, etc.) as most visitors were visiting the park on a day-trip. If respondents strictly followed the instructions on the form and only included spending within the national park or its surroundings, a considerable amount of their spending in connection with the visit would have been unaccounted for. As this study aims to determine the total economic impact of the national park, it was important to account for all spending related to the visits.

As the researcher was present when surveys were filled during the first fieldwork period, the participants were instructed to include also spending off the peninsula on the survey forms, and in subsequent survey collection periods the form was revised (Appendix 2) to a two-column format of collecting spending data separately for the national park and its surroundings, and for elsewhere in Iceland. This two-column design was initially used in Finland in the surveys as well, but later dropped in favour of a separate section in the survey as it was found to confuse the respondents. Similarly, in this study the two-column design was found to be challenging for some respondents, but the researcher was present to help respondents in filling out the survey, which was not the case in Finland, and it was deemed very important to keep the survey form as short as possible - on one page only - to encourage as many responses as possible.

Long-distance travelling expenses such as airfares were excluded from this study even though it could be argued that a certain share of these could also apply to the national park visit days and it would be possible to assign them partially to the travel costs for the visitors.

3.3.3 Choice of economic multipliers in the study

The concept of economic multipliers was introduced in Chapter 2.3. Multipliers represent the secondary sales, income, value-added and employment effects derived from visitor spending. It is important to note that in the MGM framework multipliers operate on a regional basis without concerning the effects of changes in the amount and distribution of spending elsewhere (Stynes, 2001b). In a full-employment, closed economy, economic activity overall would not increase with new activities; for every new job created, another would be lost somewhere. National park tourism based on domestic visitors could work

this way, hence Stynes' (1999b) recommendation to exclude local residents to the area and consider how to approach other domestic visitors. This is not a major concern in this study, however, as according to OECD (2017b), the tourism boom in Iceland operates with the influx of foreign currency from international visitors, and in-migration of foreign workers to fill jobs created by the boom – exports from tourism in 2016 were up 2.75 times from 2010, at a value of 466 billion ISK (Icelandic Tourist Board, 2017c), and Arion Bank (2017) now describes tourism as a primary sector in Iceland. The situation denotes a production gap in the tourism sector where local production is not able to meet the tourism demand, and allows the multipliers to describe actual economic growth - not just displacement.

Even if the pre-conditions are suitable, the usage of multipliers in economic impact analysis draws criticism. Crompton (2006) lists the 10 most common mischievous practices concerning the use of multipliers, and later (Crompton, 2010) goes as far to say that it's best not to use them at all to avoid high probability of a flawed analysis. Crompton, Jeong and Dudensing (2016) suggest that researchers and agencies have used multipliers abusively to inflate visitor spending effects partly due to ignorance, but also in deliberate efforts to legitimize their position. This is unfortunate as the economic impacts are real – however, careful consideration of available multipliers, a conservative approach for interpretation of the results, and transparent use of methodologies are critical in avoiding exaggerated economic impacts.

A good example of the need for conservative interpretation and transparency are the employment effects. In Chapter 3.3.4 three assumptions in the MGM model regarding the job effects were introduced: strict linearity, no economies of scale or efficiency improvements. Crompton et al. (2016) summarize some effects of these assumptions: There's no slack in the model, so if additional visitor spending creates a need for one hour of labour, this can represent a new job, whereas in reality it could be covered by existing workers during non-busy period or by working overtime. Also, the model does not specify the time it will take for spending to generate new jobs.

Reference economic and employment multipliers for the MGM2 model were calculated by the IMPLAN Pro 2.0 model (Minnesota IMPLAN Group, 2004) and provided for rural areas, as well as for small and large metropolitan areas in the United States

(Stynes et al., 2000). Based on Chang's (2001) finding that population density correlates well with the multipliers, a similar classification was used in Finland with parks being separated into three groups according to the population density of the park hinterland area: capital area, other built-up area, and rural area. A fourth multiplier class was created based on national parks in tourism centres and resort areas. Multipliers for each class were calculated from regional input-output tables produced by Statistics Finland for Metsähallitus, using employment, sales, turnover and economic output data (Huhtala et al., 2010).

OECD (2017a) has published national input-output tables for Iceland based on 2011 national accounts data. However, it is not recommended to use national-level multipliers as they tend to overestimate the secondary effects (Teigeiro & Díaz, 2014). In case of lack of local data, appropriate reference multipliers provided by the model should be used instead (Stynes & Sun, 2003). Stynes (1999a) points out that in rural areas, sales multipliers are typically very low in the range of 1.0-1.5. A multiplier of 1.0 means there are no secondary effects. As Stynes' research team and Metsähallitus both commissioned an external commercial research institute to carry out the research on the regional multipliers, this approach was considered too expensive and beyond the scope of this proof-of-concept study.

Instead of converting the national I-O tables into economic and employment multipliers, a decision was made to use the most recent set of default MGM2 rural multipliers based on I-O data from 2001 and the consumer index corrected in 2007. These multipliers are expected to give a conservative estimate of the employment and secondary impacts due to lack of consumer price index and inflation correction for the past 10 years. For example, the average sales multiplier in the rural default set is 1,29 compared to 1,68 (30 % higher) in the most recent Finnish rural multiplier set (Table 4). Results in this study will be presented in a way that shows the direct and indirect (multiplier-bound) economic effects separately.

For example Archer (1984) warns against 'borrowing' multipliers from another region as the structure of the local economy may always be different. This warning is acknowledged – however, one of the objectives of this proof-of-concept study is to test the applicability of the whole methodology in the Icelandic context. Perhaps one of the

outcomes of this study, if successful, will be research into Icelandic regional input-output table and economic multipliers, allowing updates and corrections to this study as well as data for further studies.

Table 4. Latest Finnish sectoral economic multipliers for each national park area (2014)

Economic output multiplier	Rural area	Built-up area	Capital area	Tourism centre
Retail	1.78	1.73	1.90	1.84
Local transport	1.78	1.68	2.03	1.78
Accommodation, restaurants and cafes	1.50	1.61	2.12	1.54
Tourism services (e.g. tours, activities)	1.76	1.69	1.99	1.76
Other services	1.58	1.71	2.08	1.65
Employment multiplier (man-years / 1 M€ sales)				
Retail	19.5	16.6	9.6	19.5
Local transport	16.8	12.3	8.4	15.1
Accommodation, restaurants and cafes	17.4	16.1	13.9	15.7
Tourism services (e.g. tours, activities)	15.5	14.6	9.9	15.3
Other services	14.7	16.5	13.1	14.8

3.3.4 Economic multipliers in calculations

The MGM2 model computes spending by multiplying per unit average spending values by the number of visitor units (Stynes et al., 2000). These calculations can be made by visitor segments, such as local and non-local day users, overnight visitors staying at campsites, hotels, hostels, campervans or Airbnbs. Segments allow more detailed results concerning the type of visits, but require some additional background data (e.g. accommodation type) to be collected as part of the survey. The economic impacts of visitor spending are then calculated by sector-specific multipliers for each spending vector. Multipliers convert spending to jobs and income, and estimate the secondary effects of spending. In the MGM2 model, multipliers are both sector- and region-specific as for example spending on accommodation has a different impact than spending on retail. The economic size of the region also affects the secondary impacts, hence the different local or regional multipliers (Stynes et al., 2000).

The MGM2 model uses Type II SAM (Social Accounting Matrix) multipliers for sale and employment impacts. The type I sales multiplier describes the ratio between sum of direct and indirect sales divided by direct sales. The type II sales multiplier also includes

induced sales in the sum. For example, if a restaurant purchase has a Type II sales multiplier of 1.5, a sale of 10.000 ISK would yield a total sale effect of 15.000 ISK, with 10.000 ISK in direct sales and for example 3.000 ISK in indirect sales and 2.000 ISK in induced sales. According to Stynes (2001b), SAM multipliers are more conservative Type II multipliers, which account for visitor spending-related income to local service providers that is not immediately re-spent (e.g. commuting workers, income that is saved in the bank or contributed to retirement funds).

Employment multipliers are defined (Stynes, 2001b) as the ratio of total employment to direct sales, describing how many direct, indirect and induced jobs (Jobs Type II multiplier) are needed to produce a certain total amount in sales in a certain sector (1 million USD by default). Job multipliers include part-time and seasonal jobs, assume linear dependencies (e.g. increased visitor nights mean that more workers are needed in the accommodation sector in linear proportion) and do not account for economies or diseconomies of scale (e.g. increased or decreased efficiency in services due to innovation or change in visitor number). For example, in the rural reference multiplier set, ca. 22 jobs are needed to serve sales of 100 million ISK in grocery stores. Thus, if the annual spending by national visitors in groceries is 50 million ISK, 11 jobs should be necessary to satisfy this demand according to the employment multiplier.

An important concern regarding the sales multipliers is the capture rate which measures how large a part of the spending is retained. For example, for imported products such as fuel, the capture rate is very low, typically only a small sales margin such as 10 % while rest of the spending leaks abroad. On the other hand, the capture rate of services is typically high, up to 100 %, unless the service relies heavily on imports to operate. Thus, an effective spending multiplier is defined as the capture rate multiplied by the sales multiplier (Stynes, 2001b).

The MGM2 model allows the multiplier calculations to accommodate for local production and manufacturing by entering the share of local production in different sectors, however in this proof-of-concept study this option was not used due to complexity of the trying to accommodate and calculate local production both in the Snæfellsnes peninsula and elsewhere in Iceland – all manufacturing and production sectors were entered as 0 % local production, again a conservative approach as increasing

local production rate would have increased the secondary economic impacts. The MGM2 model also allows for entering sector-specific retail and wholesale margins to achieve as accurate capture rates as possible – defaults were used in this study as detailed information on the sales margins was not available.

While discussing sources of error in use of the MGM2 model, Stynes et al. (2000) highlight that most likely sources of error in the studies come from sampling errors in visitor counting, and biases or non-responses in visitor spending surveys. While generic multipliers receive often the most attention or doubts on validity, errors introduced by default multipliers are typically between 2-5 % and at maximum 10 % as they change slowly barring rapid structural changes in the economy. Stynes et al. (2000) conclude that efforts should be focused at high quality visitor count data and spending surveys.

3.4 Guidelines for data collection and implementation procedures

Stynes (1999b) has listed several guidelines and considerations for sampling and data collection that have been applied in this study, and should be noted also for further studies:

- The study region in the survey should be well-defined; this can be achieved by a map, a certain range from the collection site (recommended 50 kilometre radius) or a county border. In this study, the surveys (Appendix 1 and 2) used a map of the Snæfellsnes peninsula to indicate the limits of the national park and to discern visitation sites within and outside of the park boundaries. Incidentally the map covers almost exactly a 50 km radius from the national park as the 'park surroundings'.

- Minimum spending categories recommended by the model are accommodation costs between different lodging types, food and beverages between restaurants and grocery stores, transportation expenses; recreation, entertainment and admissions fees, and souvenirs and other retail purchases. These categories can be augmented by other categories specific to the region, and it can be considered on case-by-case basis whether air travel costs should be included. Recommended total number of categories is 6-12 and they should be mutually exclusive to avoid double-

counting. This study used the standard spending category set and excluded air travel for simplicity (as there is no local air travel to Snæfellsnes peninsula and most of the international air travel leaks out of the economy).

- Recommended unit of analysis is party per day or night. Conducting the analysis by individuals instead of party per day or night can also be considered, but Stynes warns against the difficulty of allocating individual costs to families or people travelling with children. In this study, data was collected on a party basis (person travelling alone being a party of one) and then converted in spreadsheets to individual costs for clearer presentation of per-person costs associated with the park visits. The number of children in the parties in the study was negligible.

- Time period for recording visitor spending can be day/night, 24 hours or the entire trip. Questionnaires for entire trips can only be collected at the end or after people's trips, and they often represent significant recall errors. Questionnaires for 24-hour periods tend to exhibit some telescoping error meaning people report costs for the period that should not be included. Stynes suggests that adding a column for spending elsewhere (vs. spending in or around the park) can reduce this error. In this study, the unit of analysis was based on a 24-hour period, and the column for spending elsewhere was included in version 2 of the questionnaire (Appendix 2).

- Local residents should be identified in the study as their spending doesn't represent 'new spending' to the area (i.e. would likely be spent in the area anyway). Economic impact studies can then decide whether or not to include this spending in the final results. In this study, a question on the 'local resident to Snæfellsnes peninsula' -status (Appendix 1 and 2) was included, but in the end no local residents were found in the sample. Instead, residents in Iceland living elsewhere in the country were used to represent the local visitor segment.

- For accurate economic impact analysis, visitor segments need to be representative of the visitor population. If the same survey is used to

estimate both the spending within visitor segments and the ratios between visitor segments, bias can occur if different visitor segments don't answer the surveys in comparable ratios. In an optimal scenario, ratios of different types of visitors (segments) and spending for each segment should be studied separately. This approach could also account for variances between different segments so larger samples would be collected from the segments where the variation in spending in larger. In this study, the approach was taken that a large enough sample (500-600 responses) would be sufficient to provide reasonably accurate data on both accounts for the proof-of-concept study. Undertaking two separate surveys would have been excessively time-consuming and expensive. However, as will be further discussed in Chapter 4, this issue has a potential source of error in this study, as it was difficult to get responses from the local residents and from bus-tour participants (who were not a visitor segment of their own, but currently perhaps under-represented in the day-visitor segment).

- Dealing with zeroes, blanks, outliers or inconclusive data can cause errors in analysis. In this analysis the survey answers were verified by the researcher onsite – for example, if respondent left the accommodation field blank the researcher confirmed how or where they slept (e.g. car, couch-surfing, etc.). Respondents were also asked to elaborate on very high spending values for example for multi-day tours, so that the answers could be broken down per day/night in the different spending categories for analysis. Some respondents filled surveys between the fieldwork periods at the Malarrif visitor centre counter, and some of these surveys missed information in certain fields (typically transport costs and accommodation as they had been pre-paid, though concerning the 24-hour period) – such surveys and other ones with incomplete or inconsistent data were excluded from the sample.

3.5 General considerations and limitations

Stynes et al. (2000) list several considerations in the MGM2 methodology that need to be addressed in connection with this study:

1) In the case of many economic analyses such as MGM2, the visitor information relies on generic visitor studies and counting, and does not contain all the key parameters of the economic models (length of stay, type of accommodation, re-entries to the park, etc.). In this study, the spending survey included these details while relying on generic visitor counting for the total visitor numbers only.

2) In countries such as USA and Finland where there are dozens or more national parks, spending surveys are too expensive to be carried out in each park individually and generic spending profiles are used instead. Stynes et al. (2000) admit the possibility of sampling errors due to relatively high spending variance within the spending profiles and outliers in the data, but concludes that as the spending profiles are adjusted with each new dataset, they provide reliable estimates of the spending in different situations. In the case of this study, as no previous spending data exists in Iceland concerning visitor spending in the national parks apart from the initial visitor study at Vatnajökull NP (Sigrún Inga Sigurgeirsdóttir & Þorvarður Árnason, 2008), all calculations rely on the collected primary data and any errors are due to possible biases on the sample itself. For future work, spending profile figures could be verified and adjusted based on surveys at Thingvellir and Vatnajökull national parks.

3) As Iceland doesn't produce regional input-output data tables for the local economic multipliers, usage of generic multipliers is subject to criticism because of the potential for errors. However, as discussed in Chapter 3.3.4, multipliers generally generate small errors, whereas sampling errors in visitor counting and spending surveys may introduce much higher errors. Economic multipliers have an effect only on the indirect and induced effects of visitor spending, and the most conservative set of reference multipliers is used in this study to avoid the risk of overestimation. Results will also be presented without the effect of the multipliers for full transparency.

There are also some additional considerations and limitations specific to Iceland due to the nature of the study and locally available data. Results provided by this study should

be viewed as an initial baseline to be verified by further studies and surveys at different locations. Potential biases and errors that may affect the accuracy of the study are as follows:

- Visitor count data for July-August 2017 was not yet available for this study, and the visitor count numbers used in this study for the peak summer months are from 2016; this lack of most current data results in a significant underestimation of visitors for the 2017 summer period. Assuming the nation-wide increases in visitor numbers for July (15,2 %)[2] and August (17,6 %)[3] 2017 compared to the same months in 2016 would be reflected at SJNP, this could mean the economic impact calculated by this study is missing over 9200 visitors and their spending impact (see Chapter 4.3.2). When the visitor counter data becomes available, the calculations and results can be simply updated.
- Calibration of the visitor counters may have become outdated due to the sharp increase in visitor numbers. There is currently no long-term hand calibration data concerning the Djúpalónssandur counter to establish whether the percentage of visitors by tourist buses is increasing or decreasing in Snæfellsjökull NP. Overall, the percentage of tourists travelling in tour buses seems to be showing a decreasing trend while rental car use in increasing (see q38 in Icelandic Tourist Board, 2017b).
- Design of the survey form went through two versions (see Appendix 1 and 2, percentage of version 1 surveys was 9% of N), and results were standardized afterwards. The standardization process used may induce minor inaccuracies in the balance between the spending on the peninsula and elsewhere in Iceland: on version 1 surveys, spending on fuel, transport, accommodation and groceries for visitors on one day trips was marked for elsewhere in Iceland. For visitors spending more than one day in the national park or its surroundings, rental car or transport costs were marked for elsewhere in

[2] See Icelandic Tourist Board: 272 þúsund erlendir ferðamenn í júlí, August 9th 2017

[3] See Icelandic Tourist Board: 284 þúsund brottfarir erlendra farþega í ágúst, September 6th 2017

Iceland, while accommodation, groceries and fuel where marked for peninsula (unless noted otherwise in the collection phase). Potential inaccuracies in the balance between the peninsula and elsewhere in Iceland do not affect the total economic impacts of the spending of these visitors.

- Visitor surveys collected are biased towards spending patterns of foreign self-driving travellers, compared to guided bus-tour participants who were reluctant (usually hurrying to the bus) to answer the survey. Also, very few Icelandic residents were present at the survey sites to participate in the study, and not everyone wanted to participate in the study. Perhaps being able to provide surveys in Icelandic or by interviewers speaking Icelandic would ensure higher response rate from the domestic visitors in future studies.

3.6 Implementation of the study

The study has been implemented according to the timetable in Table 5. Initial research plan was prepared in November 2016, and design of the visitor surveys and field work was carried out in January-February 2017. Visitor spending surveys in the winter were collected in February-March 2017, and surveys in the summer were collected in June 2017. Analysis and write-up part of the thesis was completed in July-September 2017.

Table 5. Project timetable

Timing	Objective
11/2016-2/2017	Project preparation and planning phase
2-3/2017	Collection of winter visitor spending survey sample at the Snæfellsjökull National Park
4-5/2017	Input and analysis of the winter survey sample
6/2017	Collection of summer visitor spending survey sample at the Snæfellsjökull National Park
7/2017	Input and analysis of the summer survey sample
7/2016- 6/2017	Collection period for the visitor count data from the Djúpalónssandur counter
7-9/2017	Analysis of the data, application of the MGM model and write-up of the final report

4 Results

4.1 Description of the collected sample

The collection of visitor spending surveys for the economic impact calculation formed the bulk of the fieldwork carried out in this study. The initial target was to collect a sample of ca. 100 surveys from visitors during winter and 500 surveys from visitors during summer. Rationale for collecting separate samples from winter and summer visitors was that winter and summer visitors were expected to display different visitation and spending patterns; for example, winter visitors were likely to spend a shorter time in the national park and its surroundings and thus have fewer overnight stays in the Snæfellsnes peninsula, but also to spend more money for accommodation since most of the campsites are closed in the winter. Assumptions on how behavior and spending patterns would be different are not important as such in the economic analysis, but these expectations justified the extension of the fieldwork period from the mid-winter period only to mid-winter and mid-summer periods to capture any differences the collected data might present between winter and summer.

Visitor spending surveys were collected as follows: winter sample during February 6th – March 12th and summer sample during June 2nd – 25th. A total number of 239 surveys were collected and of these 24 were discarded due to missing or inconsistent data, leaving 215 valid surveys as the final dataset. As the survey design allowed people travelling together to answer the survey together and submit the total expenses related to their visit, the actual sample of respondents (n = visitors surveyed) is 501; larger than the number of survey sheets collected as presented in Table 6.

Table 6. **Summary visitor spending survey collection – only valid responses included**

Period	**Surveys collected**			**Visitors surveyed (n)**		
	Malarrif	*Djúpalóns-sandur*	*Total*	*Malarrif*	*Djúpalóns-sandur*	*Total*
Winter	30 (Ver. 1: 20)	55	85	66 (Ver. 1: 46)	130	196 (39 %)
Summer	54	76	130	127	178	305 (61 %)
Overall	84	131	215	193 (39 %)	308 (61 %)	501

As the first set of surveys during winter were collected using version 1 (Appendix 1) of the survey sheet, the target respondent sample size for winter was increased to 200 to compensate for possible minor deviations produced by normalization of version 1 and 2 survey sheet data. In the end, 196 valid respondent responses were collected during winter period. The summer data consists of 305 valid respondent responses. In the process of collecting summer survey data it started to become clear after surveying ca. 200 respondents that the dataset was saturating – responses didn't show new patterns or significant variation, and therefore a decision was made to settle for a sample of 500 valid respondent answers as for example Kajala (2007) suggests. In the end, visitor spending was surveyed from a total of 557 visitors, and 501 were accepted as valid responses after checking and cleaning the data. The sample size is comparable to Souza's (2016) study, in which he collected 108, 329 and 97 valid visitor responses from three different Brazilian national parks to calculate the visitor spending in different segments.

4.2 Handling multi-destination visits in the responses

Participants in the survey were asked if the Snæfellsjökull national park was the *'only or the most important destination', 'one among other intended destinations'* or *'a non-planned destination'* on their route in the Snæfellsnes peninsula. This question is important in the economic impact analysis by providing information on how many travel decisions the national park has influenced.

The overwhelming majority of visitors, 81 %, visited the national park as *one among other intended destinations* as Table 7 shows. For 12 % the national park was the only or most important decision in visiting the peninsula and for 7 % it was a non-planned destination on the route. There were no major differences in this regard between the winter and summer visitors – few more winter visitors seemed to regard the park as a non-planned destination and some summer visitors as one among other intended destinations. Underlying reasons for these differences are beyond the scope of this study and linked to increasing studies about the seasonality of tourism in Iceland (see e.g. Gyða Þórhallsdóttir & Rögnvaldur Ólafsson, 2017; Icelandic Tourist Board, 2017b).

Table 7. Importance of the national park in visiting the Snæfellsnes peninsula

"National park is.."	Winter	Summer	Overall
only or the most important destination	13 %	11 %	12 %
one among other intended destinations	76 %	84 %	81 %
non-planned destination	11 %	5 %	7 %

Huhtala et al. (2010) explain that in the context of Finnish national parks a similar question was used to determine the range of economic impact by comparing those visitors in the study who stated the park was *the only or most important destination* (minimum impact) and all responses (maximum impact).

In the context of Snæfellsnes peninsula (and Icelandic national parks in general) the question of how to attribute the share of economic impact between national park and other non-NP destinations on visitors' tours was expected to become an issue, so an additional question of *'how many other sites on the Snæfellsnes peninsula'* visitors have visited was introduced in the survey to provide more data and options for analysis. This question allows testing the MGM-methodology in the Icelandic context with different approaches, for example:

1) Divide all spending by the number of sites visited. This approach gives the national park its absolute share of the visitors' visits on a given day. However, it treats the park as a single stop compared to others and doesn't take into consideration multiple stops within the park.
2) Divide all spending by the average number of sites visited and exclude visitors for whom the national park was a non-planned destination.
3) Include all spending for those visitors for whom the national park was the only or most important destination, divide the spending of those visitors for whom it was one among many planned destinations by the number of sites visited, and exclude all visitor spending for whom the national park was a non-planned destination.

Approach 3) was chosen to provide the baseline number in this study. It should be noted that none of the methods above are able to accommodate the relative significance or value of the different places to the visitor as there were no questions in the survey concerning the importance or priority of the visited sites.

Table 8 provides details on the other destinations on visits to the Snæfellsnes peninsula. Survey participants visited on average 1.5 other sites (2.5 in total with the NP) on the peninsula during the day of the study; 1.1 (2.1) during the winter and 1.8 (2.8) during the summer. The difference can be expected simply based on the short daylight hours in the winter and the long day in the summer. Also, the national park consists of several different locations people generally visit on a round trip around the park, so time can become an issue with regard to visiting other locations on the peninsula. The most popular other sites or destinations respondents had visited were Arnarstapi and Hellnar, Kirkjufell and Grundarfjörður, Búðir, Hellissandur, Rif, Ólafsvík and Stykkishólmur.

Table 8. **Other non-NP sites visited on the peninsula during the day of survey**

Destination	Winter	Summer	Overall
Arnarstapi/Hellnar	36 %	50 %	45 %
Kirkjufell/Grundarfjörður	26 %	29 %	28 %
Ólafsvík	18 %	20 %	19 %
Búðir	7 %	18 %	14 %
Hellissandur	5 %	18 %	13 %
Stykkishólmur	4 %	14 %	10 %
Rif	8 %	9 %	9%

4.3 Time spent in the national park and its surroundings

Visitors were asked how many days they planned to spend in the national park or its surroundings, including the rest of the peninsula. As the spending data is surveyed in the questionnaire for one day or 24 hours, visitor spending is then multiplied by the number of days visitors spend in the park. Table 9 presents some key statistics on the duration of visits. Summer visitors stay 31 % longer in the park and its surroundings compared to the winter visitors. During the winter, day trips are the most common form of visitation to the national park; in the summer two-day visits. A one-day visit is the most common visit-type across the whole year. This has implications for the economic impact calculation as in most cases one-day visitors typically buy their overnight stays elsewhere in Iceland and pay for their transport or tour costs at the source of their tour – usually within the capital region.

Table 9. Visit duration to the national park and its surroundings

How many days altogether…	Min	Max	Average	Mode	Total days	Total man-days
Winter	1	5	1.6	1	134	315
Summer	1	9	2.1	2	268	640
Overall	1	9	1.9	1	402	955

4.3.1 Respondent background

At the end of the survey form, the visitors were asked some demographic questions to determine how balanced the sample was, for example, in terms of local *vis-à-vis* foreign visitors. It is worth noting that the sample (N=501) did not include any residents living in the Snæfellsnes peninsula and only 4 % of the respondents were residents in Iceland. These are marked differences in comparison to USA and Finland were the MGM methods have been employed – there the share of local and domestic visitors has been much higher. For example, in Sipoonkorpi National Park located in the Finnish capital region, 95 % of the visitors were local residents (von Boehm, 2010) and in the popular Pallas-Yllästunturi National Park in Finnish Lapland 94 % of the visitors were (non-local) Finnish residents (Rantatalo & Ylläsjärvi, 2011). A high percentage of foreign visitors is not surprising in the light of the tourism boom in Iceland but it does highlight the fact that the methodologies may need to account for the economic impact in different ways in the local vs. national context and it also effectively means that investments into the national parks will be aimed at different beneficiaries.

The largest nationalities of respondents in the survey are presented in Figure 8. 42 % of the respondents were from USA or Canada. While this is consistent with the general tourist numbers in Iceland (Icelandic Tourist Board, 2017a), it may also present a potential bias in the survey methodology as North Americans are much more comfortable with an English-language survey and a researcher approaching them in English than people from other, non-English speaking countries. During the survey collection, some German and Italian visitors said that they did not understand English well enough to participate. Whether this creates a meaningful bias in the actual visitor spending is arguable but it should be noted nonetheless – and future studies should consider providing respondents with different language options. In addition to the major nationalities presented in Figure

8, there were respondents from Austria, Italy, China, Singapore, Belgium, Chile, Russia, Qatar, Finland, Slovakia, Malta, Slovenia, Poland, Sweden, Czech Republic, Denmark, Taiwan, Norway, Israel, Ireland, South Korea, Romania and Iran.

The average age of respondents was 38; women filled in 49 %, men 39 % and couples 12 % of the surveys. However, the gender distribution of respondents was based on the person writing down the survey form, so it doesn't represent everyone in the cases where one person filled the survey for a party of two or more people.

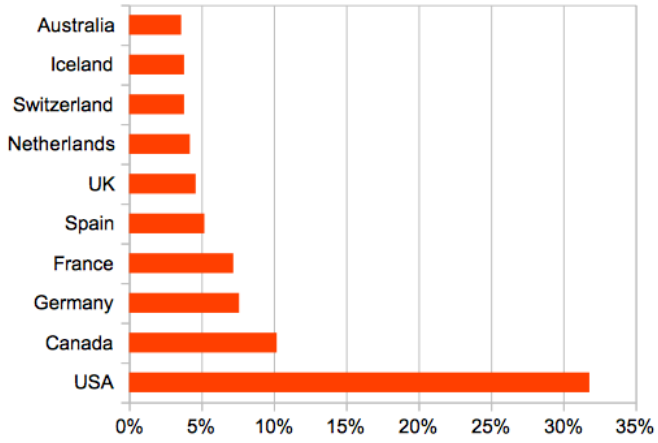

Figure 8. Major nationalities of the respondents.

19 people (4 % of the respondents) were participants of an organized bus tour and 18 people had booked a self-drive tour package where their package included car rental, accommodation and in some cases also flights (which were excluded from the costs). As discussed in Chapter 3.5, the sample may under-represent the share of the bus tour participants from all visitors and create some bias in the economic impact as most of their spending (accommodation, tour fees) takes place at the point of origin and not on the peninsula.

4.3.2 Visitor counting

Latest dataset available for this study from the Djúpalónssandur road counter supplies visitor data until end of June 2017. Table 10 presents the monthly number of visitors to Djúpalónssandur from May 2014 when the counter was installed (Rögnvaldur Ólafsson & Gyða Þórhallsdóttir; 2017, July). The total number of visitors for the one year period July

2016 – June 2017 based on the available data is 152.877, which is used in the economic impact calculations in this study.

Table 10. Monthly visitors and rate of increase from previous year at Djúpalónssandur.

	2014	2015		2016		2017	
January		609		1 205	98 %	2 584	114 %
February		1 136		2 162	90 %	4 571	111 %
March		1 955		5 461	179 %	8 717	60 %
April		2 816		5 109	81 %	9 921	94 %
May	4 665	8 217	76 %	11 507	40 %	14 712	28 %
June	12 233	16 953	39 %	21 402	26 %	26 664	25 %
July	16 776	24 840	48 %	29 252	18 %		
August	16 882	20 983	24 %	27 217	30 %		
September	5 717	8 952	57 %	16 562	85 %		
October	2 358	3 893	65 %	6 957	79 %		
November	1 125	1 623	44 %	3 284	102 %		
December	452	686	52 %	2 437	255 %		

Table 10 also provides a useful verification for the definition of winter and summer travelling periods - the visitor numbers confirm that months May to September receive most visitors according to the general seasonality tourism trends in the Icelandic countryside (Gyða Þórhallsdóttir & Rögnvaldur Ólafsson, 2017). Being able to camp and sleep outdoors affects visitor spending and the length of visitors' stay, so the spending figures in the economic analysis in Chapter 4.6 are based on weighted averages from visitors' winter and summer spending based on the percentages of July-September 2016 and May-June 2017 visitors representing the share of the summer visitors and October 2016 - April 2017 visitors representing the number of winter visitors, and their respective weighted averages including length of stay as presented in Table 11.

Table 11. Shares of winter and summer visitors, length of stay and total share of spending

Period	No. visitors	% of visitors	Length of stay (days)	% of total spending adjusted for length of stay
Summer (July-September 2016 & May-June 2017)	114 407	75 %	2.1	80 %
Winter (October 2016 – April 2017)	38 470	25 %	1.6	20 %

These shares between winter and summer season are likely to slightly overestimate the proportion of winter visitors as they include the growth of the latest winter season, which has been especially significant in winter season 2016/17 as pointed out by Table 11, but not the peak summer season in 2017. Similarily, the total visitor numbers (and thus the overall economic impact) will be a slight underestimation as the visitor count data is missing the July-August 2017 visitor numbers.

However, these omissions of the latest visitor data need to be simply acknowledged when interpreting the results of the economic analysis. The scale of the economic impact will still be valid regardless of whether it's missing the latest growth in the numbers, and furthermore as new data becomes available, the results can be updated.

4.4 Visitor spending overview

Regarding visitor spending, the participants were asked to enter their spending in the last 24 hours (or one full day) both on the Snæfellsnes peninsula and elsewhere in Iceland in categories of fuel and other service station purchases, transportation, guided tours, cultural activities, accommodation, café and restaurant purchases, groceries, souvenirs and other purchases or spending. A summary of average visitor spending in these categories is provided in Table 12. It's important to note that zero-spending cells and averages for less than 3 values have been excluded from the calculations to give a more realistic figure of how much money a single visitor spends during one day in each category. It is also possible for the combined spending in one category to be higher than spending in that category on the peninsula or elsewhere if the visitors have spent money in both during the same day, which was often the case for fuel, food or restaurant and café purchases.

Table 12. Summary of visitor spending (ISK) per visitor per 24 hours

Period	Type / Location	Fuel	Transport	Tours	Cultural activity	Accommodation	Cafe & restaurants	Groceries	Souvenirs	Other retail	Other spending	Total
Winter	Peninsula	2692	4615	6336	3183	8983	4330	3075	2352	250	0	14398
	Elsewhere	2615	6547	22165	3160	7396	4451	3255	1305	1282	0	16949
	Combined	2840	6400	11442	3438	8468	4935	3423	1736	1076	0	26364
Summer	Peninsula	2636	4121	4150	1402	7633	3529	1983	1938	413	2212	11290
	Elsewhere	2887	6001	19261	1650	6173	3903	2635	2037	7603	2460	11610
	Combined	2838	5926	8713	1654	7193	3895	2372	2043	6248	2295	20962
Overall	Peninsula	2655	4343	5270	2080	8094	3816	2368	2050	358	2212	12388
	Elsewhere	2741	6208	20969	2154	6793	4192	2919	1671	4443	3573	13708
	Combined	2839	6110	10224	2303	7697	4312	2789	1927	3662	2735	23098

Several interesting findings can be highlighted from Table 12:

- Visitors in the summer use considerably less money on average than visitors in the winter (20.962 ISK vs 26.364 ISK).
- Highest per visitor spending in a single category comes from tours (10.224 ISK, standard deviation 7.973 ISK) and accommodation (7.697 ISK, standard deviation 6.612 ISK) both in winter and summer.
- As discussed in Chapters 3.5 and 4.3.1, bus tour participants are likely to be under-represented in the sample. However, their overall average spending of 26.390 ISK[4] is relatively close to the overall average of 23.098 ISK and matches almost exactly the average winter season spending of 26.364 ISK - when most of them were interviewed anyway. These findings suggest that under-

[4] Calculated from the visitor spending survey data by averaging the spending of bus tour visitors identified by a separate note by the researcher on their answer sheet during the collection phase.

representation of the bus tour participants is not expected to have significant effect in the economic impact analysis, and if any, the effect is a negative bias as their overall spending is above average.

- Overall, money spent on tours is still relatively low compared to accommodation and transport as nearly all visitors are paying for the latter in one way or another.
- Spending averages between the Snæfellsnes Peninsula and rest of Iceland (capital region) are very close to each other, which may suggest that in the Icelandic context significantly lower economic multipliers for rural regions may not be justified in the same way as in Finland or USA. However, while prices and consumption of visitor services seem to be similar between the peninsula and rest of Iceland, it doesn't automatically follow that the secondary economic impacts would also be equal. Verifying this would require further studies but it may suggest that using the low rural baseline multipliers can produce a negative bias in the economic impact analysis for the secondary effects. One of the Finnish researchers involved with the Finnish MGM studies indicated this (E. Vatanen, email discussion, August 6th 2017) by suggesting that given the small size of the Icelandic economy, national-level multipliers might be good estimates also for the Snæfellsnes Peninsula.

High standard deviation in certain spending figures warrants a closer look. The variation in tour spending can be explained by the relatively low number of tours, and by consisting of both expensive day tours from Reykjavik and inexpensive local tours such as the popular Vatnshellir lava cave tour in the Snæfellsjökull NP. Regarding accommodation, the high standard deviation is broken down to averages by different types in Table 13. Hotel nights (ca. 11.000 ISK) were the most expensive type of accommodation in the survey but guesthouse, cottage and AirBnb nights were not far behind in the 7.000-8.500 ISK range. The majority respondents stayed in guesthouses, hotels, AirBnbs or camped during summer. There were also a considerable number of respondents who didn't pay for accommodation for various reasons, e.g. camping outside

campsites, sleeping in the car, staying with friends or family or at a university as part of a summer course.

Table 13. Cost and share of different accommodation options

Type of accommodation	Average cost (ISK) per person per night	%-respondents
Guesthouse	8.419	24 %
Hotel	10.733	22 %
AirBnb	7.158	16 %
Camping	840	15 %
Hostel	5.231	7 %
Cottage	8.361	5 %
Farm	4.854	2 %

Concerning the regional vs. national economic impact it is important to compare where the spending takes place. Based on the results of the visitor spending survey, during winter 40 % of spending took place on the peninsula and 49 % in the summer – the annual average was 45 %. Considering that within Snæfellsjökull National Park itself people can't currently spend any money (apart from buying small souvenirs like maps or postcards) and the high number of one-day visitors, these shares of local spending are relatively high. As people spend on average 2.1 days in the national park or its surroundings during the summer, it is natural that more spending is allocated to the peninsula from overnight stays, café and restaurant purchases, fuel etc.

4.5 Visitor segmentation based on the sample

Responses to the visitor spending survey suggested significant revisions to the default visitor segments of the MGM2 model presented in Table 2. As there isn't any overnight accommodation or camping available (nor allowed) within Snæfellsjökull NP, all segments for overnight stays inside the park fall out. 0 % respondents were local residents of the Snæfellsnes peninsula, so the study essentially didn't reach any local visitors to the park. However, for functional segmentation the category was modified to include Icelandic residents as local users in any kind of accommodation or any kind of visit. Other segments for non-local visitors were based on the 'shorthand' segmentation introduced by Stynes & Sun (2003): day-trip visitors, 'hotel' (any indoor accommodation) visitors, and camping visitors. This segmentation represents meaningful distinctions between different kinds of visitors and allows functional shares of the total sample for statistical analysis as shown in Table 14.

Table 14. Visitor segmentation by lodging type based on the survey type

Segment	N	%-share
1. Icelandic residents as local visitors (LOCAL)	19	4 %
2. Non-local day-trip visitor (NL DAY)	203	41 %
3. Non-local overnight visitors in indoor accommodation, e.g. hotel, guesthouse, farm, AirBnb, cottage, friends, … (NL HOTEL)	229	46 %
4. Non-local overnight camping visitors, e.g. campsites, campervans, sleeping outdoors, … (NL CAMP)	50	10 %
Total	501	100 %

4.6 Economic impact

The MGM2 methodology calculates the economic impact based on visitor spending in each segment per visitor per day/night. Spending in each category is multiplied by a sectoral multiplier and this result is multiplied by the total number of visits (days/nights spent in the national park). Any adjustments or omissions need to be accommodated for before the final calculations. Table 15 presents the final visitor spending data used in the economic impact analysis.

The following steps have been taken to modify and compact data from Table 12 to match the MGM2 calculation format:

1) Zero-spending cells are now included in the averages.
2) Spending is calculated per visitor segments (see Table 14).
3) Spending averages are weighted between actual winter and summer visitor ratios as per Table 11.
4) Visitors for whom the national park was a non-planned destination (N=35) have been excluded and the spending of those for whom it was 'one among other destination' has been divided by the total number of sites they visited that day as explained in Chapter 4.2.

Table 15. Segmented average spending (ISK) per visitor per day corrected for economic impact calculation

Segment	N	Share	Fuel	Transport	Tours	Cultural activity	Accommodation	Cafe & restaurants	Groceries	Souvenirs	Other retail	Other spending	Total
LOCAL	18	4 %	1129	0	0	0	822	1182	219	0	0	0	3352
NL DAY	185	40 %	1149	3027	1489	176	3387	1475	1026	220	17	55	12021
NL HOTEL	221	47 %	979	2498	1284	249	4654	1744	779	207	347	118	12860
NL CAMP	42	9 %	646	2988	168	0	189	674	514	128	18	26	5351
Total	466	100 %											

Total number of visits was calculated based on Table 11 by multiplying visitors in winter and summer by their respective lengths of stay, totaling in 301807 person days/nights. The visitor and spending data was inputted to the latest version of the MGM2 spreadsheet updated in 2007 and model's generic multipliers for rural regions were used (Stynes, Propst, Chang and Sun, 2007). These multipliers produce the lowest indirect and induced sales effects to keep the results conservative as local multipliers were not available. Spending categories used by the MGM2 spreadsheet were slightly different from the survey form, so they were matched as per Table 16 - local tax rates for different spending categories were also added (RSK, 2017; Ministry of Finance and Economic Affairs, 2017). The average tax rate of 35 % was used for direct income taxes (OECD, 2017b).

Table 16. Matching spending categories from survey to MGM2 spreadsheet

Category in survey	Category(s) in MGM2 spreadsheet	Tax rate
Fuel and other service station costs	Gas & oil	42 %
Transportation (rental cars)	Local transportation	24 %
Guided tours and other rec. activities	Admissions & fees	11 %
Cultural activities	Admissions & fees	11 %
Accommodation	Motel, hotel, cabin, B&B or camping fees	11 %
Café and restaurant purchases	Restaurant & bars	11 %
Groceries	Groceries, take-out food/drinks	11 %
Souvenirs	Souvenirs and other expenses	24 %
Other retail purchases	Clothing	24 %
Other spending (e.g. tunnel toll)	Other vehicle expenses	24 %

The first set of results from the MGM2 spreadsheet is presented in Table 17; average and total spending by visitor segments. Overnight hotel-segment contributes to 53 % of the total annual spending, 1.8 billion ISK. The second-largest spending segment is the day-trippers who contribute 42 % of the total spending, nearly 1.5 billion ISK. Local visitors and campers contribute only fractions to the total spending, 1 % and 4 % respectively.

Table 17. Spending by segments

Segment	Visits in person-days/nights	Average spending (ISK)	Total spending (thousand ISK)	% of total spending
LOCAL	12 072	3 352	40 469	1 %
NL DAY	120 723	12 021	1 451 211	42 %
NL HOTEL	141 849	12 858	1 823 942	53 %
NL CAMP	27 163	5 350	145 319	4 %
Total	296 721	11 467	3 460 941	100 %

The overall economic impacts of visitor spending are presented in Table 18. Stynes et al. (2000) define the output variables as follows: 'Jobs' is an estimate of the number of full-time, part-time and seasonal jobs supported by these sales. 'Personal income' is the income resulting from the direct sales and it includes wages, salaries, proprietor's income, and employee benefits. 'Value added' includes personal income plus rents, profits and indirect business taxes.

Table 18. Economic impacts of visitor spending: direct & secondary effects

Sector/Spending category	Direct sales (thousand ISK)	Jobs[5]	Personal income (thousand ISK)	Value-added (thousand ISK)
Motel, hotel cabin or B&B	1 078 934	224	470 603	764 089
Camping fees	5 130	1	582	1 399
Restaurants & bars	457 984	106	173 308	195 595
Admissions & fees	423 247	110	153 718	257 107
Other vehicle expenses	24 032	3	4 675	10 687
Local transportation	800 876	141	432 830	484 714
Grocery stores	63 490	14	24 296	32 461
Gas stations	68 861	10	24 657	32 046
Other retail	51 163	11	23 565	32 956
Wholesale Trade	27 083	7	14 637	16 392
Total Direct Effects	**3 000 802**	**629**	**1 322 870**	**1 827 447**
Secondary Effects	878 820	118	253 881	469 711
Total Effects	**3 879 622**	**746**	**1 576 751**	**2 297 158**
Secondary Effects Multiplier	1,29	1,19	1,19	1,26

The total annual economic impact of Snæfellsjökull NP is approximately 3.9 billion ISK, of which 3.0 billion is produced by direct sales effects and 0.9 billion by multiplier-bound secondary effects. Spending in the national park contributes to ca. 700 jobs, 1.6 billion ISK in personal income and 2.3 billion ISK in value-added. The largest spending category is accommodation, generating over 1 billion ISK and ca. 200 jobs alone. Transportation,

[5] As the MGM2 application works in USD, all spending figures from the surveys were converted to USD in the MGM2 spreadsheet using the official June 15th 2017 rate of 1 USD = 101 ISK by the Central Bank of Iceland. Economic impacts are converted back to ISK using the same rate, so the sales, personal income and value-added impacts are not affected by the used exchange rate. The employment effects however are dependent on the used exchange rate as they can't be converted back. For example, using the official exchange of September 7th 2017 of 1 USD = 106 ISK, the resulting total jobs would be 710 instead of 746, a difference of 5 %. Thus, the weak exchange rate of USD at the time of data entry contributes to a positive bias on the jobs impacts. While the negative bias of the low rural reference multipliers and missing high-season visitors from July-August 2017 likely exceeds this positive bias, job impacts have been presented in a scaled-down format in the text. It is worth noting, that using a very strong USD rate such as 1 USD = 140 ISK (March 16th 2015, Central Bank of Iceland), the resulting total jobs would be 39 % less at 536, which is not realistic as a strong USD would likely increase visitors, associated spending and economic impacts. Thus the employment effects should be considered indicative.

restaurant and café purchases, and tours & other recreational activities are also significant contributors to these economic effects.

It is worth noting that while the rural area multipliers keep the sales-based economic impact as conservative as possible, they may in this study slightly overestimate the number of generated jobs in some sectors and underestimate them in others. Job multipliers for rural areas in certain sectors are higher than in metropolitan regions, because the same amount of sales in labour intensive sectors such as accommodation or tours requires more people in rural areas due to the smaller scale of services – imagine running one hotel with 500 beds vs. 50 guesthouses with 10 beds. For example, in the reference rural multiplier set, 21 direct jobs are needed to sustain hotel accommodation sales of 101 million ISK (reference to 1 million USD; using exchange rate of 1 USD = 101 ISK by Central Bank of Iceland, June 15th 2017), whereas only 16.58 direct jobs would be needed for the same amount in a small metropolitan region such as Reykjavik. As 45 % of the visitor spending in this study took place on the Snæfellsnes peninsula and the rest mainly in the capital region, some positive job bias could be generated for the 55 % spent in a more efficient accommodation market. However, differences in averages across all job multipliers are much smaller: 11.98 vs. 12.93 between small retro and rural overall direct employment multipliers.

For total employment effects across all sectors, the situation is reversed with 17.12 jobs needed in small metro areas and 16.70 in rural areas as there are fewer supporting industries and shorter value-chains to support job generation for indirect and induced sales. As the differences in total employment effect multipliers were negligible, and there were significant labour-intensive sectors also producing negative biases in the job results (e.g. local transportation job multipliers would be 40 % higher in small metro than rural areas), the results have been not adjusted sector by sector in this study. Until the Icelandic input-output tables for rural areas and associated economic multiplier sets become available, an option to consider for future studies might be to run the visitor spending in the vicinity of the national park through the rural reference multiplier set, and remaining visitor spending though the small metro reference multiplier set. In this study this option was considered but it fragmented the data too much in the smaller visitor segments.

Table 19. Tax Impacts of visitor spending

	Sales taxes (million ISK)	Income taxes (million ISK)	Total tax revenue (million ISK)
State taxes	492	463	955

Tax impacts of visitor spending connected to visits to Snæfellsjökull NP are presented in Table 19. Total annual tax revenue is 955 million ISK; 492 million ISK from sales taxes and 463 million ISK from income taxes. All taxes in this model accrue to the state, the model doesn't account for municipal property taxes for example.

The results are discussed in detail in the next chapter.

5 Discussion

5.1 Main findings

The key result of this proof-of-concept study is that the annual economic impact of Snæfellsjökull National Park is 3.9 billion ISK and the park contributes to ca. 700 jobs (indicative) in tourism and supporting industries. These numbers are higher but in line with the scale of the results from using a MGM2-based methodology in Finland. For example, in the latest study by Metsähallitus (2017a), the total economic impact of the similarly sized Pyhä-Luosto National Park in the Finnish Lapland with 153000 visitors in 2016 was 13,7 million euros (or 1.7 billion ISK, using exchange rate of 1 EUR = 125 ISK by Central Bank of Iceland, September 4th 2017) and with 137 full-time jobs generated; the minimum economic impact of the Pyhä-Luosto NP was deemed at 8.8 million euros (or 1.1 billion ISK). As explained in Chapter 3.3.2, Metsähallitus describes the maximum economic impact including all visitors and their spending, and the minimum economic impact by including only those visitors for whom the national park was the only or main destination. The approach taken in this study on which visitor spending to include falls between these numbers. Metsähallitus also converts jobs to full-time equivalents, which has not been carried out in this study. Pyhä-Luosto NP is located in a sparsely populated rural wilderness area but serviced by tourist resorts, so its aggregate economic sales multiplier for the secondary effects in the study was 1.71, or 33 % higher than the defaults used in this study (Table 4).

The key difference to consider when comparing the economic impacts from the Finnish national parks (or other similar MGM2-based studies) to this study is that the Finnish studies only included local economic impacts from the national parks and their surroundings whereas this study included also the impact of national park visit -related spending from elsewhere in the country. In this study, 45 % of the overall spending took place in the Snæfellsnes Peninsula in the vicinity of the national park – assuming the economic impacts are generated in a linear manner between the peninsula and rest of Iceland, the economic impact of the local spending on the Snæfellsnes Peninsula would be ca. 1.8 billion ISK, which would fall exactly between the maximum and minimum impact of Pyhä-Luosto NP in the Finnish study. However, as discussed earlier, we believe that only including the local spending would not represent a realistic figure of the

economic impact of the national park in Iceland as the visitors and their travelling patterns are markedly different. In this study, 96 % of the visitors were foreign tourists and nearly half of them on a day trip from the capital area. These visits to Snæfellsjökull NP would not be possible without the tour, car rental and accommodation services provided by the capital region. In the Finnish examples presented earlier, 95 % of the visitors were either locals or residents and in such context focusing on the spending in or around the national parks to determine their economic impact is appropriate.

It is important to emphasize that the high numbers of foreign tourists account for almost all the economic impact of Snæfellsjökull NP, and the situation can be expected to be similar in Þingvellir and Vatnajökull National Parks as well. While 4 % of the visitors were Icelandic residents, their spending contributed only 1 % of the total spending as they spend approximately one-fourth of the money daily compared to day-trip or overnight tourists, excluding campers (Table 17). Metsähallitus (2017b) considers 2.8 million visitors to the 39 Finnish national parks in 2016 high compared to the Finnish population of 5.5 million people. In Iceland this ratio is an incredible over 2 million visitors (Þórhallsdóttir, Ólafsson & Rögnvaldsdóttir, 2017; Þórhallsdóttir, 2017; Thingvellir National Park, 2017a) to 3 national parks, compared to a population of 329.000 people (OECD, 2017b). These numbers highlight the tremendous economic value the parks currently generate, but at the same time reflect the fragile nature of the foreign tourism -based economy and environmental pressure these visitor numbers present for nature in these parks.

In Chapter 2.5 we referred to an estimate from 2006 that by 2012 the national and regional economic impact of Vatnajökull National Park was expected to be 3-4 billion ISK annually. It's quite revealing that according to this study, even a conservative account of the economic impact of Snæfellsjökull National Park would reach that impact level with only ca. 150.000 visitors. It is not simple to count the total number of visitors per year for Vatnajökull National Park, as the visitor counters in different locations can't recognize whether the same visitors are visiting multiple sites or not. If all the Vatnajökull counter records were summed together with recent inclusion of the popular Jökulsárlón glacial lagoon (Jökulsárlón becomes; 2017, July 25) the park would have ca. 2 million visits in total (Þórhallsdóttir, Ólafsson & Rögnvaldsdóttir, 2017). Assuming conservatively, that

about 900.000 of these visits would be carried out by different people, of the economic impact of Vatnajökull NP could be in the range of 18-24 billion ISK.

5.2 Importance of the National Park for the Snæfellsnes Peninsula

The results of this study suggest that ca. 0.7 billion ISK of total personal income generated by Snæfellsjökull NP annually remains on the peninsula, and ca. 1 billion ISK in value-added including also company profits. These figures assume a uniform conversion of spending location to economic impacts, though verification of this assumption is beyond the scope of this study. Considering the significant economic impact of Snæfellsjökull NP discussed in the previous chapter, it is interesting to look into the visitors' motives for visiting the peninsula, and opinions of the peninsula residents regarding the national park.

Based on the responses in the spending survey, 12 % of the visitors came to the peninsula only to visit the national park, 81 % came to visit it as one among many destinations, and for 7 % the national park was a non-intended stop (Table 7). Even though it was the main reason for a visit only for a relatively small share of the visitors, it was still a 'reason to come' for 93 % of all the visitors; and the economic impacts presented above have been calculated in a way that excludes spending on other destinations in the peninsula, and all spending of visitors for whom the national park was a non-planned destination has been excluded. Results from the Vatnajökull NP visitor survey from 2008 (Sigrún Inga Sigurgeirsdóttir & Þorvarður Árnason, 2008) showed that only about half of the visitors knew about the national park before coming to Iceland – this may explain a portion of the non-intended visits also in this study.

These findings seem to conflict somewhat with the views of the residents living in the Snæfellsnes Peninsula (Jónína Hólmfríður Pálsdóttir, 2016): half of residents considered Snæfellsjökull NP important for businesses in the area, but majority believed that it did not affect their work or income, or influx of new residents to the area. However, the majority of the residents believed that the national park has had a positive impact in attracting visitors to Snæfellsnes, and attitudes to tourists were generally positive. These results would seem to suggest that a relatively small number of people living on the peninsula are directly impacted from the tourism income stimulated by national park – or that they do not in all cases recognize the influence of the national park in the visitors'

travel decisions. Some discrepancies were also raised by the results that people living in the north part of the Snæfellsbær municipality thought the park was more important for the business community, and more people in the south of the municipality viewed the national park to have more positive impact on their employment and income. These differences could also simply be explained by the towns and businesses being concentrated on the north coast and the south coast being more dominated by farms and sole proprietors.

Participants in Jónína Hólmfríður Pálsdóttir's (2016) study were relatively poorly informed concerning Snæfellsjökull NP in general. A little over one-fifth had followed the process of establishing the national park in detail, and few were familiar with the park's Management Plan (Umhverfisstofnun, 2010). The Management Plan states that it is important for employment, social and conservation reasons for the employees of the national park and the local community to work together in developing the park, however there seem to be opportunities to take this collaboration further. At the moment, two adventure tour companies operating in the Snæfellsjökull NP have created partnerships with the park management (Jónína Hólmfríður Pálsdóttir, 2016).

Views of the peninsula's residents also seem to be conflicted over the question of the expansion of the NP: one-third were in favour, one-third neutral and one-third against (Jónína Hólmfríður Pálsdóttir, 2016). Expansion of national parks and protected areas always raises many questions among the people living in the park's vicinity – will they benefit from the increased protection and increased number of visitors, or will their rights to the lands and livelihoods be limited? Results of this study give strong evidence that at least the economic impacts are significant, and there is space for expansion, for example by increasing services and offerings to visitors, so they do not need to procure them from the capital region.

Another interesting question - that hasn't yet been discussed in this study - is whether the significant economic impacts described so far would have been realized even if the Snæfellsjökull area wasn't a national park (or another kind of protected area). Based on this study we can't provide a conclusive answer. For example, Weiler and Seidl (2004) have reported a significant impact on visitor numbers upon designating natural sites as national parks, and Snæfellsjökull National Park was recognized as an important reason

for visitation by participants in this study. However, to evaluate whether visitors would have visited the area even if Snæfellsjökull wasn't part of a national park would have required a speculative question in the survey. Such a question was considered in the design phase of the survey but since it would have been the only speculative question with several undetermined underlying issues (e.g. how would the marketing, tours and services in the area have been different if it hadn't become a national park in 2001), it was decided not to include it. A more robust way to address this matter would have been to study the visitation numbers and motives before and after the area was designated as a national park, but such studies or publications could not be found.

5.3 Economic impact vs investments in the parks

Different studies have used slightly different methods of calculating the economic impact to costs ratios regarding the funds used for national parks. In Finland, the researchers at Metsähallitus calculated the 10:1 economic impact to cost ratio (Kajala, 2012) comparing the parks' annual economic impact to the annual budget of the national parks including investment costs with a 15-year payback period for small infrastructure items and 30-year payback period for larger infrastructure items such as mid-size visitor centres (L. Kajala, interview, August 14th 2017). On the other hand, Souza (2016) calculated the 7:1 economic impact to cost ratio for the Brazilian National Parks simply by comparing the annual economic impact to the annual budget of ICMBio, the agency managing Brazilian Federal Protected Areas.

Snæfellsjökull National Park's budget for 2017 is approximately 66.7 million ISK, comprised of 26 million in salaries, 5 million in procured services, 7.5 million in housing and infrastructure costs, 8.2 million in operating expenses and 20 million in additional funding for improvements and maintenance (J. Björnsson, email conversation, September 12th 2017). Using Souza's (2016) approach and comparing the annual 3.9 billion total economic impact to the annual park budget[6], Snæfellsjökull National Park provides a staggeringly high economic impact to cost ratio of 58:1. Without the multiplier-

[6] Preferred approach to comparing the costs with the economic impact would have been to include the investment costs in the calculations. However, this approach was not possible as it proved difficult to retrieve this data from Umhverfistofnun.

bound secondary impacts, the economic impact to cost ratio would still be 45:1. As the park generates approximately 955 million ISK in direct sales and income taxes, even the tax income produced by the park is over 14 times its budget.

These numbers may seem almost implausible compared to the 10:1 overall economic impact to cost ratio figure from the Finnish National Parks. However, they are not directly comparable as the Icelandic ratio is missing the investment costs[6], and includes non-local spending. However, when we compare the number of visitors and national parks, and the type of visitors and their spending, the rationale for the large difference can clearly be seen. In Finland, the 10:1 ratio is produced by 2.8 million visitors to 39 national parks. The vast majority of the visitors in Finland are domestic travelers whose spending is significantly lower than of foreign tourists (one-fourth in this study). However, in Iceland 3 national parks are visited by ca. 3 million visitors, 95 % of which are foreign and spend significant amounts of money on accommodation, transport and tours to visit the parks. The costs to the state for managing 39 national parks vs. 3 are obviously at different scales.

The annual budget of 2017 for Snæfellsjökull National Park is primarily a maintenance budget without any large construction or expansion projects, and it doesn't reflect the long-term establishment costs of the park such as the building of visitor centres; thus the actual economic impact to cost ratio would be somewhat lower when these long-term expenses are accounted for. However, the economic impact to cost ratios point out a severe imbalance in the funding of the park compared to the number of visitors it serves and their associated spending. The question could be raised whether the visitors are receiving the level of service from the parks compared to what they are paying for their visits? If we assume different state-funded operations are individual budgetary units responsible for being sustainable based on the public goods or tax revenue they generate, there would seem to be opportunities to increase funding to Snæfellsjökull National Park to enable it to serve its visitors better. For example, during the data collection in the winter, many visitors interviewed raised the point of very limited basic park services during that season.

5.4 Challenges in the Icelandic study setting

The context of Icelandic national parks presented a number of unique questions that required certain decisions to be made in the planning, data collection and analysis phases. Earlier literature on the methodology provided answers and recommendations to some of them, however some had no previous references in the literature, so decisions on how to handle them were left to the researcher. A summary of these questions is provided below:

1) *Winter vs. summer visitors.* In the planning phase, the visitor counter data showed that winter season was growing much faster than the summer season, and it was hypothesized that visitor travel patterns and spending would be different between winter and summer season due to limited services in Snæfellsnes peninsula in the winter. Thus, it was decided to collect visitor spending surveys separately from winter and summer visitors, and use weighted averages based on the visitor ratios between these seasons in the final spending figures inputted to the MGM2 model. No references were found in the MGM-related literature concerning separate seasonal samples but the results from the foreign visitor survey 2016 (see q62 in Icelandic Tourist Board, 2017b) suggested higher visitor spending in the winter season. The decision was justified as there were clear differences in the spending, visitor segments and length of stay between the seasons in the survey data in this study as well.

2) *Local vs. national economic impact.* The MGM-methodologies are designed to calculate the local economic impact of visitor spending in national parks. In the original context in the USA, and also in Finland where the methodologies have been extensively applied, this approach makes sense as the majority of visitors are domestic and travel to the national parks for recreational purposes from their homes. Most of their spending related to the trip takes place in or around the national park. However, due to the ongoing tourism boom in Iceland, the vast majority of the visitors to the national parks are foreign tourists - in this study 96 % - and they spend a considerable amount of money related to the national park trips elsewhere in Iceland (mainly in the capital region) due to limited number of points of entry to the country, and limited services around the

national parks. In this study 45 % of the visitor spending took place in the Snæfellsnes peninsula and the rest elsewhere in the country. Thus, a decision was made to include this spending in the economic impact calculations to produce a realistic figure for the total economic impact of the Snæfellsjökull National Park both on the local and national level. This decision was made during the first survey collection period based on the difficulties people had in allocating their spending on the first version of the survey form, so another column for spending elsewhere was added to the survey form (Appendix 1 & 2). This option was recognized in earlier literature both by Stynes (1999b) and the Finnish researchers (Huhtala et al., 2010). The new survey form proved to be somewhat complex for respondents to fill out by themselves, and it was helpful for the researcher (or other support person) to be present to assist with the form to ensure completeness and validity of the responses.

3) *Role of local visitors.* Stynes (1999b) suggests that the spending of local residents who live in the vicinity of the national parks should be separated or excluded from the results, because their spending would likely contribute to the local economic impacts in any case. In this study this did not become an issue as the sample (n=501) didn't reach any residents of the Snæfellsnes Peninsula. Icelandic residents from other parts of the country were used to form the 'local visitor' segment.

4) *Multi-destination visits.* In Iceland it is very common for visitors to visit several sites and destinations in one day, either self-driving or on organized tours. The share of spending on a particular day attributed to other non-national park destinations needs to be excluded from the economic impact of the national park (Stynes et al., 2000). In Finland, Huhtala et al. (2010) had experimented with different solutions to account for multi-destination trips and settled for calculating a range of economic impact by including all visitor spending from a given day even if it contained non-park sites (maximum impact) or only including the spending for visitors for whom the national park was the only or most important destination (minimum impact). As this issue was recognized already in the planning stage in this study, the survey form was augmented to collect more

detailed information on the non-park sites visitors had visited that day. Visitor spending was then calculated by including all spending for those visitors for whom the Snæfellsjökull NP was the only or most important destination, by dividing the spending of those visitors for whom it was one among many planned destinations by the number of sites they had visited, and by excluding all visitor spending for whom the national park was a non-planned destination. This approach was considered to give a conservative yet accurate account of the value of the national park during the visitor's visit to the area.

5) *Party vs. individual as the unit of analysis*. Stynes (Stynes, 1999b; Stynes et al., 2000) recommends to use 'party per day/night' as the base unit of analysis, as parties are typically better able to express their spending as a whole unit compared to their individual shares. In this study spending survey data was collected on a 'party per 24 hour' -basis, but converted to individual spending for presentation of the results as it's easier to refer to an average spending of 11.467 ISK per person per day than the average spending of an average-size party. The unit of analysis doesn't matter in the economic impact calculations as long as units match across the spreadsheet.

6) *Local economic multipliers not available.* The indirect and induced economic effects in the MGM2 model are based on economic multipliers for sales and jobs, which determine the extent of the secondary effects of visitor spending. Economic multipliers are based on input-output tables that capture the structure of the local economy and trace the flow of money between different sectors. OECD (2017a) has released national input-output tables that could be used to calculate national economic multipliers, but Stynes & Sun (2003) warn against using national multipliers for rural areas as they tend to overestimate the effects. Instead MGM2 model's reference rural multipliers, which were originally developed for the United States, were used. The aggregate sales multiplier in the study was 1,29 which is a very conservative figure – for comparison, an equivalent rural multiplier in the recent economic impact studies concerning Finnish national parks was 1,68. As discussed in Chapter 4.6, using the reference rural multiplier set may however produce positive bias in

the job effects in certain sectors (and negative in others). The effect for this study was deemed negligible but having local economic multiplier sets for capital/built areas and rural areas would eliminate this uncertainty.

7) *Sample sizes*. Kajala (2007) has recommended samples of 300-500 units for economic impact studies in recreation and protected area context. In this study, a sample representing 501 people was achieved after 56 respondents were discarded due to incomplete or inconclusive responses. The sample was divided further into visitor segments, and each segment should contain a recommended minimum of 30 people and an absolute minimum of 10 people (Huhtala et al., 2010). In the local resident segment only 19 people were reached. This highlights the fact that detailed segmentation and other partitioning of samples (e.g. to winter and summer seasons) increases the need to collect larger samples, or to target segments differently in the sampling, for example by higher sampling of a visitor segment with more variation in spending. In this study, the sample was used both to represent the ratios between different visitor segments and their spending. Ideally, the segment ratios and spending would be sampled separately, so 100 % of the visitors in a certain period could be sampled to identify the visitor segments, and then spending could be surveyed within these segments by necessary sample sizes in each case. In the scope of this proof-of-concept study it was not possible to conduct two different sets of field studies.

8) *Limited research community support for the methodology.* The researcher behind the MGM methodologies has unfortunately passed away, and much of the documentation of the methodology has been lost due to restructuring of the Michigan State University website where he used to teach. Many critical files related to MGM2 methodology were recovered from internet caches and archives for this study. Researchers working with Metsähallitus and the Finnish national parks have developed the MGM2 methodology further to suit the Finnish context; they can potentially provide some support and consultation on the application of the methodology to other countries and all their publications are still available online. Souza (2016) has recently completed a PhD dissertation

concerning the economic impact of national parks in Brazil using MGM2. Similarly Woltering (2012) has studied the economic impact of national parks in Germany in his PhD dissertation, referring to Stynes' publications although using a different methodology. Job (2008) also studied the economic impact for two German national parks using a value-added-analysis similar to MGM methodologies.

5.5 Applicability of the methodology in Iceland and suggestions for further research

As presented in Chapter 5.4 and earlier, the Icelandic context provided some challenges that have not always been issues elsewhere where the MGM methodologies have been employed. However, the results of the visitor spending survey are consistent with the expected characteristics of visitors to the national parks in Iceland, and so are the economic impact results from MGM2 calculations. Thus, the results are expected to give a good estimate of the economic impact of Snæfellsjökull National Park and the scope of the study could be extended to other protected national parks and areas as well.

One of the main questions, and departures from the standard MGM outputs, is the inclusion of national park visit-related spending outside the vicinity of the national park as tourism in Iceland is based on self-driving or organized tours originating from the capital region. The second question concerns the exact economic multipliers in Iceland both in the rural contexts and the capital region. In this study, a conservative set of default rural multipliers was used, which is likely to somewhat underestimate the secondary efforts in the rural areas surrounding the national park and severely underestimate the effects of the park visit-related spending from the capital region. Thus, a separate study would be needed to estimate these multipliers in Iceland to achieve as realistic results as possible. It might be sufficient to research a general set of rural multipliers for the Icelandic countryside in addition to the capital region – this would considerably limit the research effort needed, and possibly overcome some privacy issues related to studying the economic input-output flows in very sparsely populated areas. Teigeiro & Díaz (2014) have also published a method for estimating tourism-related multipliers from the OECD (2017a) input-output tables that may be useful in future studies – currently their method is limited to hotel and restaurant sector on the national level.

Regarding extending the study to other national parks in Iceland, especially Vatnajökull NP that covers a much larger area and several different areas of visitation, it would be practical to research the spending per visitor segments on a more robust level as suggested in Chapter 5.4, so that they could be used across the national parks. This way visitor surveys in different locations would only need to identify the visitor segment, and data collection would be much faster and cost-effective as visitor counters already provide visitor number data in most relevant locations.

This study didn't raise any major issues regarding the compatibility with ASTA database developed by Metsähallitus in Finland. Different multipliers, currencies and visitor segments would naturally entail small changes, as might Vatnajökull NP with multiple points of data collection. Inclusion of the economic impact on a national level in addition to local impacts, and possible use of two sets of economic multipliers for spending in the different regions, would likely suggest the largest needs for changes to the current database setup, but these shouldn't present any hurdles that couldn't be overcome with simple changes to the data entry user interface and calculation backend. More detailed analysis of the compatibility should be carried out in discussions between Metsähallitus and the local stakeholders – these initial comments are based on access to a rather non-technical user manual of the system.

Another related research question, which has not been covered in this study, would be to study the social carrying capacity (Manning, 1997) or tourism carrying capacity (McCool & Lime, 2001) of the national parks in Iceland further. Anna Dóra Sæþórsdóttir, Anna Mjöll Guðmundsdóttir and Þorkell Stefánsson (2016) studied the visitor experience at Djúpalónssandur along with seven other popular attractions in South and West Iceland. Based on the data collected in summer 2014 to winter 2015, visitors to Djúpalónssandur experienced the second least crowdedness caused by other tourists and the highest overall satisfaction, suggesting that at the time of Anna Dóra's study, the tourism carrying capacity of the site hadn't yet been reached. However, the current amount of monthly visitors to Djúpalónssandur is already 2-4 times higher depending on the month (see Table 10) and such increases in a short period may have negative effects on the visitor experience and contribute to exceeding the carrying capacity of the location.

These issues could be studied in connection with future research to the economic impacts. So far, the increase in tourism and flow of visitors to the national parks has meant increasing economic impacts, but at some point the parks may reach a point where the high numbers of visitors begin to affect tourists experience negatively and start to reduce the visitor numbers or shorten periods of stay, diminishing the economic impacts. Anna Dóra Sæþórsdóttir (2013) studied this phenomenon at Landmannalaugar, the starting point for Iceland's most popular hiking route and part of the Fjallabak Nature Reserve. The study indicated that already during 2000-2009 before the recent tourism boom, the characteristics of the visitors had shifted from nature purists to more urban visitors and an increasing number of visitors considered that the area had too many tourists, interfering with the nature experience.

While highland destinations such as Landmannalaugar may not be representative of visitor experience or behaviour at popular lowland tourist attractions, they may serve as a 'canaries in a coal mine' to other natural attractions on what unsustainable growth may entail. With record numbers of visitors each year, Iceland's national parks are very susceptible to this development and already struggling to manage the visitor numbers sustainably. Results of this study concerning the substantial economic impact of Snæfellsjökull National Park could provide impetus also for stronger environmental (and visitor) management to ensure economic returns from the national parks also in the future. The parks certainly seem produce sufficient economic impacts and tax revenues to implement stronger management policies and measures.

6 Conclusion

This study presents findings of the first study conducted in Iceland regarding the economic impact of national parks. As a result of Iceland's booming tourism, the sector has become the country's most important source of foreign revenue within just a few years. However, at the same time increasing numbers of visitors create challenges for the sustainability of the natural attractions that over 80 % of the visitors come to Iceland for. As some of the country's most popular attractions, Iceland's three national parks, Þingvellir, Vatnajökull and Snæfellsjökull, are at the heart of this development, attempting to keep the infrastructure and human resources at pace with growing visitor numbers. This requires investments to the national parks that may seem be to without returns, as national parks in Iceland in general don't collect visitor fees (apart from parking and toilets in the busiest locations), nor attempt to balance with the costs with in-park sales and fees.

While establishing and maintaining national parks requires national funding, they also produce economic impacts in several different ways and methodologies have been developed to calculate these impacts. One of the most well-known such methodologies is called the Money Generation Model (MGM) developed for the US Park Service by Daniel Stynes at the Michigan State University. A variant of the MGM methodology has been used to calculate the economic impact of all the Finnish national parks since 2009. In Finland, the studies concluded that every invested euro into the national parks produced ten euros in returns. This finding served as impetus to carry out this study in Iceland and see if the methodology would be applicable in the Icelandic context, where the national park tourism follows quite different patterns and customs, however the context is relatively similar – both Nordic countries with long distances, large unpopulated areas and nature-based tourism industries.

To develop and test the MGM methodology in Iceland, a proof-of-concept study was conducted on the Snæfellsjökull National Park. The MGM2 variant was chosen as it provides more detailed results concerning the secondary impacts of national park - related spending than the original MGM methodology or Tourism Satellite Accounts

(TSA), which is otherwise commonly used in calculating the economic impact of tourism. MGM methodologies use realized visitor spending as their main data source to determine the parks' economic effects across different sectors, profits, income, jobs, tax receipts and value-added. A sample of 501 respondents from the visitor spending surveys was collected during the winter and summer seasons in February-March and June 2017 at the Malarrif Visitor Centre and at Djúpalónssandur. The visitor number data was sourced from a counter at Djúpalónssandur (Rögnvaldur Ólafsson & Gyða Þórhallsdóttir; 2017, July). Economic multipliers that determine the secondary economic effects are not yet available in Iceland, so defaults were used as provided by the MGM2 methodology.

The Icelandic context posed some unique challenges on how to apply the methodology, which have been discussed in Chapter 5.4. The results however are comparable with the figures obtained from Finnish national parks. Visitors spent on average 1.9 days and ca. 11.500 ISK per day on the park visit. This figure represents the direct intended spending in connection with the national park – the actual per-day spending average in the survey was 23.098 ISK but the effect of non-national park destinations on the peninsula and respondents who didn't plan to visit the park was excluded before the economic impact analysis. Day-trip tourists from the capital region are the biggest visitor segment, closely followed by people staying overnight at hotels, guesthouses, hostels or Airbnbs somewhere on the peninsula. These segments also spend the most money connected to trips to the national park. Campers and Icelandic residents formed 14 % of the visitors, but contributed only 5 % of the total visitor spending.

The overall economic impact of Snæfellsjökull National Park was estimated at 3.9 billion ISK (3.0 billion in direct effects and 0.9 billion in secondary effects) and as therefore generating ca. 700 indicative full-time, part-time and seasonal jobs. 45 % of the visitor spending took place on the Snæfellsnes peninsula, estimating the local economic impact at ca. 1.7 billion ISK. Traditionally the MGM methodologies have been focused only on the local or regional impact of national park -related spending, but in this study a decision was made to include spending also from elsewhere in Iceland, essentially the capital region, because most of the park tourism is currently based on the services from the capital region and wouldn't be possible otherwise.

MGM2 methodology's lowest reference set of rural economic multipliers was used to calculate the impact of all visitor spending in this study, as local economic multiplier tables are not yet available for Iceland. The results therefore are likely to underestimate the economic impacts due to three main reasons: 1) Multipliers in the reference set haven't been updated since 2007, and for example the Finnish rural area multipliers from 2014 are 30 % higher than the ones used in this study. 2) As 55 % of the spending took place outside of the Snæfellsnes Peninsula (practically all of it in the capital region), a higher set of multipliers for small metropolitan regions could have been applied for that part of spending. 3) Visitor counter data from Djúpalónssandur may underestimate the total number of visitors to Snæfellsjökull NP as not every visitor is expected to stop there. Additionally, visitor numbers were not yet available for high-season months of July-August 2017, so data from 2016 was used instead, resulting in a potential underestimation of ca. 9200 visitors based on national increases in visitor numbers.

Comparing the economic impact to the budget of the Snæfellsjökull National Park, ca. 67 million ISK in 2017, the economic impact to cost ratio turned out to be extremely high at 58:1. The park generates over 14 times its budget in direct sale and income taxes. Direct comparisons between the annual budget and economic impact overlooks long-term development costs of establishing the national parks such as purchasing land and building visitor centres. However, the results strongly indicate that is it possible, perhaps even rational, on self-sustaining basis to increase funding to the national park to cope with the increased environmental and social pressures of growing tourism and visitor numbers to the park, and to provide better services to the visitors. Uncontrolled and unmanaged tourism to the park will likely end up in decreasing economic returns as the visitors' nature experience will be diminished and visits eventually cancelled or shortened.

These economic impact to cost ratios also provide important new information for comparisons of long-term impacts of nature protection vs. exploitation to Umhverfistofnun and other governmental bodies when they are considering granting licenses for companies to utilize Iceland's hydro- or geothermal power reserves, or negotiating permits for new aluminum or ferrosilicon plants.

As a proof-of-concept study regarding the use of the MGM2 methodology in Iceland, this study demonstrates that the methodology is applicable in Iceland with slight adjustments. Further research on visitor spending by segments may provide a practical shortcut for extending the study to all national parks and protected areas in Iceland -- if it can be verified that visitor spending per segment is relatively uniform in different parks and locations in Iceland, then only visitor shares per segment need to be identified at different locations. Further research into the Icelandic residents' segment is also warranted as the sample (n=501) in this study managed to reach only 19 domestic visitors. Another topic for further research would be to determine exact economic multipliers for capital and rural regions in Iceland, as this would increase the accuracy of the projected secondary impacts over the conservative defaults that were used in this study.

This study is the first step in order to evaluate the entire economic value of national parks and other protected areas in Iceland, and more research is needed in many areas. However, it already strongly demonstrates the immense economic value these natural sites and areas represent to Iceland's economy as tourism establishes itself as the long-term key-driver for the country's sustainable growth. In light of the results presented in this study, government agencies need to deliberate carefully whether the utilization of hydro- and geothermal reserves, or providing permits to heavy industries, can match the return on investments of nature protection and development of nature-based tourism.

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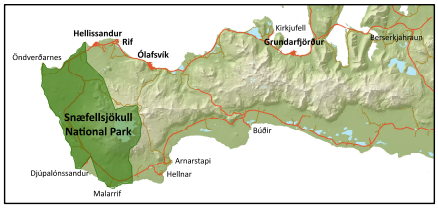
Appendix 1: Visitor Spending Survey, version 1

Visitor Spending Survey: Snæfellsjökull National Park - Winter 2017

This survey is conducted as part of a Master's Degree thesis in Economics at the University of Iceland. Aim of the survey is to research the local economic impact of National Parks in Iceland, and to provide information for decision-making and policies regarding the development of National Parks. Answering this one-page questionnaire will only take a couple of minutes and all answers will be treated anonymously. We are grateful for your time and participation in this study. Questions regarding the survey: Jukka Siltanen, email jks16@hi.is.



1. On this trip to the Snæfellsness Peninsula, the National Park is...
   - ☐ your only or the most important destination?
   - ☐ one among other intended destinations?
   - ☐ a non-planned destination along your route?

2. What other sites in the Snæfellsness Peninsula have you visited in the last 24 hours (or one day)?

_____

3. How many days are you going to stay altogether in the National Park or its surrounding areas? _____

4. How many people are travelling in your party? _____
Party is defined as your family, friends, partners, etc. you're travelling with... Please do not include other participants of an organized tour.

5. In the following section we will ask you to estimate your spending in connection to visiting the National Park and its surroundings. Please indicate whether you will estimate:
   - ☐ your personal expenses only or your share of your party's joint expenses
   - ☐ total expenses of your party.

6. Please select the currency you're most comfortable estimating the expenses in:
   ☐ ISK ☐ EUR ☐ USD ☐ GBP ☐ Other _____

7. In the following questions please indicate your total expenses for the last 24 hours (or one day) on this trip in the National Park and its surroundings:

Fuel and other purchases from service stations?	
Costs for transportation? Eg. rental car, taxi, local buses, ...	
Recreational activities? Eg. guided tours, sports activities, ...	
Cultural activities? Eg. cultural events, museums, crafthouses, ...	
Accommodation?	
Cafe and restaurant purchases?	
Groceries? Eg. food and beverages from supermarkets	
Souvenirs?	
Other retail purchases? Eg. shopping for clothing, goods, ...	
Other spending? Specify type _____	

7b. Type of accommodation if overnight stay:
- ☐ Hotel
- ☐ Guesthouse
- ☐ Hostel
- ☐ Farm accommodation
- ☐ Private rental (eg. Airbnb)
- ☐ Camping / camper van
- ☐ Summer house / cottage
- ☐ At family / friends
- ☐ Other: _____

8. Are you a local resident living in the Snæfellsness Peninsula? ☐ Yes ☐ No

9. Gender? ☐ Female ☐ Male ☐ Other ☐ I don't want to say

10. Year of birth _____

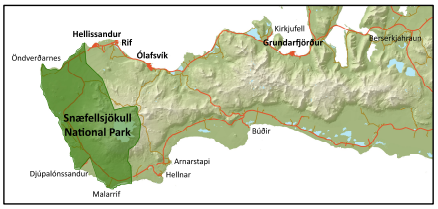
11. Country of residence _____

Thank you for your time!

Appendix 2: Visitor Spending Survey, version 2

Visitor Spending Survey: Snæfellsjökull National Park – Winter/Summer 2017

This survey is conducted as part of a Master's Degree thesis in Economics at the University of Iceland. Aim of the survey is to research the local economic impact of National Parks in Iceland, and to provide information for decision-making and policies regarding the development of National Parks. Answering this one-page questionnaire will only take a couple of minutes and all answers will be treated anonymously. We are grateful for your time and participation in this study. Questions regarding the survey: Jukka Siltanen, email jks16@hi.is.



1. On this trip to the Snæfellsness Peninsula, the National Park is...
   - ☐ your only or the most important destination?
   - ☐ one among other intended destinations?
   - ☐ a non-planned destination along your route?

2. What other sites in the Snæfellsness Peninsula have you visited in the last 24 hours (or one day)?

_____

3. How many days are you going to stay altogether in the National Park or its surrounding areas? _____

4. How many people are travelling in your party? _____
Party is defined as your family, friends, partners, etc. you're travelling with... Please do not include other participants of an organized tour.

5. In the following section we will ask you to estimate your spending in connection to visiting the National Park and its surroundings. Please indicate whether you will estimate:
   - ☐ your personal expenses only or your share of your party's joint expenses
   - ☐ total expenses of your party.

6. Please select the currency you're most comfortable estimating the expenses in:
   ☐ ISK ☐ EUR ☐ USD ☐ GBP ☐ Other _____

7. In the following questions please indicate your total expenses for the last 24 hours (or one day) on this trip **column a)** in the National Park and its surroundings, or **column b)** elsewhere in Iceland

	a	b
Fuel and other purchases from service stations?		
Costs for transportation? Eg. rental car, local buses, ...		
Guided tours and other recreational activities?		
Cultural activities? Eg. events, museums, ...		
Accommodation?		
Cafe and restaurant purchases?		
Groceries? Eg. food and beverages, …		
Souvenirs?		
Other retail purchases? Eg. clothing, goods, …		
Other spending? Specify type _____		

7c. Type of accommodation if overnight stay:
- ☐ Hotel
- ☐ Guesthouse
- ☐ Hostel
- ☐ Farm accommodation
- ☐ Private rental (eg. Airbnb)
- ☐ Camping / camper van
- ☐ Summer house / cottage
- ☐ At family / friends
- ☐ Other: _____

8. Are you a local resident living in the Snæfellsness Peninsula? ☐ Yes ☐ No

9. Gender? ☐ Female ☐ Male ☐ Other ☐ I don't want to say

10. Year of birth _____

11. Country of residence _____

Thank you for your time!