Global Sustainable Tourism Dashboard

Technical Report 2016

Professor Susanne Becken

Professor Graham Miller

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Griffith University, Queensland, Australia

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Rochelle Turner (Research Director at World Travel & Tourism Council)

About this report:

This report has been produced in consultation with key stakeholders, including providers of data, supporting organisations, and potential user groups. The report provides technical information on how the indicators for the Global Sustainable Tourism Dashboard were conceptualised, how data were sourced and how analysis was conducted. The goal of the Dashboard is to provide a set of top-level indicators that can be reported on alongside the traditional economic indicators, to give a fuller understanding of the contribution of the tourism industry.

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Organisations involved

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Griffith University is a top ranking University based in South East Queensland, Australia. Griffith University hosts the Griffith Institute for Tourism, a world-leading institute for quality research into tourism. Through its activities and an external Advisory Board, the Institute links university-based researchers with the business sector and organisations, as well as local, state and federal government bodies. For more information, visit www.griffith.edu.au/griffith-institute-tourism.

About University of Surrey

The School of Hospitality and Tourism Management at the University of Surrey is consistently ranked as the number one school of tourism and hospitality management in the UK by the Guardian, Times and Independent University Guides. The School placed consistently in the top three Universities in the world for tourism scholarship on assessments of research outputs and quality of tourism staff. It is known for leading research into the social sciences of tourism. For more information visit http://www.surrey.ac.uk/school-hospitality-tourism-management

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1. Executive Summary

For the 2016 Global Sustainable Tourism Dashboard:

Development	**A small, but slowly increasing, share of tourism goes to developing countries:**
	Least Developed Country/Small Island Developing States share of tourism expenditure 5.8% of total expenditure.
	Least Developed Country/Small Island Developing States share of direct tourism employment 7.9% of total employment.
Distribution	**Travel activity is highly concentrated:**
	The Top 10 outbound countries make up 56% of total tourism expenditure.
	The Top 10 destinations accumulate 48% of global tourism expenditure.
	The share of Top 10 airports relative to all passenger volumes is 18%.
Resource efficiency	**Resource efficiency in the accommodation sector is improving:**
	The carbon, energy and waste efficiency is improving on a per guest night basis amongst environmental leaders.
	The annual carbon emissions in a hotel are 8 tonnes per guest room and the global hotel sectors carbon footprint is 150 Mt of CO2-e.
Aviation emissions	**The carbon footprint of aviation is growing, but relative efficiency gains are being made:**
	Total aviation emissions from passenger travel in 2015 were 566 Mt of CO_2.
	The average one-way journey emitted 187 kg of CO_2 in economy class and 365 kg of CO_2 in business/first class.
	Carbon efficiency across all travel in 2015 was 0.09 kg of CO_2 per passenger-kilometre.
Protected Areas	**Tourism planning in World Heritage Areas is not widespread:**
	Of all natural and mixed World Heritage Areas, 68 sites (30%) have an extensive level of planning for tourism.
Gender	**Gender equity in tourism and travel related employment is improving:**
	The proportion of female employment is 37.5%.
	The average share of women in management positions is 28.5%.
Safety	**Safety and terror-related fatalities:**
	The probability of being killed in a tourism-relevant terror attack in 2015 was 1.4 in a million, up by a factor of about 3 compared with 2005.

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2. Background

2.1. Aim of the Global Sustainable Tourism Dashboard

Economic indicators of the number of arrivals, receipts, jobs and investment are collected at a global scale by a range of organisations. These indicators allow tourism to make the case for policy changes that encourage the further development of the sector. However, with the growing maturity of the industry comes the need to measure beyond the economic indicators and recognise the impact tourism has on both people and the planet, and assess the effectiveness of the actions being taken to mitigate these impacts. Hence, the proposal is to develop a set of top-level indicators that can be reported alongside the traditional economic indicators, to give a fuller understanding of the contribution of the tourism industry.

2.2. Indicator selection

The Global Sustainable Travel and Tourism Dashboard (the 'Dashboard') is designed to complement the many efforts to promote sustainable development. As such, indicator selection was informed by the 17 United Nations Sustainable Development Goals, as well as other initiatives and programmes.

The dashboard aims to be relevant and comprehensive by covering all dimensions of sustainability (economic, environmental and social) (Miller and Twining-Ward, 2005). Further, the indicators are designed to represent key dimensions of Travel and Tourism and:

i) Be simple and easily understood,
ii) Draw on existing (big) data,
iii) Be globally relevant,
iv) Provide added value and
v) Be defensible and transparent.

Indicators were mostly derived based on existing data sources, but are presented in a way that provides important and new insights. In some cases, new partnerships were forged to obtain data previously unavailable or pool data to obtain more robust indicators.

A stakeholder workshop was held on 14 September 2015 at the University of Surrey to discuss the need and format of the Dashboard, examine the suggested sustainability dimensions and explore potential indicators and data sources. A document was sent to stakeholders thereafter to gain further feedback on the draft 'architecture'. Ongoing discussions with key experts and supporting organisations helped shape the first iteration of the Dashboard, presented in this report.

2.3. Existing monitoring systems

The Dashboard addresses an important gap at the global level, where monitoring systems largely focus on economic impacts of tourism. Table 1 summarises key programs or initiatives that provide regular information on a wide range of economic, environmental and social indicators. For example, at the global level, the United Nations World Tourism Organisation (UNWTO) collects data from nations globally to provide estimates of tourist arrivals, departures and expenditure, amongst others. The World Travel and Tourism Council (WTTC) publishes regular updates on the economic impacts of tourism, based on data from various sources (including UNWTO), Tourism Satellite Accounts, and an economic model developed by Oxford Economics. Focusing on aviation, limited data on revenue-passenger kilometre and fuel burn are publicly available by the International Air Transport

Association (IATA). No global data that cover social issues and are specific to tourism are publicly and regularly available.

Table 1. Overview of key organisations that provide tourism trends at various levels and for different dimensions of the triple bottom line.

	Economic	Environmental	Social
Global	WTTC: GDP contribution, Employment, Export, Investment UNWTO: Arrivals & Expenditure	IATA revenue-pkm and fuel burn ICAO emission factors UNEP-WCMC/IUCN World Database on Protected Areas (no tourism specific information)	
National	WTTC Country Reports/ Tourism Satellite Accounts National Statistics that contain tourism-relevant industry codes WEF Travel & Tourism Competitiveness Index Dataset OECD's 2013 report on tourism competitiveness indicators	Isolated academic exercises (e.g. national tourism carbon/water footprints)	
Destinations	• EarthCheck • Global Sustainable Tourism Council (framework, no data) • The European Tourism Indicator System • Academic research assessing various impacts of tourism • Other destination benchmarking programs		
Businesses	Annual Reports (companies)	International Tourism Partnership: Hotel Carbon/Water Measurement Initiative Global Reporting Initiative, CDP, Dow Jones Sustainability etc. EarthCheck Environmental/Sustainability certification programs (e.g. LEED)	

Similarly, at the national level, most tourism monitoring programs focus on economic outputs, for example through Tourism Satellite Accounts (TSAs). Isolated academic studies have estimated carbon footprints associated with tourism in different countries (e.g. Dwyer et al., 2010) or sub-state destinations (Walz et al., 2008). Related approaches are emerging to assess the water footprint of tourist destinations (Hadjikakou et al., 2013). The World Economic Forum's Travel & Tourism Competitiveness dataset provides information on a wide range of dimensions that cut across the economic, environmental and social impacts of tourism, and also assess tourism's policy environment.

Multiple programs are available at destination level, some of which provide guidelines for destinations to measure and monitor tourism's performance on a range of suggested criteria. The Global Sustainable Tourism Council's guidelines are a prominent example, but other regional approaches exist, for example the European Tourism Indicator System (Miller et al., 2013). Some destinations have taken a proactive approach to developing systems that integrate information obtained from multiple data sources to track the performance of tourism and identify potential issues early (e.g. for an example from the Gold Coast, Australia see McLennan et al., 2015, and Becken and McLennan, 2015).

A wide range of environmental management, certification and/or benchmarking systems exist at business level and are used by leading companies in the Travel and Tourism industry. Indeed, Environment, Social and Governance (ESG) reporting is becoming more widespread, and the WTTC (2015) suggests that the sector has now entered a phase where 'everyone is reporting' and integrating environmental and social indicators with core business strategies.

The Dashboard will draw on existing systems and programs to bring together data that provide a global tracking mechanism for tourism across economic, environmental and social dimensions. It will do this in an innovative, creative and engaging way that encourages stakeholders to access the data, learn more about tourism and generate greater understanding of the impacts of the sector.

2.4. Structure of this report

In the following, each indicator in the Dashboard is explained in terms of its rationale, data sources and methodological approach. Where possible, a link is made to other existing initiatives with which the indicator aligns. Economic indicators are presented first, followed by environmental and social indicators.

In total there are 6 sustainability dimensions with a total of 16 indicators. It is envisaged that these will evolve over time with more indicators being developed as gaps are identified by stakeholders, and as more data sources become available.

3. Economic dimensions and measures

3.1. Contribution to development

Rationale:

There is evidence that tourism can be redistributor of wealth and as a result function as a tool for development and poverty alleviation (Medina-Muñoz et al., 2016). Tourism expenditure from foreign visitors in developing countries stimulates economic activity, infrastructure development and employment.

The rationale aligns with ongoing initiatives, such as UNWTO's ST-EP program. Whilst not often realised in practice, the indicators selected to measure tourism's contribution to development are based on the assumption that economic benefits from tourism can be achieved when tourism is well managed. Indicators on development also align with SDG 1 "End poverty in all its forms everywhere" and SDG 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all".

To capture the potential impact that tourism has on the poorest countries, the following two indicators focus on the Least Developed Countries.

- Economic indicator Ec1: Tourism exports ($) in LDCs and SIDS : Total tourism exports ($) globally
- Economic indicator Ec2: Tourism employment in LDCs and SIDS : Total tourism employment globally

Data source and analysis

Data for the two indicators come from the WTTC. The information on Least Developed Countries is based on the latest assessment by the World Bank. At the time of analysis, there were 49 countries that the World Bank designated as "Least Developed Countries" (LDCs). However, WTTC only has data for 36 of these countries. To enhance the number of countries benefiting from tourism for their development, the indicator also includes Small Island Developing States (SIDS). The list of SIDS is provided by the World Bank, who identify 50 countries. WTTC has tourism data on 47 of these countries. There is overlap between the two lists meaning that analysis of tourism exports and employment is possible for a total of 78 LDC and SIDS countries.

Findings:

The first indicator shows that tourism brings increasing benefits to the poorest countries in the world. In 1995, LDCs and SIDS earned a combined US$35bn from tourism expenditure, but by 2015 this had risen to US $77bn in real prices. From a low in 2000, when LDCs and SIDS earned 4.6% of all tourism expenditure, by 2015 this had risen to 5.9% demonstrating an increasing share of world tourism earnings by the least developed countries in the world.

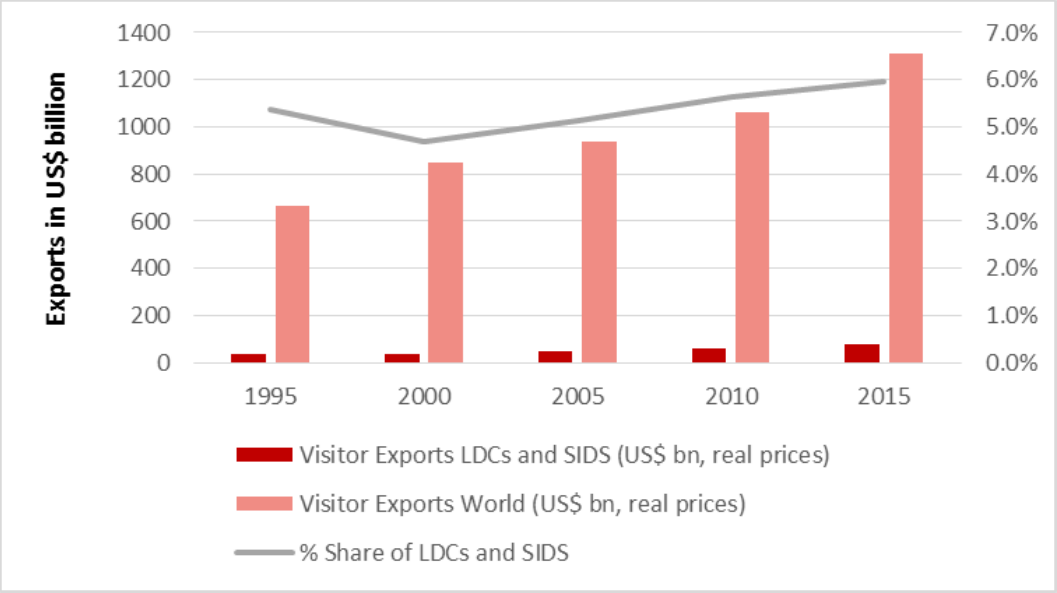

Figure 1. Economic indicator Ec1 showing tourism exports in LDCs and SIDS ($ and %) (Source: WTTC).

In Figure 2 direct tourism employment in LDCs and SIDS increases from 3.2m jobs in 1995 to 8.5m jobs in 2015. The share of total direct employment in tourism in SIDS and LDCs increases from 4.4% of global employment to 7.9% in 2015.

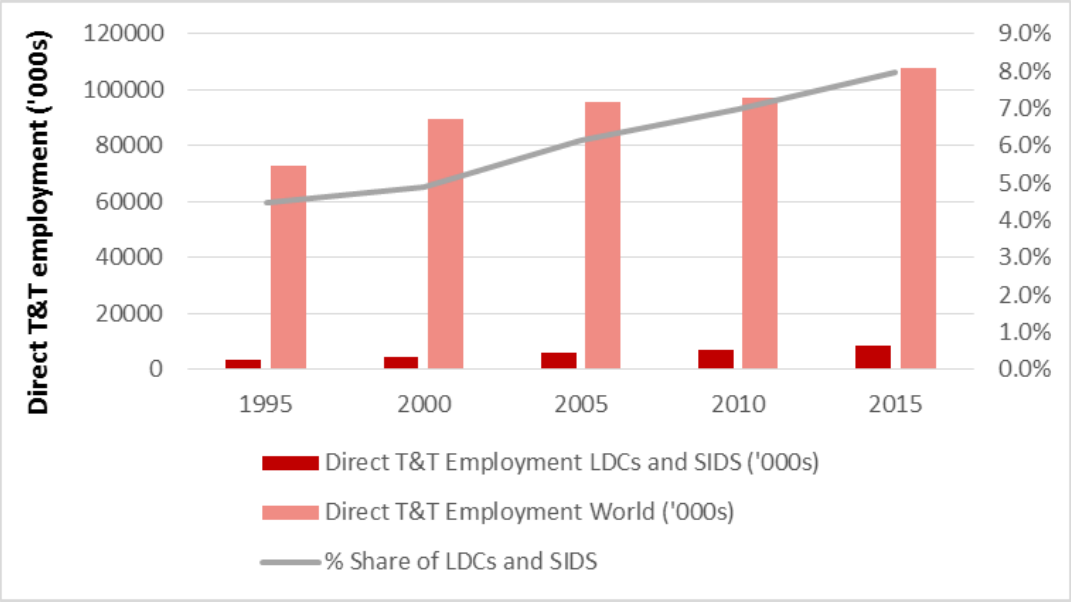

Figure 2. Economic indicator Ec2 showing tourism employment in LDCs and SIDS (number of jobs and %) (Source: WTTC).

These two economic indicators demonstrate that tourism has increased in economic value for the least developed countries on the planet as well as brought employment to residents at a faster rate than the expansion of tourism earnings and employment for the rest of the world. However, tourism benefits in developing countries are still comparatively small.

3.2. Distribution of tourism

Rationale:

Tourism is relatively concentrated in time and space. There is growing recognition that better dispersion of tourism is more sustainable because the economic benefits are more spread out and because capacity constraints in popular destinations are mitigated. Moreover and from a destination perspective, the reliance on a small number of source countries undermines the resilience of tourism in recipient countries. Dominance of world tourism by a small number of countries also raises issues of fairness and equity in being able to access the sights of the world. The way tourism is 'distributed' relates to the Global Code of Ethics for Tourism (see UNWTO, nd), in particular to Article 7 'right to travel' and Article 8 'liberty of tourist movement'.

Concentration of tourism (as opposed to dispersion) can be measured in several ways. Here, two approaches are taken. First, concentration is analysed at the country-level, and second it is examined by looking at the busiest airports around the world. By tracking whether the world's top 10 airports (both in terms of origin or destination of travel) are changing over time, as well as getting relatively more or less dominant it is possible to detect possible trends of dispersion.

Three indicators will track whether global tourism concentrates towards fewer dominating source markets and recipient destinations, or whether it diversifies to include more departures from a wider range of countries and arrivals to a broader range of destinations.

- Economic indicator Ec3: Share of Top 10 outbound expenditure: All outbound expenditure
- Economic indicator Ec4: Share of Top 10 receiving countries export earnings: All inbound export earnings
- Economic indicator Ec5: Share of Top 10 world's busiest airports (passenger arrivals plus departures): All air passengers

Data source and analysis:

For most countries, the reason for promoting their tourism industry is to earn revenue, and similar to the Ec1 indicator related to developing countries, Ec3 and 4 focus on visitor export earnings. Assessing the dependency of outbound expenditure on a small number of countries, namely the top 10 markets, highlights the risks associated with a lack of diversification. In addition, tracking the Top 10 receiving countries shows who is benefitting most from 'global tourism'. The source of data for share of the indicators Ec3 and Ec4 is the WTTC economic data.

To identify the busiest airports in terms of departures and arrivals, the Amadeus booking database was used. Thus, to track EC5, passenger numbers at departing and arriving airports were added up for each month of 2015. Transit travel was not included as the focus here is on where people travel from (origin) and where they want to go as their final destination. The data in the Amadeus database combine domestic and international travel. The share is obtained by comparing the Top 10 busiest airports with the sum of all passengers in 2015.

Findings:

The share of the Top 10 outbound countries of total global tourism expenditure in 2015 was 56%. Thus, over half of international tourism export activity is due to 10 countries. Figure 3 below highlights the dominance of China and the US for world outbound tourism spend. It is worth noting that seven of the top ten countries who spend the most on world tourism are

also the same countries in the top ten for the countries that earn the most from tourism. This means that a substantial share of global tourism activity occurs is reciprocated between a small number of countries.

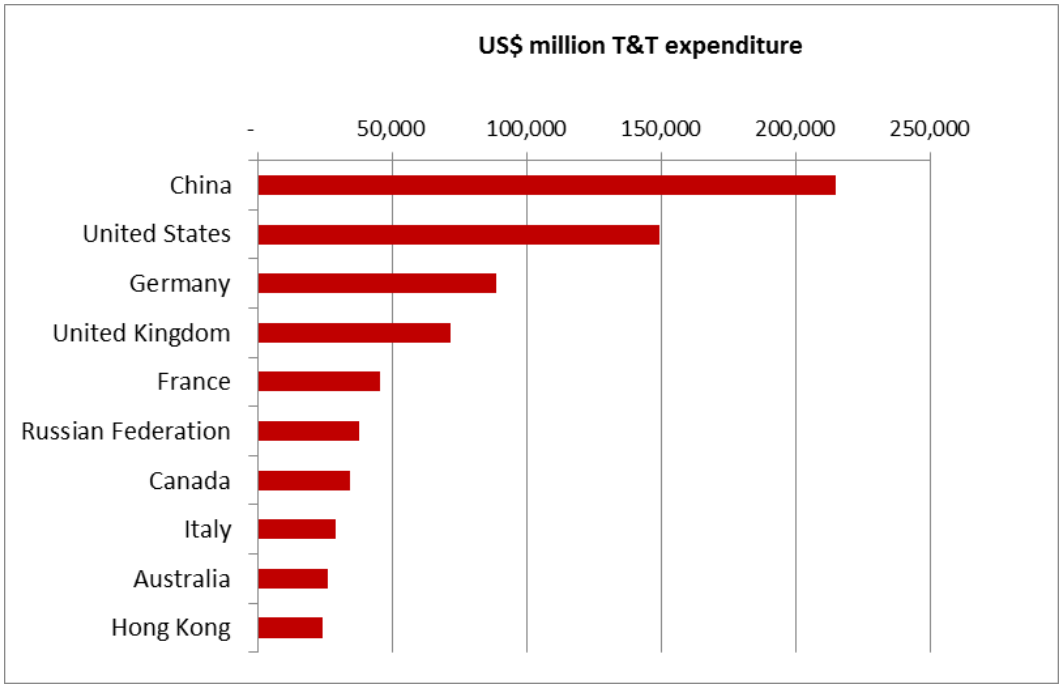

Figure 3. Economic indicator Ec3 showing the Top 10 countries in 2015 in terms of expenditure (Source: WTTC).

An analysis of data from 1995 to 2015 shows the persistent overall dominance by the Top 10 countries in terms of the world's outbound expenditure (between 52 and 58%), even though the composition varies slightly. The long-term pattern indicates that the concentration of outbound expenditure has declined between 2000 and 2010 to reach a low point of about 52%. Of note is the effect of the 2008 economic crash and the reducing overall share of the top 10.

China's role within the top 10 is particularly noteworthy. China does not feature in the top 10 in 1995, is 9th in 2000, 7th in 2005, 4th in 2010 and 1st in 2015 – growing 347% between 2010 and 2015. Owing to China's significant growth, the share of Top 10 outbound expenditure compared with all expenditure has increased in recent years.

In terms of tourism receiving countries, the Top 10 destinations accumulate 48% of global tourism expenditure. Thus, half of the economic impact concentrates in about 10 countries. More specifically, Figure 4 shows the top 10 countries that earned the most from foreign visitor spending in 2015. The data demonstrate the heavy concentration of benefit received by the US, with China and Spain in second and third.

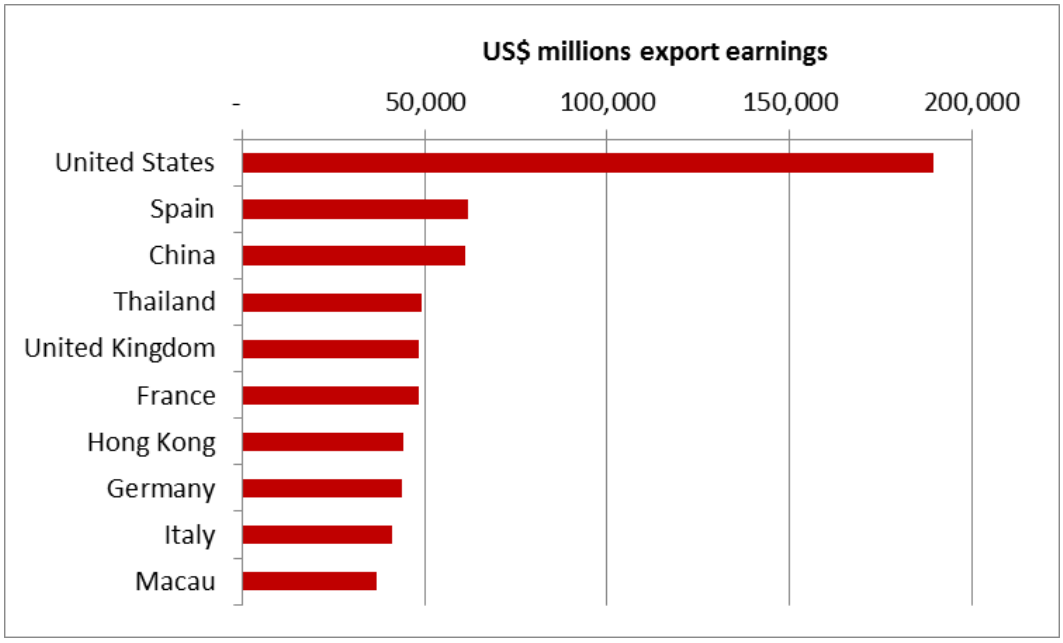

Figure 4. Economic indicator Ec4 representing the Top 10 countries in terms of visitor export earnings (Source: WTTC).

The world's busiest airports in 2015 are shown in Table 2 below. The share of Top 10 airports relative to all passenger volumes is 18%. Four of the Top 10 airports are in China, with Hong Kong being a fifth. Beijing airport alone accounts for 2.7% of passengers, just measured on arrivals and departures and not counting transit passengers. A monthly analysis shows the stronger seasonality of London, Los Angeles and New York airports, highlighting a clear summer peak in July and August.

Table 2. Economic indicator Ec5: Departures and Arrivals at the Top 10 airports (Source: Amadeus)

	Departures	Arrivals	TOTAL	Share of global passengers
Beijing Capital International Airport	38,010,832	38,310,846	76,321,678	2.7%
Tokyo International Airport	31,549,844	31,883,191	63,433,035	2.2%
Los Angeles International Airport	26,543,690	26,597,013	53,140,702	1.9%
London Heathrow	25,377,436	25,572,168	50,949,604	1.8%
Chongqing Jiangbei International Airport	24,761,587	25,101,186	49,862,773	1.7%
Hong Kong International Airport	23,268,259	23,387,970	46,656,229	1.6%
Guangzhou Baiyun International Airport	22,951,394	23,100,705	46,052,099	1.6%
Dubai International Airport	21,745,262	21,732,174	43,477,436	1.5%
Shanghai Pudong International Airport	21,308,218	21,329,420	42,637,639	1.5%
New York John F. Kennedy	21,236,797	21,392,579	42,629,376	1.5%
All Top 10	**256,753,319**	**258,407,252**	**515,160,571**	**18.0%**

4. Environmental dimensions and measures

4.1. Hotel resource use

Rationale:

Tourist accommodation contributes about 21% to tourism's global greenhouse gas emissions (Scott et al., 2008) and as such is an important aspect of the sector that needs to improve energy and carbon efficiency. Increasingly, tourism is also recognised for its high demand for freshwater and calls for systematic monitoring and reporting of water footprints have become more widespread (Becken et al., 2014). In addition, and in particular in sensitive environments, tourism can contribute substantially to waste generation. Reducing waste in tourist accommodation brings also co-benefits for energy use, carbon dioxide (CO_2) emissions and water quality.

Energy, CO_2, water and waste can be measured both per guest night and per room. Both measures will be tracked in the Dashboard. Importantly, improving resource efficiency in tourist accommodation will result in decreasing resource inputs and outputs per guest night or guest room, indicating relative achievements. In addition, however, it is crucial that the industry reduces absolute resource use and generation of waste products. The initial focus is on hotel accommodation as the largest sub-sector within tourist accommodation more broadly, and also due to its relatively higher resource intensity compared with other forms of accommodation (e.g. campgrounds) (Becken et al., 2001).

The indicators associated with resource use align with the SDG 6 "Ensure availability and sustainable management of water and sanitation for all", 7 "Ensure access to affordable, reliable, sustainable, and modern energy for all", 12 "Ensure sustainable consumption and production patterns" and 12 "Take urgent action to combat climate change and its impacts". They also support the 10YFP program by UNEP and UNWTO.

- Environmental indicator Env1: Annual improvement in energy use per guest night
- Environmental indicator Env2: Annual improvement in CO_2 emissions per guest night
- Environmental indicator Env3: Annual improvement in water use per guest night
- Environmental indicator Env4: Annual improvement in waste production per guest night
- Environmental indicator Env5: CO_2 emissions per hotel room and year
- Environmental indicator Env6: Total global hotel CO_2 emissions per year

Data sources and analysis:

Data stem from the EarthCheck certification scheme, which is based on Agenda 21 principles and recognised by global frameworks such as the CDP (formerly the Carbon Disclosure Project). The EarthCheck Standard was one of the first programs to require operators to supply externally verified data on energy use, water consumption, and waste production, amongst other indicators. It is one of the longest-standing and most robust schemes that involve quantitative reporting, benchmarking and auditing (Font, 2002).

EarthCheck provided access to their resource database; in particular resource use data for business hotels (N= 526), vacation hotels (N= 295), and hotel villas (N= 55). The resulting sample of hotels is not representative of all hotels in these three categories globally, as it represents a group of generally larger businesses that have demonstrated environmental leadership and commitment to ongoing improvement. The indicators presented in the Dashboard therefore reflect the progress made by sustainability leaders and should be interpreted as a better-case scenario.

To calculate improvement rates data from businesses that have been a member of EarthCheck for more than one year were analysed. To assess a percentage improvement in efficiency for any of the four indicators, the previous year's data point was divided by the more recent year's data point. Thus, reporting an energy efficiency of 100 megajoules per guest night in 2015, compared with 110 megajoules in 2014, represents an efficiency gain of 10%. Medians were used to minimize the influence of unusually high values. Carbon emissions in the EarthCheck database represent CO_2-equivalent; that is they include the impact of non-CO_2 greenhouse gases.

In addition to EarthCheck data, the Dashboard draws on carbon emissions that were measured by using the International Tourism Partnership's Hotel Carbon Measurement Tool. Based on the HCMT methodology, Greenview in partnership with Cornell University developed an online tool to provide hotel benchmarks and footprints for the travel industry. The Cornell Hotel Sustainability Benchmarking study is a global benchmarking index published annually through the Cornell Center for Hospitality Research, with support of leading hotel companies including Diamond Resorts, Hilton, Hongkong & Shanghai Hotels, Host Hotels & Resorts, Hyatt, IHG, Mandarin Oriental, Marriott, Park Hotels, Saunders Hotel Group, and Wyndham. The 2014 data are the most recent data supplied through the Footprinting tool. Information from over 5,000 hotels on energy use, floor area and occupancy rates was supplemented with Greenview data provided in partnership with Horwath HTL Asia. Data were tested for validity, and results are published online by geographic location, market segment, and climate zone.

For the Global Sustainable Tourism Dashboard, the median values for each country's carbon emissions per room per year were extrapolated to total room supply in each country where available. This procedure was able to capture over 75% of the global hotel supply, and the remainder was estimated based on the other available data to arrive at global figures.

Findings:

Improvements in resource efficiency of leading hotels are in the order of several percent per annum (Figure 5). In particular, carbon and waste improvements tracked between 4-6% in 2012 to 2014. Recent gains have been more modest and water use per guest night has increased on average by 3% per guest night. Note that in a given year multiple factors could lead to above- or below-average improvements, including economic conditions and climatic factors. Note that hotels also benefit from reductions in carbon intensity of grid-supplied electricity.

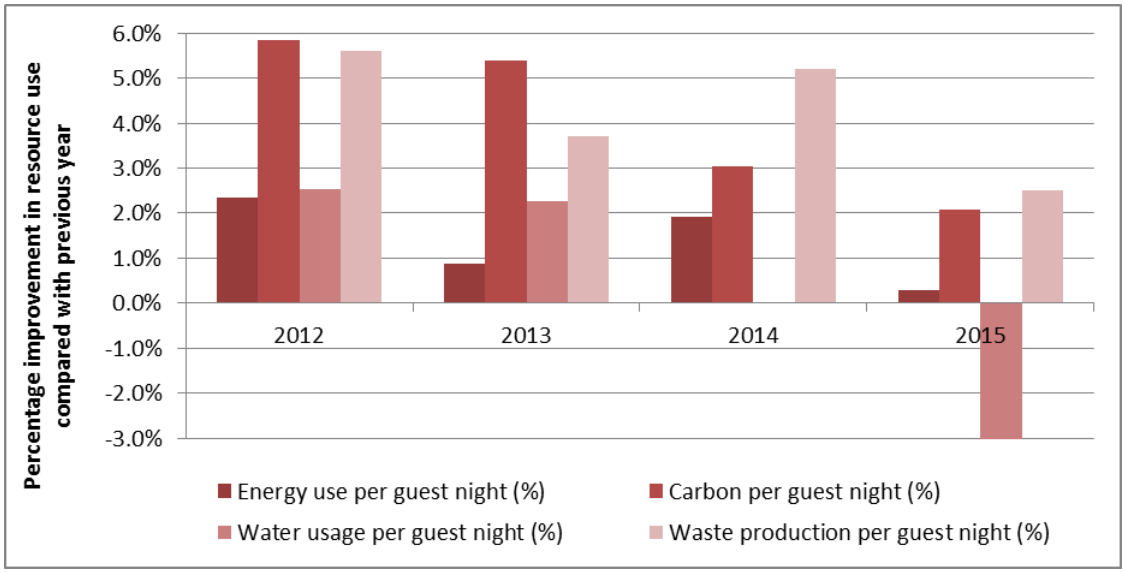

Figure 5. Environmental indicators Env1, 2, 3 and 4: Resource efficiency improvements in the hotel sector (Source: EarthCheck).

The data collected using ITP's Hotel Carbon Measurement Tool are only available for 2014. Based on the data provided by hotels and hotel chains across a wide range countries, it can be estimated that the CO2-equivalent emissions per room and per year are 8,056 kg. On an intensity basis, and compared with earlier data, carbon emissions per room are decreasing and will continue to decrease as they are largely dependent on external power grid emission factors. However, due to the projected growth in tourism, absolute emissions from hotels are likely to increase over time.

Assuming full occupancy, and extrapolating to the global hotel room stock, the total emissions from hotels in 2014 were in the order of 150.2 Mt of CO_2-e. The global estimate is largely driven by China and the USA, which collectively represent nearly half of the global hotel supply. For example, 2014 hotel emissions in China represented over a quarter of the global total. The median carbon intensity of hotel rooms in China was 12,508 kg of CO_2-e per room, 55% higher than the global average. This highlights that future changes in global hotel carbon emissions will be driven primarily by the performance of hotels in China, as well as by the carbon intensity of China's electricity sector.

4.2. Air travel carbon dioxide emissions

Rationale:

The aviation industry's emissions are significant, for example, its 2014 greenhouse gas emissions were estimated at 714 million tonnes in 2014 (Global Carbon Project, 2015) or around 2-3% of global GHG emissions. Considerable progress has been made in increasing fuel efficiency of aircraft. Based on data from 26,331 aircraft, Rutherford and Zeinali (2009), for example, estimated that the increase in efficiency of fuel burn between 1960 and 2008 was 51%.

Over the last 20 years, aircraft capacity measured in available seat-kilometre has grown by more than 25%. Air travel has doubled every 15 years and is forecast to continue to do so at an estimated rate of 4.7% per annum between 2012 and 2032 (Airbus, 2013). To meet this growth, the global fleet is expected to grow by 20,930 airplanes in 2032. Considering both growth and further improvements in efficiency, it has been estimated that fuel demand from aviation will continue to grow at a rate of around 2% (Chèze et al., 2011) per annum until 2025.

It is important, in particular with a view towards the pressing targets of carbon reduction agreed upon in the Paris Agreement, to monitor aviation's greenhouse gas emissions and ensure efficiency targets are on track. The need to reduce aviation emissions aligns with the SDG 12 "Take urgent action to combat climate change and its impacts".

Three indicators are useful. First, it is essential to track absolute emissions. Second, the average emissions per 'one-way journey' can be monitored to assess the combination of two effects, namely carbon efficiency of air travel and consumer choice in relation to route, carrier and distance. Thirdly, the average emissions per passenger-kilometre can be tracked as a measure of relative efficiency.

- Environmental indicator Env7: Total CO_2 produced by passenger air travel per annum
- Environmental indicator Env8: Average carbon footprint per 'journey'
- Environmental indicator Env9: Average carbon intensity, measured in CO_2 per passenger-kilometre

Data source and analysis:

The data stem from the Amadeus booking database in combination with ICAO emission factors that are specific to each airport-airport pair. Amadeus data constitute a combination of actual bookings (bookings through various Amadeus customers) and modelled data (to account for bookings made through other systems.

The database provides information on all idiosyncratic travel itineraries booked each month. The itinerary consists of an origin, up to two transit airports, and a destination. The sequence of this travel is referred to as a 'journey'. When the traveller returns a new journey starts (origin, transit, destination). Thus a return trip consists of two journeys.

Distances and specific greenhouse gas emission factors are provided for each airport pair (either for airports, or in some cases for cities when there are multiple airports). The factors stem from the ICAO emission database (ICAO, 2014). ICAO emissions factors are generally lower than factors provided through other tools (e.g. some carbon calculators) because they only include CO_2 and exclude any other greenhouse gases or altitude effects. Further, the factors apportion some of the emissions associated with a flight to freight, lowering per-passenger kilometre emissions. The ICAO data differentiate between booking classes, allowing an estimate of premium versus business class carbon footprints.

Findings:

The total CO_2 emissions from passenger air travel in 2015 were 566 Mt. Note, that this figure is lower than IATA's (2016) estimated CO_2 emissions for 2015 of 781 Mt. The difference is explained by the inclusion of freight-related emissions in the IATA figure, whereas the data presented here exclusively focus on emissions attributed to passenger travel. The difference is 27% which is in line with freight-to-passenger ratios (based on weight) suggested in the literature (see Howitt et al., 2011).

Figure 6 shows monthly variations and the relative contribution of booking classes. The peak of aviation emissions is in July and August due to higher passenger volume (19% of all passengers in 2015). Further, whilst premium class (first and business class) only comprise 5% of all passengers, the related carbon footprint is 10%. This highlights the relatively higher emissions associated with premium travel.

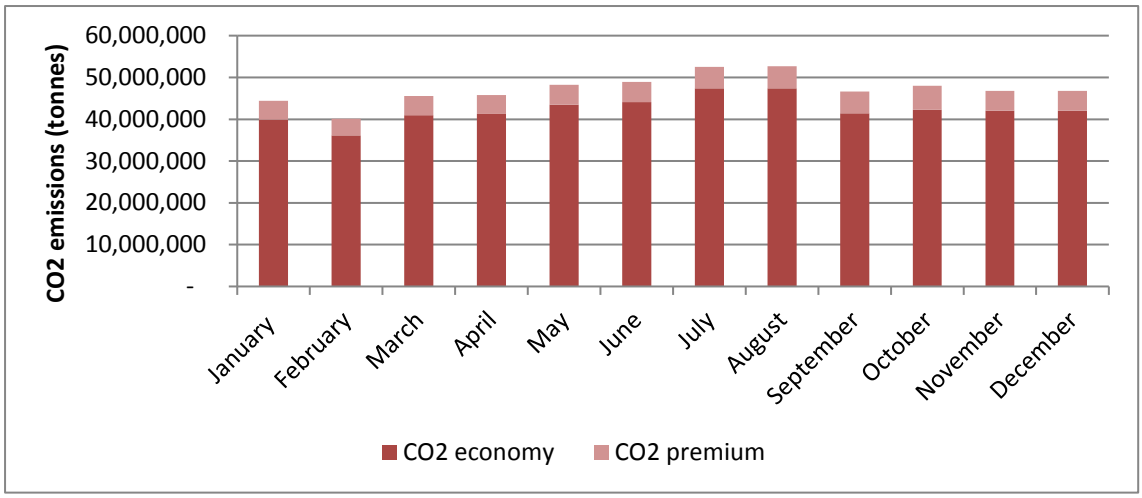

Figure 6. Environmental indicator Env7, showing CO_2 emissions from passenger air travel by month and booking class (Source: Amadeus).

The average one-way journey produces 187 kg in economy class and 365 kg of CO_2 emissions in premium class. Note, that the typical trip involves two journeys, so these values have to be doubled. Minor variations can be observed throughout the year with a peak in October (Figure 7).

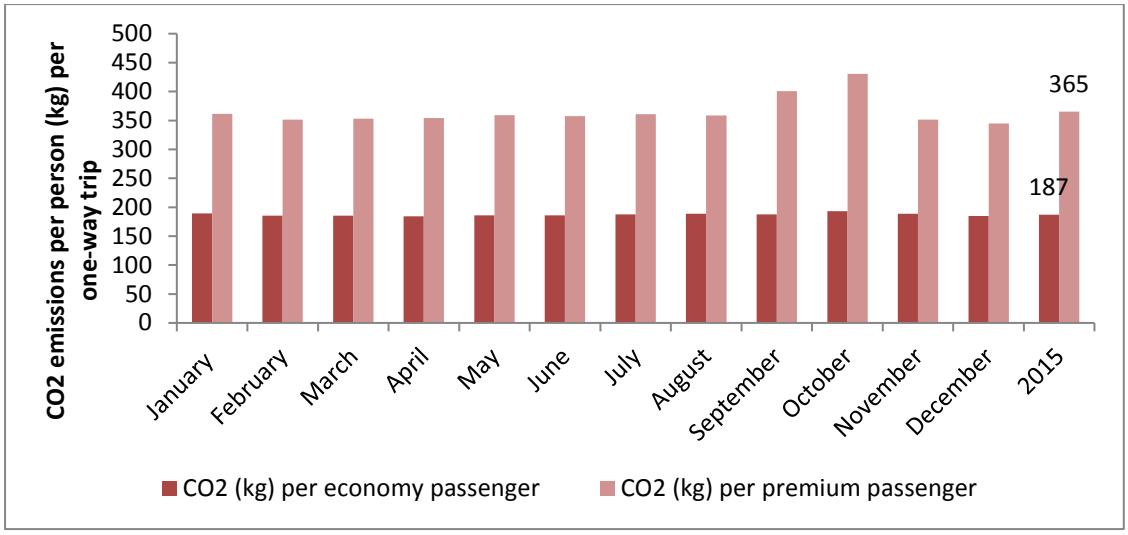

Figure 7. Environmental indicator Env8: Air travel emissions per journey (Source: Amadeus).

The average carbon intensity of all flights (Env 9) was 0.9 kg of CO_2 per passenger kilometre. This is very low compared with some values reported in the literature, but can be explained given the ICAO methodology of deriving airport-airport pair factors that exclude freight and do not include non-CO_2 emissions. To illustrate the variation, Table 3 shows emission factors for the most frequently travelled air routes in August 2015.

Table 3. Illustration of passenger volumes and emission factors for busiest routes in August 2015 (Source: Amadeus)

Route	Passengers	CO_2 emissions per passenger in economy class (kg)	Distance	kg CO_2/pkm
Seoul – Jeju	1,176,486	69.3	451	0.15
Tokyo - Sapporo	803,406	101.9	820	0.12
Tokyo - Fukuoka	666,319	103.5	881	0.12
Sydney - Melbourne	590,002	89.0	705	0.13
Peking - Shanghai	546,495	107.5	1,077	0.10
Hong Kong - Taipei	516,677	90.2	804	0.11

4.3. Natural World Heritage Areas – Tourism management

Rationale:

Natural World Heritage sites are globally recognized as the world's most important protected areas. With a total coverage of 279 million hectares these account for more than 8% of the combined surface covered by protected areas (International Union for Conservation of Nature, 2014). Tourism in natural areas, and in World Heritage sites in particular, can be a driving force and important mechanism for conservation, but only if adequate management strategies are in place. Tourism to World Heritage Areas is growing and there is increasing recognition of the need to manage visitors.

More recently, UNESCO has begun to more systematically consider tourism planning, monitoring and sustainable management in their international frameworks. The goal is to develop approaches that assist managers to protect the heritage whilst facilitating sustainable tourism and economic development outcomes (UNESCO, nd). The indicator therefore aligns with UNESCO's World Heritage – Sustainable Tourism (WH-ST) program. It also supports SDG 15 "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss". The protection of marine areas relates to SDG 14 "Conserve and sustainably use the oceans, seas and marine resources for sustainable development"

- Environmental indicator Env10: Share of natural/mixed World Heritage Areas with a Tourism Strategy or Management Plan.

Data source and analysis:

There is no existing database that contains tourism-relevant information on natural or mixed World Heritage Areas. Thus, based on UNESCO's list of sites a web search determined which of the 229 natural and mixed World Heritage Areas have stand-alone tourism management plans or cover tourism within their general management plans. Locating plans was difficult as over two-thirds of the sites are located in countries where English is not an official language; however Google Translate was used to search in multiple languages including languages such as Arabic that do not use the ISO basic Latin alphabet.

Once located, the research determined the type of tourism management strategy used for each site and the extent of planning for tourism within the stand-alone tourism or general management plans. Translation programs were used to read plans in languages other than English. An Excel database was created with the above information provided for each of the 229 areas, including weblinks to the relevant plans and strategies.

Findings:

As at April 2016 we have identified 229 natural and mixed World Heritage Areas in 97 countries. Of these, just 12 sites, 6%, have a current stand-alone tourism management plan, with one additional site having an out of date stand-alone tourism plan and a further 9 claiming to have a stand-alone plan that could not be verified (Figure 8). Just 68 sites (30%) have an extensive level of planning for tourism. This includes both stand-alone tourism management plans as well as general management plans that cover tourism management extensively. Of the 18 sites listed as 'in danger', only one has an extensive level of tourism management. It is worth noting, however, that these figures are based on management plans that could be found online, and it is possible that some sites have adequate tourism or general management plans that are not online or could not be located.

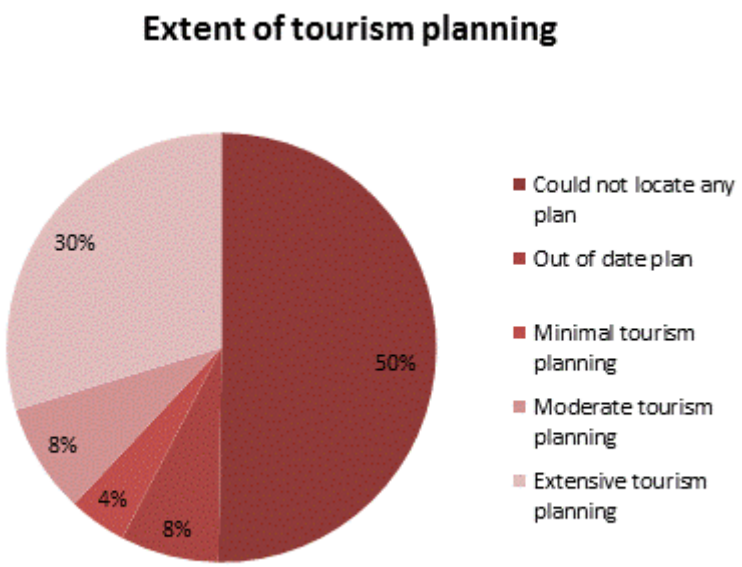

Figure 8. Environmental indicator Env10 showing World Heritage Areas and their tourism planning (Source: web-based search).

5. Social dimensions and measures

5.1. Gender equity

Rationale:

Gender inequality is often deeply rooted: in many countries women have limited or no access to land, capital and education. In addition, often women work at home or within a family business which means they have limited protection by law. Women often have to reconcile work and family demands. As a result, women are often in less paid positions, engage in undeclared or part-time work, and may face discrimination at the workplace (Baum, 2013).

It is now widely understood that gender equality is a key component of achieving greater sustainability. Providing opportunities for employment and development is a potential area of strength for Travel and Tourism. As raised by the group 'Equality in Tourism' (see http://equalityintourism.org/), growth in international exports from tourism does not necessarily benefit women and that "without a rigorous gender analysis in the thinking, development, practice and evaluation of tourism, women will continue to be exploited". Tourism can present substantial opportunities for female employment and equity, and monitoring will ensure that both employers and policy-makers can follow progress made and identify ongoing issues.

In tourism, it seems that the gender gap in terms of general employment is closing, but inequity in leading positions persists. Reporting on gender issues related to tourism executive management in the Southern Africa Development Community (SADC) countries, Nyaruwata and Nyaruwata (2013) conclude that only a minority of CEOs were female, and more gender mainstreaming policies are needed, for example dedicated executive management training programmes for female managers. The goal of gender equality relates closely with SDG 5 "Achieve gender equality and empower all women and girls".

- Soc1: Women in Travel and Tourism workforce : All employment in Travel and Tourism
- Soc2: Women in management positions in Travel and Tourism workforce : All employment in Travel and Tourism

Data sources and analysis:

Since there is no comprehensive data source for gender equity in tourism companies, it was decided to use information from those businesses that report through the Global Reporting Initiative (GRI). GRI reporting is voluntary and companies chose those indicators that are relevant or material to them. The reports are publicly available and information was retrieved from the GRI global database, disaggregated into three categories: a) Tourism & Leisure, b) Aviation, and c) Railroad. Note that reports of companies that were not directly related to travel and tourism were excluded (e.g. lotto companies in the leisure category, aircraft manufacturers in the aviation category, and engineering companies in the railroad industry).

Only reports that at a minimum reported total employment numbers were included, whereby the focus was on 2014 and 2015. For those 2014 reports that contained a comparison with 2013 data, these were recorded as well to obtain a sense of trend. The database developed for the purpose of the Dashboard contains 76 reports for 2013, 125 for 2014 and 20 for 2015. The 2015 number is expected to grow as companies submit their reports to the GRI. Of the 125 reports in 2014, 98 reported on their female employment and 53 specified the proportion of women in leading positions. Note that the definition of leading positions (executive, manager etc.) may differ for each company and the results should only been

seen as indicative). In 2015, the numbers were 18 reports for female employment and 10 for management positions held by females. Since it is of interest to the industry, the proportion of employees under 30 is reported here, but since the numbers of reports are relatively small (38 in 2014 and 7 in 2015) youth employment is not included as a formal indicator at this stage.

To obtain an indication of female employment in the Travel and Tourism industries, the proportion of female workforce was weighted by the number of employees in the company. Thus, larger companies will influence the outcome more than smaller ones. In 2014, a total of 3,928,909 employees were captured through the Travel and Tourism relevant GRI reports (note that not all companies report on each relevant indicator). The number for 2015 at this point is 375,742. For the proportion of female managers, an average across all companies was taken, and the data were not weighted by employment. The reason for this was that female contribution in leading positions is interpreted as a principle that applies to big and small companies in the same way, and the total number of female managers is less relevant.

Findings:

The results for 2013, 2014 and 2015 show that the share of female employees across all three travel-related GRI categories is increasing. In 2014, the year with the largest dataset, the proportion of female employment weighted by company size was 37.5%. In addition, the average share of women in management positions in 2014 was 28.5% (Figure 9). The trend here is slightly downwards, but this could change as more reports are being submitted. Youth employment in 2014, weighted by company size was 13.2%, but note that the sample size is very small.

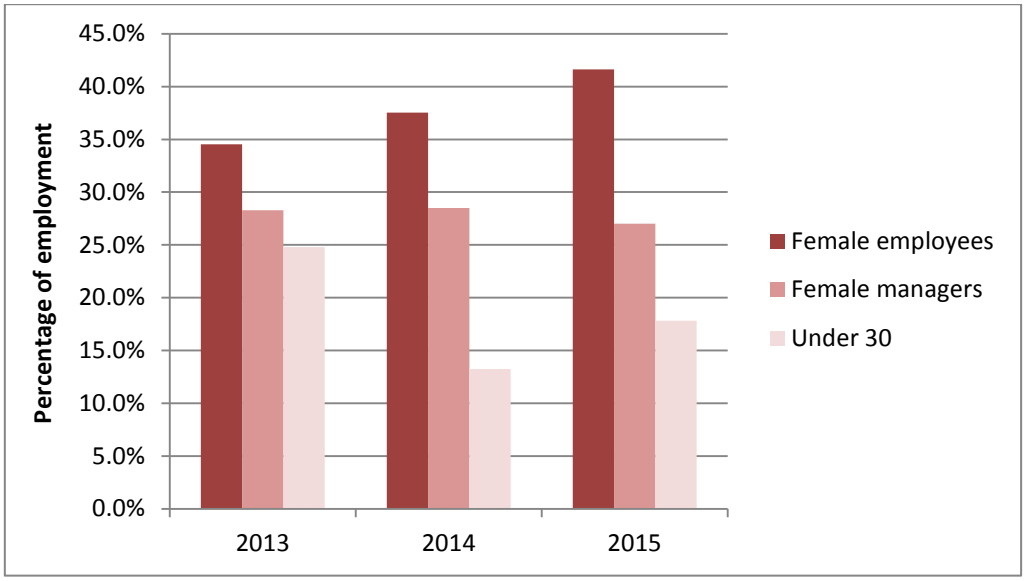

Figure 9. Social indicators Soc 1 and Soc 2 showing gender equity in Travel and Tourism companies that report to the GRI (Source: individual GRI reports).

It is interesting to compare female employment between the three selected GRI categories, namely tourism/leisure, aviation and railroad. Table 4 summarises the sector proportions pooled across the years 2013-15 (to obtain larger sample sizes). It can be seen, that the tourism sector has the most favourable split for female and male employment, with railroad having the lowest proportion of female workers, but a slightly higher proportion of women in management roles.

Table 4. Female employment by GRI category (Source: individual GRI reports, 2013, 2014 and 2015)

	Female employment (%)	Female managers (%)
Tourism	49%	32.4
Aviation	39%	22.8
Railroad	19%	25.7

5.2. Safety

Rationale:

Promoting peaceful and inclusive societies for sustainable development is at the core of SDG 16. Safety and security are essential ingredients of tourism, with research showing quite clearly that risk perceptions influence destination image and choice. Risk in this context relates to perceptions of probabilities and adverse outcomes of particular tourism activities, services or events. Destinations that are perceived as unsafe have been found to be associated with a lower likelihood of visitation compared with those that are believed to be safe (Reisinger & Mavondo, 2006). The risk of conflict and terrorism has attracted particular attention, in particular in response to several high-profile and tourist-focused attacks in recent times.

To examine whether the risk of being affected by a terror attack has increased for international tourists, the number of fatalities relative to international arrivals is estimated to generate the social indicator Soc3.

- Soc3: Terror-related fatalities in tourism-relevant targets: International arrivals

Data sources and analysis:

Data are drawn from the Global Terrorism Database (GTD) developed and maintained by the University of Maryland (National Consortium for the Study of Terrorism and Responses to Terrorism (START), 2016). The GTD is a comprehensive and methodologically robust set of longitudinal data on incidents of domestic and international terrorism. The database is updated frequently and data were available to analyse trends up to 2016. Incidents recorded in the database correspond to the following definition of terrorism: "*the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation*". More detail on the methodology can be found here: https://www.start.umd.edu/gtd/using-gtd/.

For the purpose of the Dashboard, data were used for the time period between 1995 and 2015. Further, it was decided to focus on fatalities (rather than other incidents such as kidnapping) and only include those numbers killed that related to the following target subtypes:

- Tourists: Specifically including tour buses, tourists, or “tours”. Tourists in this context here are persons who travel primarily for the purposes of leisure or amusement. Government tourist offices are included in this value. The attack must clearly target tourists, not just an assault on a business or transportation system used by tourists.
- Businesses: Hotels and resorts, and travel agencies are coded as business sub-targets and included in the analysis. In addition, the sub-target of “Entertainment/Cultural/Stadium/Casino” was included as tourism-relevant.

- Airports, aircraft and airline officers: An attack that was carried out either against an aircraft or against an airport. Attacks against airline employees while on board are also included in this value.
- Private citizens: within this target the sub-targets of “Public Area (garden, parking lot, garage, beach, public building, camp)” and “Vehicles/Transportation” were included as tourism-relevant. Thirdly, due to a considerable travel component attached to special events, the sub-target of “Procession/Gathering (funeral, wedding, birthday, religious)” was included.
- Transportation: not all transportation is relevant, but taxis, buses and bus stations, subways, and trains, tracks and train stations were considered as tourism-relevant sub-targets.
- Maritime targets: Includes civilian maritime and attacks against fishing ships, oil tankers, ferries, yachts.

Findings:

In 2015, a total of 38,430 people lost their lives as a result of terrorism. Based on the above defined tourism relevant sub-targets, there were 1,662 fatalities that either directly involved tourists or events and locations that are frequented by tourists (Figure 10). When only considering air travel related fatalities, the total number in 2015 was 238. Terror-related killings at tourist hotels, on tourist tours or targets at tourists directly amounted to 222.

When compared with the number of international arrivals in 2015, the probability of being killed in a terror attack was 1.4 chances in a million (Soc3). This was up from 0.5 in a million in 2005. Note that the risk of terror attack is highly concentrated in a relatively small number of countries.

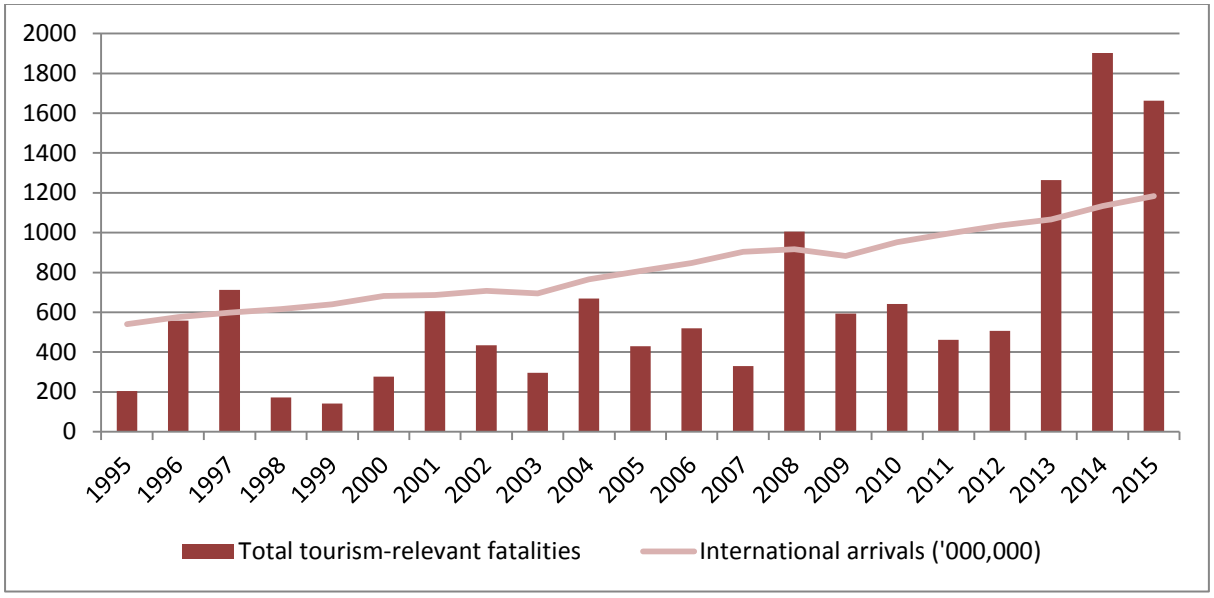

Figure 10. Tourism-relevant fatalities through terrorism compared with international arrivals (Source: GTD database from the University of Maryland).

6. Summary and future directions

The Global Sustainable Tourism Dashboard is the first of its kind. It will help monitor key dimensions of sustainable tourism in addition to existing tracking mechanisms.

As with all monitoring systems, the use of indicators has limitations. The indicators are only as good as the data that used to create them. Careful selection of data sources for the Dashboard, with consultation of key stakeholders, aimed to minimise this problem; however there are still inaccuracies and variations associated with all of the indicators. These have been communicated in a transparent way, and future improvements are expected. Indeed, it is hoped that this Dashboard initiative highlights to tourism organisations and business the benefit of collecting robust data and aggregating to generate sector-wide insights that inform everyone's decision making.

Not all indicators are equally robust and comprehensive, and some are based on data with a high resolution (e.g. the airline booking data) and others are built on limited data sets that are only updated once per year (e.g. the GRI employment equity data). Over time it is hoped that better mechanisms can be found to measure the identified sustainability dimensions in ways that provide high resolution, both in terms of geographic coverage and as a time series. Avenues to explore big data, for example social media text or other online data, are currently being explored by the research team to provide tracking mechanisms that are in real-time rather than time-lagged. Some areas of sustainability, however, will only change slowly (e.g. development and poverty alleviation), and real time data are less relevant in those cases.

It is important to remember that indicators measure a certain aspect of tourism, for example tourism expenditure, which does not always translate into desired outcomes. In other words, increased tourism exports in Least Developing Countries or Small Island Developing States does not automatically translate into community benefits, employment, gender equity, and sustainable development more broadly. Adequate policies and sound tourism management are necessary to turn the opportunity into positive outcomes. Thus, the indicator is exactly that – an indicator, but not evidence of a goal achieved.

The Dashboard is evolving and discussions with stakeholders have already revealed the need to measure tourism's progress in terms of safety and security, resilience (e.g. to extreme weather events), contribution to maintaining or supporting traditional cultures, and biodiversity – to name a few. The research team is currently working on identifying suitable partners and datasets for these areas. Some data could specifically be collected for the Dashboard, for example training provide to tourism employees or customer demand for sustainable tourism products.

An extension of the Dashboard also means inclusion of sectors that are not captured to date, for example the cruise ship industry, land transport, tourist attractions (e.g. theme parks) and so forth. The more comprehensive the Dashboard is the greater its value will be to the Travel and Tourism sector.

Finally, and in recognition of other existing frameworks and initiatives on tourism monitoring and indicator development, it seems useful to consider how the Dashboard can connect to other accounting systems, for example at the destination level (e.g. EarthCheck destination benchmarks). The indicators presented here could be used as a high-level guidance, or global benchmark, to then collect national or local data of a similar kind. Destination-based data collected in a consistent way across many destinations could be used to generate an aggregate global indicator. The research team is keen to explore future avenues of collaboration and extension and is keen to hear from researchers with comments and suggestions.

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