

REGIONAL ECONOMIC EFFECT OF COASTAL AND MARITIME TOURISM IN DENMARK

Documentation of the Danish Coastal Tourism Model
(DCTM)

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Title:

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Abstract

Coastal and maritime tourism in Denmark accounts for 37% of the total tourism revenue. This document seeks to investigate the importance of the coastal and maritime tourism in Denmark, while meeting the requirements from the EU Commission. The analysis of the coastal and maritime tourism is challenging at a national level due to the lack of available data within this area. To face these challenges, the Danish Coastal Tourism Model (DCTM) has been established. DCTM is an input-output model, which uses quantitative economic methods to enlighten the relationship between coastal and maritime activities, employment, and sectors at a municipality, as well as at a national level.

The analysis of this paper shows that the regional and socioeconomic effects of coastal and maritime tourism have a significant impact especially for the local areas in the outskirts of west and north Jutland, as well as south and north of Zealand and Bornholm. In these localities tourism is one of the main economic contributors for production of coastal oriented tourism goods and services and for the local labour market.

The RTSA structure of the Danish Coastal Tourism Model shows that foreign coastal and maritime tourism is mainly concentrated at the western coast of Jutland, while the domestic tourism is more spread out. Especially, a large share of domestic coastal and maritime tourism is observed mainly at popular cottage areas i.e. north Zealand, the west coast of Jutland and Lolland-Falster (south-east). From the supply side we find that 35.8% of the Danish population is resident within the coastal area, and that the commercial accommodation sector creates 41.7% of their primary income within the coastal area.

The direct effects and derived effects of the coastal and maritime tourism at a local level are calculated with the SAM-K/LINE® model. The coastal and maritime tourism provides 22,766 fulltime jobs and 9,972 million DKK in gross value added directly to the Danish economy and contributes to the 11,399 million DKK in total to the tax revenue. The direct effects of the coastal and maritime tourism lead to positive multiplier, which indicates spillover effects both, geographically, and across the economic activities. Based on the SAM-K/LINE® model and DCTM, the coastal and maritime tourism creates indirectly 0.43 additional jobs for every single fulltime job in the sector and indirectly adds value of 0.65 million DKK for every single million DKK value added created in the sector.

In the EU's Blue Growth strategy, the coastal and maritime tourism sector has been identified as an area with special potential for growth. This might lead to an increasing role of the coastal and tourism activities in socioeconomic development of the seaside localities effect of the coastal and maritime tourism in the future. This calls for further investments in the coastal and maritime tourism sector.

1. Introduction

Europe is a maritime continent with a long coastline stretching from the Arctic to the Mediterranean and from the Atlantic Sea to the Black Sea. Coastal and maritime tourism is one of the largest and most important sectors of tourism in Europe, employing over 3.2 million people and generating a total of 183 billion Euros in gross value added. In Europe 51% of the bed capacity in hotels is concentrated in the regions with sea borders.¹

As a part of EU's Blue Growth strategy, the coastal and maritime tourism has been identified as an area with special potential to foster a smart, sustainable and inclusive growth in Europe. The coastal and maritime tourism sector is expected to grow by 2-3% by 2020 in terms of gross value added and employment. The citizens in the EU countries increasingly become users of various coastal and maritime activities, and the demand for these activities intend to grow. The EU Commission focuses on the growth in coastal and maritime tourism, for example:

“The European strategy for more growth and jobs in coastal and maritime tourism focuses on capturing the job and growth potential of this prosperous sector by promoting skills and innovation, strengthening sustainability, maximizing available EU funding and mainstreaming EU policies affecting coastal and maritime tourism. The strategy also provides for a number of actions to be undertaken in the field of nautical tourism (NT): 1) qualifications of professional yacht skippers and recreational boating; 2) safety equipment for nautical tourism; 3) waste prevention, management and marine litter and 4) innovation for marina development.”

European Commission, 2017

Coastal and maritime tourism in Denmark accounts for a large share of the tourism revenue. This document investigates the importance of the coastal and maritime tourism in Danish localities, while meeting the requirement from the EU Commission. However, it is challenging to analyse coastal and maritime tourism at a national level due to the lack of available data within this area. To face these challenges, the Danish Coastal Tourism Model (DCTM) has been established. DCTM is an input-output model, developed by Centre for Regional and Tourism Research, which uses quantitative economic methods to analyse the relationship between coastal and maritime activities, employment, and economic sectors at municipal and national levels.

¹ European Commission, Maritime Affairs,
https://ec.europa.eu/maritimeaffairs/policy/coastal_tourism_en

The **objectives** for this documentation are:

- To develop a precise definition of coastal and maritime tourism;
- To analyse the existing regulatory framework;
- To contribute with data for coastal and maritime tourism with DCTM;
- To analyse the local economic importance of coastal and maritime tourism in Danish coastal municipalities;

The EU Commission recognises that the coastal and maritime tourism in the future can become a potential driver of economic growth. An increase in the Danish coastal and maritime tourism will have a great impact on the local areas at the seaside, as well as contribution to the local returns. An increase in the local demand, due to an increase in the tourism revenue, might lead to job creation which especially will effect young people, since the majority of tourism workers are between 16 and 35 years old.

A prospective growth in coastal and maritime tourism activities will come with a variety of challenges and Denmark cannot adequately exploit the potential alone. It is therefore essential to address the cross-border challenges at EU level, by promoting strategic trans-regional and trans-national cooperation and best practice sharing. We hope that this analysis of coastal and maritime tourism in Denmark will fill in some gaps in this research area and add values to the European Blue Growth strategy.

1.1 Definition of coastal and maritime tourism

Coastal tourism activities are carried out within the coastal area and include all respective services. Coastal tourism is 'beach-based' activities, such as swimming, surfing, sunbathing, and other coastal recreation activities. The coastal area is defined as a 3 kilometre zone along the shoreline. Maritime tourism refers to 'sea-based' activities, such as boating, yachting, cruising, surfing, diving and other nautical sports involving the sea. Notice that some coastal and maritime tourism activities overlap with each other and therefore a complete separation is not possible. The coastal and maritime activities include services, such as tackle shops, hotels, restaurants, boat and equipment rentals, charter boats, and etc.

Coastal and maritime tourism is recreational and mainly for the purpose of leisure by nature, and therefore business tourism activities are omitted in this analysis. The coastal and maritime tourism is categorised by observing the activities that visitors and tourists made at different coastal destinations. All tourists who have conducted an activity connected with the coast or sea are defined as coastal and maritime tourists. By this definition, summer-cottage tourists (only those cottages that are situated in the coastal zone), cruise tourists and leisure yacht tourists are defined as coastal and maritime tourists, as their primary purpose is to stay at the beach-side or make activities at the sea. In Denmark 95% of summer cottages are located within 3 km distance to the sea. For other types of overnight tourists, the division is made in accordance with the activities they have made at the tourist destination.

Coastal and maritime tourism in Denmark is accountable for approximately one third of all tourism revenue in Denmark and has within recent years shown a growing trend according to Danish tourism statistics.

Since 2010, European Parliament stressed the role of the Blue Growth, and the coastal and maritime tourism became one of the five focus areas for delivering sustainable growth in income and jobs in the Blue Economy. EU Commission has encouraged the member countries, including Denmark, to promote the blue economic activities and take action to boost the coastal and maritime tourism sectors.

1.2 Challenges

According to World Travel & Tourism Council, the total contribution of travel and tourism to GDP has increased by 21.5% from 2012 to 2018.² A worldwide growth in demand for coastal and maritime tourism calls for an increase in the coastal investments in order to achieve even growth across the coastal areas of Europe. Some coastal localities are losing their comparative advantage due to many newly rising low-cost regions with high popularity among tourists. The increasing and changing tourism demand requires attractive and sustainable tourism services and products that provide unique and customized experiences in coastal regions.³

The challenges are identified as:

- Lack of investment and innovation in the coastal regions;
- Less competitiveness in the coastal regions;
- Less product development in face of increasing tourism demand;

2. Coastal and maritime regulations

This section describes current coastal and maritime regulations, to form a picture of development possibilities within the coastal and maritime tourism sector.

2.1 The spatial planning act in Denmark

Denmark has a simple and clear spatial planning system with a decentralized division of tasks. The municipal councils are responsible for comprehensive land-use regulation at the local levels with a legally binding guidelines for property owners. The municipal councils summarize their objectives and strategy for development in a municipal plan, which comprises a framework for detailed local plans and for processing individual cases according to the planning act. The regional councils

² World Travel & Tourism council, Travel and tourism economic impact 2018, world: <https://www.wttc.org/-/media/files/reports/economic-impact-research/regions-2018/world2018.pdf>

³ European Commission, A European strategy for more growth and jobs in coastal and maritime tourism. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2014:0086:FIN:EN:PDF>

prepare a strategic plan for spatial development in each region that captures the overall aspects of spatial development in a region.

The minister for Environment is responsible for upholding national interest through national planning by establishing a comprehensive framework for regional spatial development planning and municipal planning through national planning reports. The ministry ensures that the municipal planning complies with the overall national interest.

The Danish Coastal Authority is the official coastal government agency. The coastal authority is a division of the Danish environmental ministry and a part of the Danish nature agency. The coastal Authority is in charge of managing the governmental socio-economic interests within the field of coastal protection and covering Denmark's entire 8,750 km coastline. The regulatory tasks concerning coastal protection and the state territorial waters are carried out by means of analyses, project planning, construction, operation and warnings.

The purpose of coastal protection is to preserve the open shores and their natural values. The coastal areas are kept from construction and installations that do not need to be located near the shore. Within a designated coastal zone that is 3 km wide, land may only be transferred to an urban or rural zones if there is a specific planning-related or functional justification for development near the seaside. The local plan proposals that permit development in the coastal zone are required to illustrate visually how this development would affect the local environment.

Construction buildings within 300 meters off the shoreline has been prohibited in Denmark since 1994 under the legislation of nature protection.

In June 2017 the Danish Parliament decided to make legislative changes in The Nature Protection Act (NPA) in order to improve the conditions for outdoor life and tourism in coastal areas. The changes in legislation make it easier to carry out certain activities within the coastal zone. In addition, existing tourism companies are now allowed to set up smaller facilities for outdoor and tourist activities. This can provide growth in the maritime and coastal tourism sector in future.⁴

2.2 Maritime Spatial Planning (MSP)

The European Parliament and the council of the European Union established a framework for maritime spatial planning in Europe in July 2014. The aim is to reduce the intensive and uncoordinated exploitation of sea areas and to reduce conflicts between sectors engaged in maritime activities. MSP has created need for documentation and mapping of the Danish maritime and coastal oriented tourism sectors, as it is only mapped sectors allowed to participate in the program.

The Danish government adopted the "Act on Maritime Spatial planning", which contains provisions for implementing directive 2014/89/EU and establishing a

⁴ The Danish parliament, accepted legislative proposals;
https://www.ft.dk/ripdf/samling/20161/lovforslag/l121/20161_l121_som_vedtaget.pdf

framework for spatial planning in the Danish maritime and coastal areas. The spatial plan is expected to be in place within 2021.

The purpose of the MPS is to develop marine areas and the utilise of marine resources sustainably. With the adoption of the act, the Danish government recognized the need for a greater coordination between activities conducted in the maritime and coastal areas and between the ones who regulate these activities. The collaboration between the authorities and the maritime and coastal sectors have together established new joint incentives, which are the backbone of the coming MSP. The sectors that are to be included in the plan are: the energy sector, maritime transport, fishing and aquaculture, the extraction of raw materials and the preservation, protection and improvement of environment, military activities, cultural heritage. Municipal plans for use of coastal water will not be regulated by the MSP, but it will take these into account. The plan has a strong focus on economic growth within the coastal and maritime sectors.⁵

2.3 Integrated Coastal Management (ICM)

On March 2013, the European Commission adopted a new initiative on integrated coastal management (ICM). The aim is to create a long-term management tool to enhance the protection of coastal resources whilst increasing the efficiency of the use of resources. The ICM program coordinates different policies affecting the coastal zone and related activities such as nature protection, aquaculture, shipping, tourism and more. It will contribute to sustainable development of coastal zones by the application of an approach that respects the limit of natural resources and ecosystem.

Denmark has developed a coastal zone management strategy that is not formally in the Integrated Coastal Zone Management strategy. Instead, the Danish Parliament included the elements of ICM in the existing management process.⁶

2.4 Challenges with the coast and maritime regulation

The aim of the European directives MSP and ICM is to ensure future growth based on an ecosystem-based approach to planning. Stakeholders' active involvement is keen in the maritime spatial planning.

The potential gains in implementing MSP and ICM is to reduce an environmental impact. Through better planning of human activities in coastal and marine areas and an increased involvement of the population and stakeholders in MSP and ICM can create a strong policy environment for marine-based activities.

The directive has been formulated by the EU with minimum requirements for which sectors are to be included in MSP and ICM. The member states can include more sectors if they consider it relevant. MSP's minimums requirements involve the

⁵ European Commision, Maritime Spacial Planning, https://www.msp-platform.eu/sites/default/files/published_msp_for_blue_growth_study_0.pdf

⁶ Centre for Coastal zone Management and Coastal Shelter Belt, <http://iomervis.nic.in/index3.aspx?sslid=73&subsublinkid=14&langid=1&mid=1>

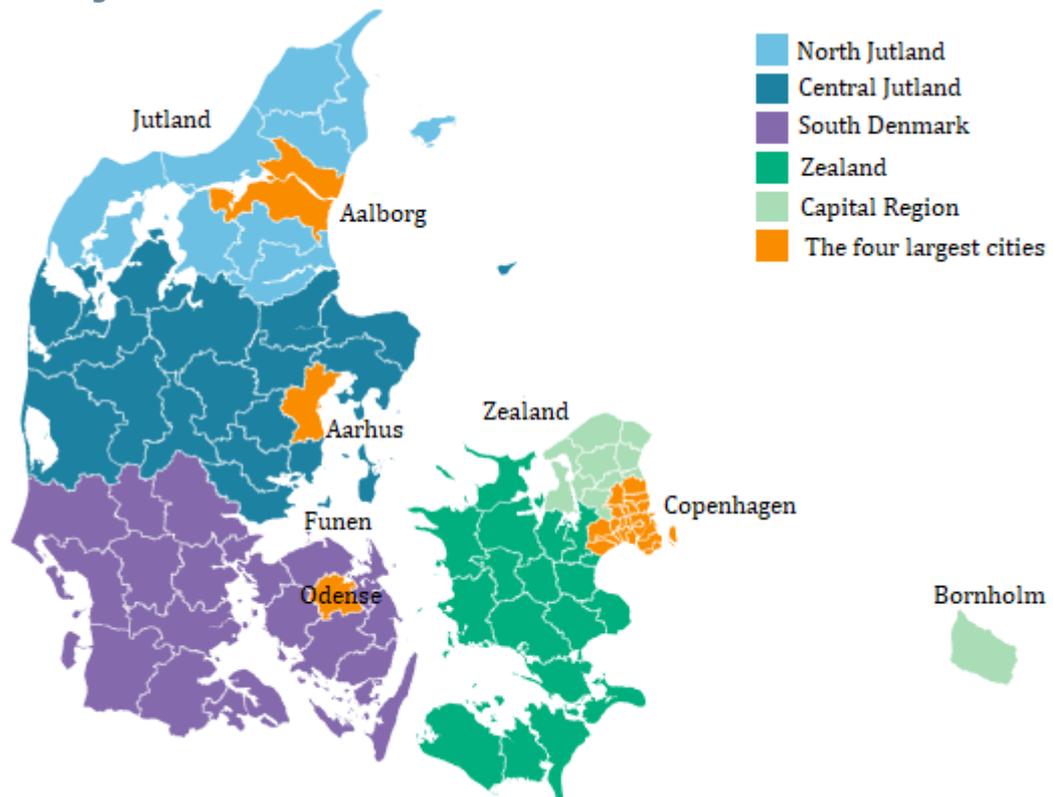
following activities: energy platforms, oil and gas extraction, shipping, underwater pipes and cables, fishing and aquaculture and nature conservation. Other sectors that use the sea are omitted. This applies for example maritime and coastal tourism.

The recent Danish legislative changes in the Nature Protection Act (NPA) improve the conditions for outdoor life and tourism in coastal areas. The national regulation in Denmark thereby includes maritime and coastal tourism as an important sector in MSP and ICM programs.

3. The regional administrative structure of Denmark

This document analyses the effects of coastal and maritime tourism at a municipal level. Figure 3.1 illustrates the local administrative structure of Denmark. Each of the five administrative regions is shown in different colours.

Figure 3.1: Regional structure of Denmark



Denmark borders Germany from the south-west and the Baltic and North seas along its 8,750 km shoreline. In Denmark, 78 out of a total of 98 administrative municipalities are defined as coastal municipalities and have coastal zone within 3 km from the seaside.

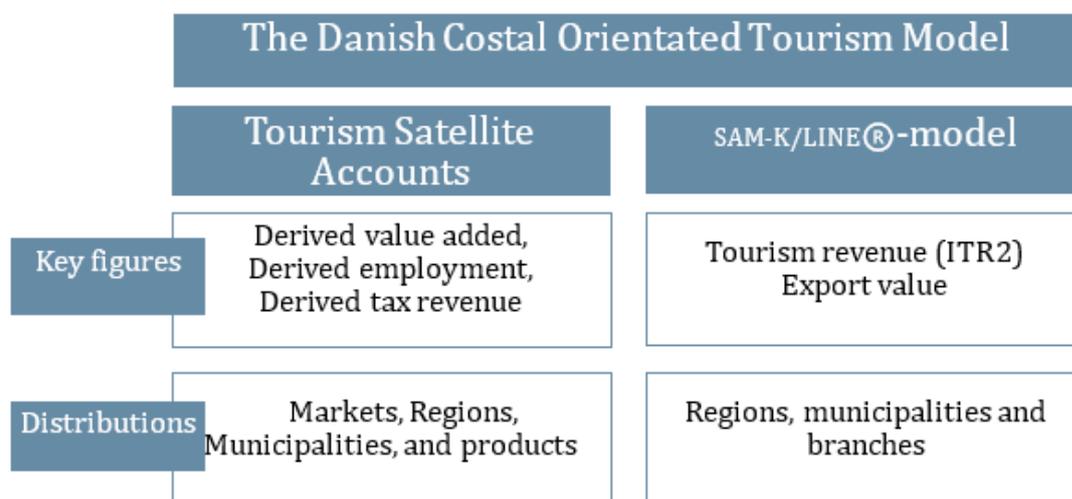
4. The Danish Coastal Tourism Model (DCTM)

The Danish Coastal Tourism Model (DCTM) is a special version of the LINE model, which is based on the Tourism Satellite Accounts and the SAM-K/LINE® developed by Centre for Regional and Tourism Research.

The DCTM specifies the total number of domestic and foreign coastal and maritime tourists, their consumption, and estimates income and employment effects generated by the coastal and maritime activities. This section presents a short description of the model and the methods.

Figure 4.1 gives an overview of the key figures from the DCTM that is based structurally on the Regional Tourism Satellite Accounts and the SAM-K/LINE® model.

Figure 4.1 The two-legged structure of DCTM



4.1 The Regional Tourism Satellite Account in Denmark (RTSA)

The Danish RTSA, developed by Centre for Regional and Tourism Research in collaboration with Visit Denmark, complies with the international recommendations for tourism satellite accounts from UNWTO, OECD and EUROSTAT. The Danish TSA are therefore comparable with TSAs from the other countries.

The Danish Regional Tourism Satellite Accountants meets the criteria for a regional tourism accounts (RTSA) as the accounts estimate tourism demand and supply, tourism contribution to regional economics including regional tourism GD and tourism employment. In order to secure its quality, RTSA is always in accordance with the National Accounts and national TSA.

The national accounts contain a number of input-output tables, which describe how transactions move between industries and sectors in Denmark. CRT's inter-regional macroeconomic model and the social account matrix of the municipalities (SAM-

K/LINE®) is used to create the regional and municipal distribution of TSA and the socioeconomic indicators, such as: employment, population and demography, primary income etc. (Madsen and Zhang, 2010; Zhang et al. 2007; Zhang and Hedetoft, 2011).

The RTSA combine and consolidate data from both demand and supply sides at the municipality. In the following sections both supply and demand for coastal and maritime tourism activities is mapped and explained. To ensure that the results from the tourism satellite accounts are in accordance with the official figures from the national accounts, the data from the supply side and the demand side are compared. Demand-side data are based on the tourist survey (TØBBE) that is collected by Visit Denmark in every three years and updated every year. Supply-side data, on the other hand, are based on the national accounts data that is constructed from the registry of economic activities every year. If there are any discrepancies, then the supply-data from the national accounts will be dominating as they are the highest quality data available.

For example, the tourists' total spending on hotels from the demand side is scaled down due to over-estimation by the demand-side data. The tourists' total expenditure (demand side) must not exceed the official total revenue of hotels which is known from the national accounts (supply side). If the demand side exceeds the supply side, then the estimated average daily consumption must be adjusted downwards.

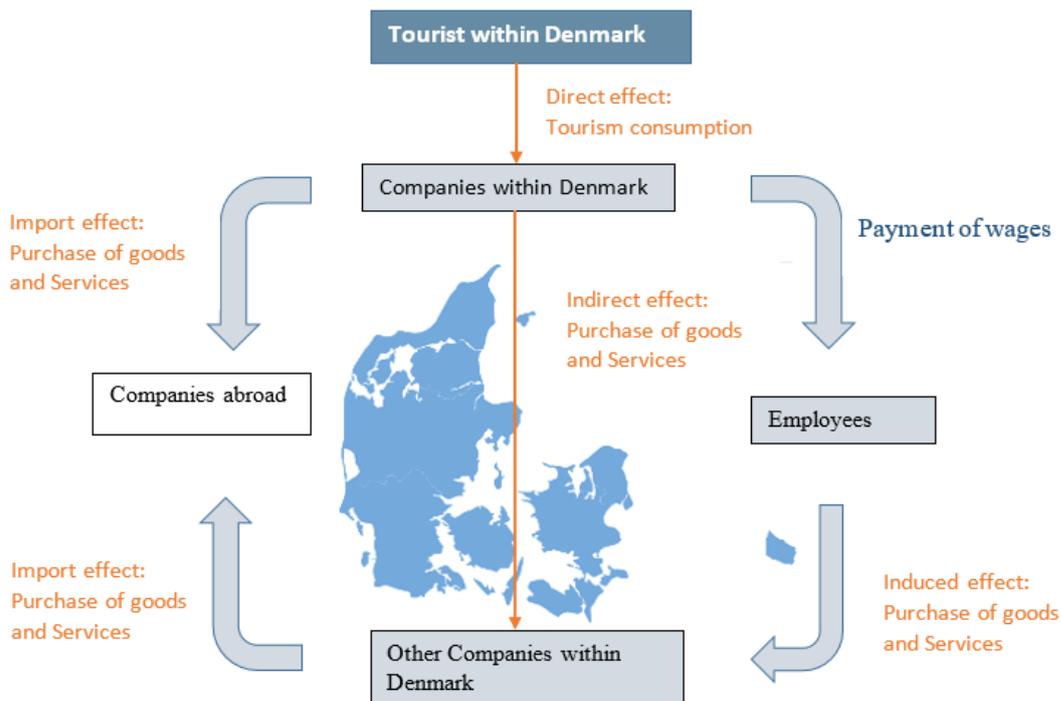
4.2 SAM-K/LINE® model

The derived effects of tourism are not a part of the satellite accounts, but they are derived by using CRT's SAM-K/LINE® model, which is the Local Inter-Regional Economic model based on an SAM (Social Accounts Matrix), Make and Use Matrices and general linear equilibrium frameworks. Therefore, the model is used to build RTSA and DCTM at the municipality level and also to calculate the direct-, indirect- and induced effects of the coastal and maritime tourism in Danish local and national economy (Figure 4.2).

The model calculates the direct and derived regional and socioeconomic effects of tourism consumption, including the isolated effects of maritime and coastal tourism. The direct effects are defined as the actual tourist spending on different commodities. The derived effects are sum of indirect and induced effects of tourism sector. Indirect effects are defined by the inter-sectoral linkages, i.e. the value created when companies trade with one another to meet the demand for commodities. Herby can companies and sectors, which are not directly linked to tourism, but have commodity trade to the tourism sectors, experience an increase in demand for their products and services. Induced effects are defined as the result of increased employment and wages due to the direct and indirect effects on the final demand. The companies pay wages to their employees, who might choose to use part of their wages for tourism consumption and contribute for the increasing demand for tourism products and services. The sum of the induced and the indirect

effects are referred to as the derived effects, which are used in the analyses. Some of the tourism revenue is used at imported goods and therefore part of the tourism revenue will disappear out of the Danish economy (Figure 4.2).

Figure 4.2 The direct, induced and indirect socioeconomic effects from tourism consumption.



Source: SAM-K/LINE®, Theoretical Framework (CRT)

The SAM-K/LINE® Model is applied to conduct general equilibrium between activities and employment within and between different sectors at a local, regional and national level. The input-output method is based on Wassily Leontief's theory, who was the first to use a matrix representation of a national economy. This method illustrates the inter-industrial relationships within an economy i.e. how production in one sector can effect on the final demand for other products and thereby employment in another sector. In the inter-industrial matrix, columns are input to an industrial sector and rows are output from a given sector. The format of the inter-industrial matrix therefore indicates the dependency between sectors. In the input-output matrix, columns represent the monetary value of each sector's input and the rows represent the monetary values of each sector's output. The format of the input-output model includes the final use of each product, which consists of private consumption, public consumption, investments and export (see works of Madsen, 2009; Madsen and Zhang, 2010; Madsen and Jensen-Butler, 2004; Madsen et al., 2002a; Madsen et al., 2002b, Zhang et al., 2007).

The Danish Coastal Tourism Model (DCTM) is a special version of the LINE Model. The purpose of setting up this model is to assess the local and national economic

value of coastal and maritime tourism at the municipality level. When there is extra demand from the coastal and maritime tourists, the exogenous demand will generate the local employment and income. The results from the model is presented in section 6.

5. Mapping supply of coastal and maritime activities at the municipality level

The supply side data originate primarily from the national accounts, as mentioned above, as series of input-output tables each year. These tables describe how transactions move between industries and sectors within Denmark. The regional and municipal distribution of figures within these input-output tables e.g. employment, population, primary income etc. is derived from CRT's SAM-K/LINE® model. The Danish Coastal Tourism Model has been constructed with the deliveries of special register data that can identify a series of variables between coastal and inland areas, i.e. how employment in different sectors is separated between the coastal zones or non-coastal zones, by identifying the economic activities using the addresses within the coastal (3 km) zone. Table 10.1.1 in appendix lists all data-inputs for building the DCTM.

The coastal area is defined as a three kilometre zone from the shoreline in all municipalities, except for the four largest cities in Denmark: Copenhagen, Aarhus, Aalborg and Odense, where the coastal area is defined as a one kilometre zone from the shoreline, due to diversified specialisation of economic activities and mixed-use of lands in larger urban areas. All economic figures within each municipality is divided between the coastal and inland area via its geographical location. i.e. if a household has its address within the coastal area, then it is considered a part of the coastal area's population. Likewise, if a company is located within the defined coastal area, then the fulltime jobs registered to that company are considered as a part of the coastal area's employment.

The following figures and tables provide maps for population, employment and commercial accommodations within the coastal zones of Denmark viewed from the supply side (i.e. tourism capacity). Commercial accommodation is defined as: hotels, hostels, camping sites and holiday centres.

5.1 Population in the coastal areas

Figure 5.1 shows the shares of population in the coastal areas. In particular, a large portion of the population lives in the coastal areas at Frederikshavn municipality (the very north part of Jutland) and on the smaller Danish islands. The table 5.1 shows 10 municipalities; the five largest and smallest shares of population that reside in the coastal areas. The five municipalities with the largest shares of residents within the coastal area are small municipalities with a relatively long coastal line. In these municipalities, the main town-centres are located within the coastal area. The five municipalities with the smallest shares of residents within the coastal area either have a small coastline, or is located without a direct access to

the coastline. If only a small part of the municipality is defined as coastal area, then a corresponding small population share is resident in this coastal area.

Figure 5.1 Share of population resided in the coastal area, by municipality (2016).

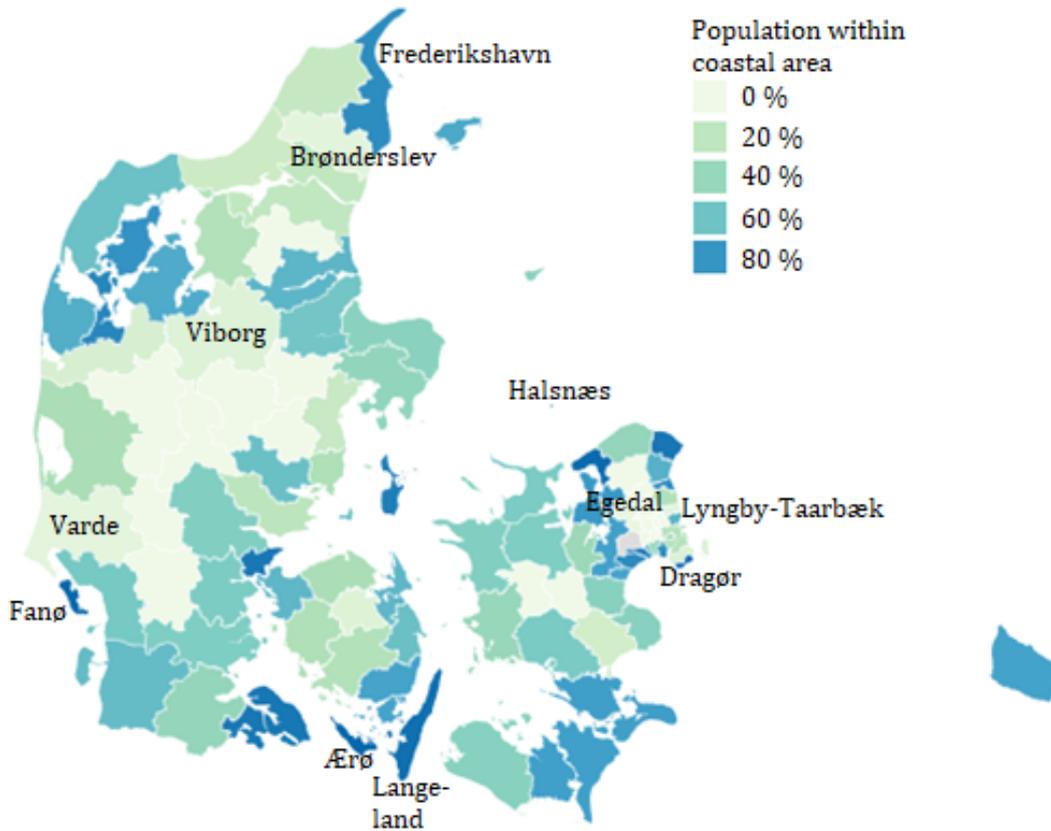


Table 5.1. Top five largest and smallest population shares (%) within the coastal area

	Population share within coastal area	Population share within inland area	Total population in the municipality
Ærø	99.5	0.5	6,190
Fanø	99.5	0.5	3,343
Dragør	99.4	0.6	14,280
Halsnæs	97.9	2.1	31,139
Langeland	95.9	4.0	12,567
Viborg	6.6	93.4	96,405
Brønderslev	4.7	95.3	36,122
Lyngby-Taarbæk	4.6	95.4	55,105
Varde	4.3	95.8	50,404
Egedal	2.4	97.6	43,064

Source: SAM-K/LINE @_COAST/RTSA18(CRT)

5.2 Employment in the coastal areas

Figure 5.2 illustrates the shares of the employment within the coastal areas in each municipality. The employment shares are calculated by full-time equivalent jobs i.e. at the place of production (i.e. workplace). When comparing the population share within the coastal area with the employment share within the coastal area a strong coherency appears. It means that if a large share of the population is resided in the coastal area, then a larger share of the total workforce is employed within the coastal area. It should be noted that the population share is in general larger than the employment share. Table 5.2 shows the top five largest and smallest employment shares within the coastal area. Some of the municipalities from table 5.1 reappear in table 5.2.

Figure 5.2 The employment share within the coastal area, by municipality (2016).

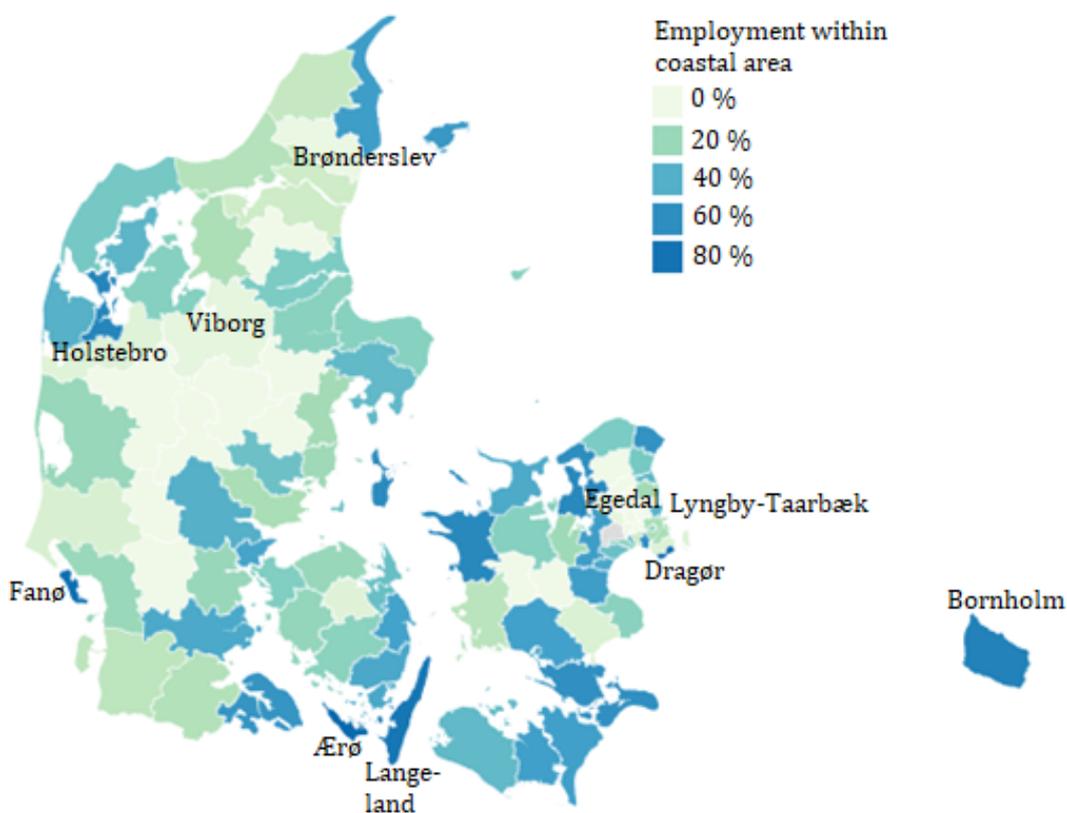


Table 5.2. Top five largest and smallest employment shares (%) within the coastal area.

	Employment share within coastal area	Employment share within inland area	Total employment in the municipality
Dragør	88.7	11.3	3,232
Ærø	86.9	13.1	2,322
Fanø	82.5	17.5	1,062
Langeland	77.5	22.5	4,453
Bornholm	68.9	31.2	16,979
Holstebro	3.6	96.4	30,186
Viborg	2.2	97.8	48,764
Egedal	2.0	98.0	11,623
Lyngby-Taarbæk	1.6	98.4	33,360
Brønderslev	1.2	98.8	13,047

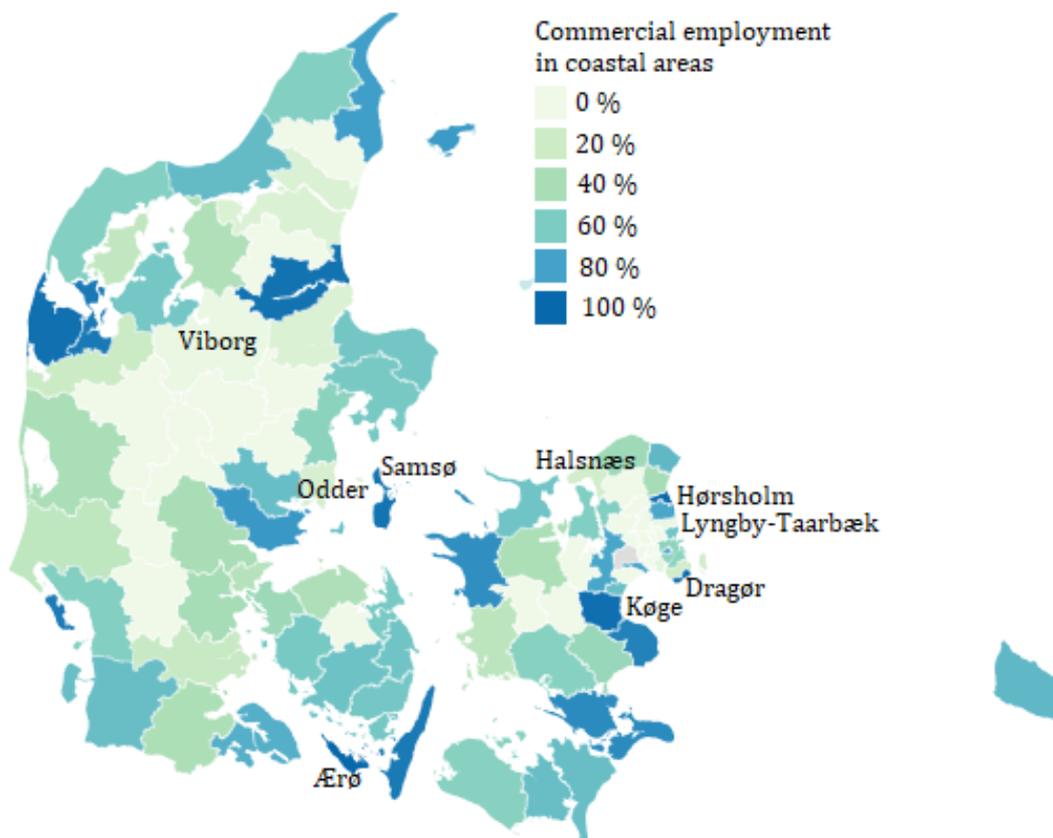
Source: SAM-K/LINE @_COAST/RTSA18(CRT)

5.3 Commercial accommodation in the coastal areas

The coastal employment at commercial accommodations serves as a good indicator at the supply side, because it indicates the bed capacity of the coastal and maritime tourism at a municipal level.

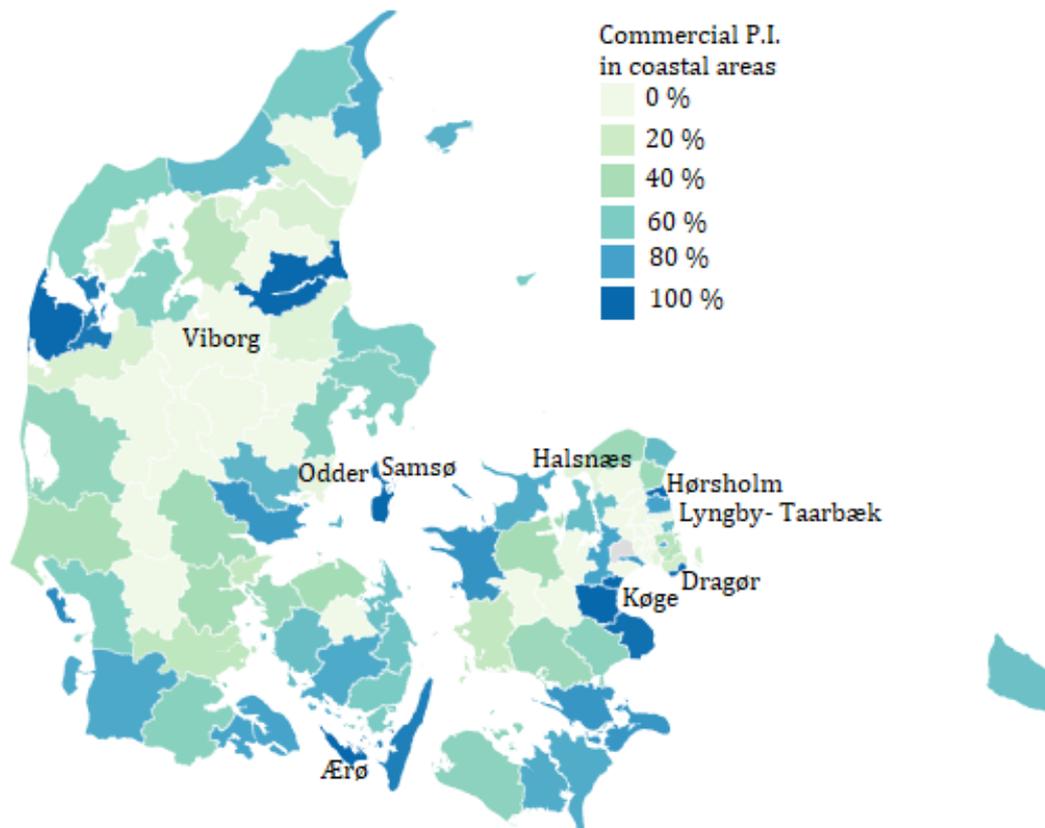
Figure 5.3 shows the shares of people working within the coastal area in commercial accommodations. The employment share in commercial accommodations is a key indicator for how much employment that is needed to serve the overnight tourists staying in the coastal areas. The commercial accommodations are defined as hotels, campsites, hostels and holiday centres.

Figure 5.3 The employment shares of commercial accommodation within the coastal area, by municipality (2016).



It should be noted, that a large employment share of commercial accommodation does not necessarily encounter a high density of maritime tourism within the municipality. It only indicates that a large share of the commercial accommodations is located within the coastal zone i.e. a small municipality only have one hotel in total, and this hotel is located within the coastal zone, all commercial accommodation employment is counted as coastal employment.

Figure 5.4 The shares of commercial accommodations primary income created in the coastal areas. By municipality (2016).



There is a consistency between the share of commercial accommodation employment and the share of primary income created by commercial accommodations in the coastal area. A larger share of employment indicates a greater coastal tourism supply in the municipality, which leads to a higher primary income for the commercial accommodations located within the coastal area.

Table 5.3 illustrates the municipalities with the five largest and smallest shares of commercial accommodation in primary income created in the coastal areas. The column to the far right shows the total primary income created by the commercial accommodations located in the coastal area.

Table 5.3. Top five largest and smallest shares (%) of primary income (P.I.) created within the coastal area by the commercial accommodations at a municipal level. The column to the far right shows the primary income created within the coastal area of commercial accommodations in million DKK.

	Commercial Accommodation P.I. share (%) created at coastal area	Commercial Accommodation P.I. share (%) created within inland area	Commercial Accommodation P.I. at coastal area (million DKK)
Hørsholm	100	0	18.59
Køge	100	0	15.94
Samsø	100	0	6.76
Ærø	100	0	5.99
Dragør	100	0	4.18
Halsnæs	9.1	90.9	0.18
Hvidovre	7.5	92.5	1.18
Odder	6.1	93.9	0.51
Lyngby-Taarbæk	2.4	97.6	0.59
Viborg	0.3	99.7	0.07

Source: SAM-K/LINE @_COAST/RTSA18(CRT)

The above table shows that commercial accommodation in some smaller and island type of municipalities is concentrated in the coastal areas; therefore, 100% of primary income is also created there.

6. Mapping demand of coastal and maritime activities at a municipal level

The demand-side data are used for analysing the coastal and maritime activities from the tourist point of view. Three data sources are applied to complement and create comprehensive database for demand of the coastal and maritime activities:

1. Tourist survey data collected by Visit Denmark (VDK), which is called TØBBE data.
2. Panel survey data on Blue Outdoor Activities in Denmark (in Danish "Blåt friluftsliv i Danmark")
3. A GIS-analysis of the locations of Danish cottages.

The panel survey and the GIS-analysis is conducted by the Institute of Geoscience and Nature Management (IGN) at the Copenhagen University.

In TØBBE survey, domestic and foreign tourists answer questions about which activities they have made at the tourist destinations. In the panel survey "Blue Outdoor Activities in Denmark", the Danish same-day visitors and tourist were asked to map all locations where they have attended an outdoor water activity

within the last year. The GIS-analysis provides data on how many Danish summer cottages located within the coastal zone in each coastal municipality.

In this study we consider 14 different types of accommodation: i.e. hotels (leisure and business), summer cottages (rented, borrowed or own use), camping, holiday centres, hostels, yachts, festivals, cruises, farm tourists, visiting family and friends and same-day visitors. The distribution key between coastal and maritime tourism and inland tourism is based on whether or not the tourist has attended maritime or coastal activities during their holidays, or had overnight stay in the coastal area.

6.1 Application of TØBBE data

If a tourist in TØBBE indicates that he/she have participated in a coastal-oriented activity during the vacation, then he/she is defined as a coastal and maritime tourist. The coastal-oriented activities are defined as; swimming in a lake or the sea, angling, boating, canoeing or kayaking, scuba diving and surfing. All tourists who stayed on a yacht or a cruise ship are defined as pure (100%) coastal and maritime tourists. Whereas all tourist who stayed at a hotel for business purpose, festivals and farms are defined as pure (100%) inland tourists.

In TØBBE, the measurement unit is the number of tourist bed nights, and the direct effect of tourism i.e. tourism revenue is assigned to the municipality where the accommodation is located. A limitation of this assumption is that municipalities with a greater attractiveness on overnight tourists will be underestimated in the analysis compare to the other municipalities.

The tourist average daily consumption is calculated on the basis of TØBBE data, and it is assumed to be the same for both inland and coastal tourists.

6.2 Application of IGN Panel data

The distribution between coastal and inland same-day visitors and tourist staying with friends and families have been collected in the panel survey "Blue Outdoor Activities in Denmark" by IGN. In the panel survey, the respondents were asked to map locations where they have performed an outdoor water activity within the last year. If the mapped location is placed within the mainland, then it will be disregarded in this analysis, as the Danish Coastal Tourism Model focus on maritime and coastal tourism. For all mapped locations the respondents were asked whether they had been using accommodations near the location.

If the respondents informed, that they had stayed at a family member or friends' property, then the respondent is defined as a coastal and maritime tourist staying with friends and families. If respondents cross the border of their resident municipality to perform a coast activity, and did not inform on any accommodation near the mapped location, then the respondent will be counted as a coastal and maritime same-day visitor. This definition implicates limitation that if a respondent had performed a coastal orientated activity within his resident municipality, but in another town within the municipality, then this respondent is not counted as a tourist, and therefore, it might underestimate the number of same-day visitors.

The direct effect of tourism is assigned to the municipality of the mapped location. Mapped locations on sea is transferred to the nearest municipality, as the municipality borders does not contain on the sea.

It should be noted that the measurement unit for the panel survey "Blue Outdoor Activities in Denmark" is a mapped location for preformed outdoor water activities within a year. One person can therefore map multiple locations for outdoor water activities during one year. In the DCTM one mapped location will be counted as one tourist. The alteration in the tourism definition between the IGN's panel survey and VDK's Tourism Survey has been necessary due to the differences in a data structure.

6.3 Application of GIS-analysis method

The GIS-analysis that estimates the share of cottages located within the coastal zone is conducted and delivered by IGN. The following three geo-data sets were used in the GIS analysis:

1. Denmark's Coastline (see SDFE: GeoDanmark. 2018);
2. Building points in Denmark (see BBR-Bygnings- og BoligRegister. 2016);
3. Denmark's municipal polygons (see GST: MiniMAKS. 2018).

These datasets are set together by a three kilometre coastal zone from the shoreline. The building positions from BBR is georeferenced as points in the data set, where the buildings referred to as summer cottages are identified. If a cottage is located within the coastal zone, then it is categorized as a coastal cottage, while all the summer cottages outside of zone are defined as the inland cottages. By using the municipal polygons, coastal and inland cottages are distributed between the municipalities.

In this document, all tourists, staying at cottages within the coastal zone are considered to be pure (100%) maritime and coastal tourists, as we assume that they will use the coast at least once during their stay, i.e. go for a beach walk, see the sunset, swim in the ocean, etc. It should be noted that the coastal zone differs from the coastal area in the supply section, where the four biggest cities in Denmark have a coastal area defined as a one kilometre zone distance from the shoreline. However, only a few summer cottages are located at the seaside near the four largest cities, and the deviation between the supply side and the demand side (the coastal zone) therefore have only a small impact on the analysis.

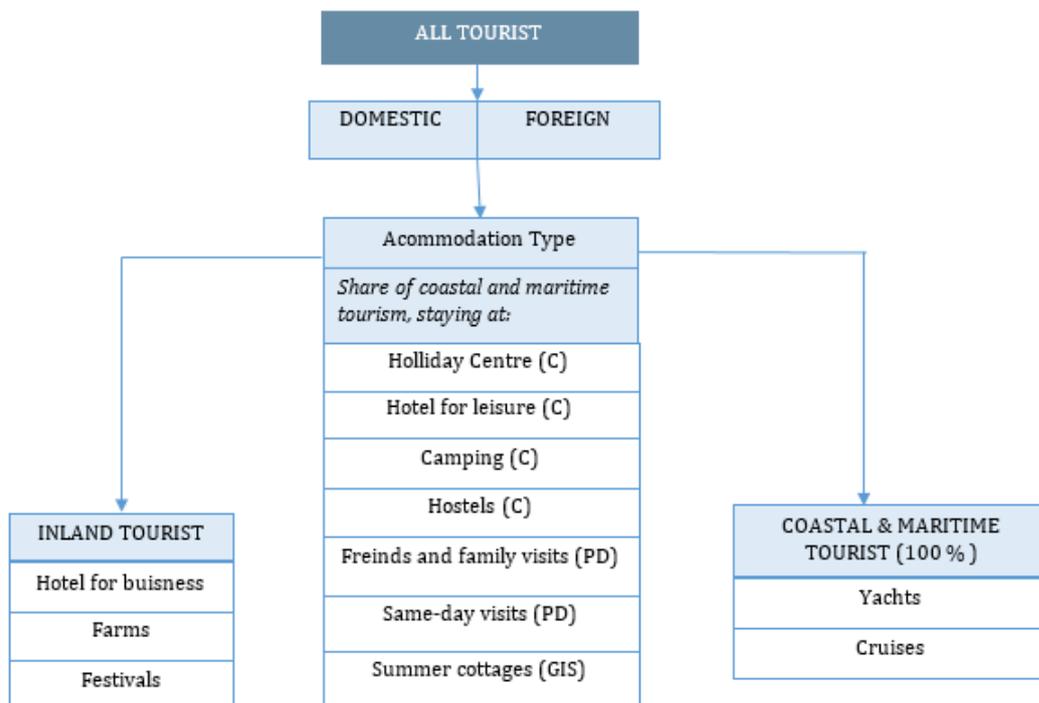
6.4 Summary of data construct and clustering method

There are 12,121 tourist interviews in TØBBE. The interviews have been carried out at different hotels, holiday centres, camping sites, hostels and summer cottages. More than 9,000 respondents were foreign tourist. The places of the interviews were chosen by Denmark Statistic, and the survey should be representative for all tourists in Denmark staying at these five types of accommodation at a municipal level. However, the further division of tourism between coastal and maritime tourism and inland tourism, lead to some categorising issues, as a relatively small

group of tourist have been questioned in some municipalities. This results in a skewed distribution between maritime and coastal tourism and inland tourism in some municipalities. To reach a more accurate distribution between coastal and maritime tourism and inland tourism, the K-mean clustering method is used. This method gives the opportunity to group data points (in this case municipalities with similar tourism traits). In this document we have chosen to work with three clusters controlled by geographical location (coastal municipality), tourism density (by inhabitant) and nationality.

Figure 6 shows an overview of how the distribution keys are created for coastal and maritime tourism and inland tourism based on types of accommodations.

Figure 6 Division of foreign and domestic tourism by coastal and maritime tourism and inland tourism



Source: Own methods and CRT database

6.4.1 Clustering Method

Firstly, only coastal municipalities have been selected. As explained above, the coastal area is defined as a three kilometre zone from the shoreline in all municipalities, except for the four largest cities in Denmark: Copenhagen, Aarhus, Aalborg and Odense, where the coastal area is defined as a one kilometre zone from the shoreline. With the use of this definition, 78 out of 98 municipalities have a coastal zone in Denmark. Secondly, the population in each municipality has been identified (2016 data). Thirdly, the estimated number of nights spent by tourists in each municipality is collected from RTSA. Then all data are merged in cross-section dataset. At last, total tourism density is calculated (= dividing the numbers of total

overnight stays by number of total population in each coastal municipality). And three density groups of municipalities are identified: high, medium and low tourism density groups.

The K-mean clustering method is used to compute the distance between the individual density and each 'group centre'. The individual density is classified to the group, which centre it is closest to. Based on the classified cluster groups, the 'group centres' is recomputed by taking the mean of all densities in the three groups. The difference between the individual densities and the new group centre is found, and the individual densities is classified into 3 new groups based on distance to the centre. This classification process is repeated until the 'group centre' does not change between iterations.

As the tourists' behavioural demand for coastal and maritime activities may differ depending on the nationality, and therefore the share of coastal and maritime tourism is calculated separately for domestic (Danish) tourist, European tourists and non-European tourists.

The tables in 10.1.3 (appendix) states the calculated distribution keys of coastal and maritime tourism based on the K-Mean Clustering Method, the GIS-Analysis, and the Panel Data survey.

6.5 Domestic tourists' demand for coastal and maritime activities

Figure 6.2 illustrates the shares of domestic coastal and maritime tourists at a municipality level. The figure shows that domestic coastal and maritime tourists have a tendency to spend their vacation in areas located at northern Zealand, Lolland-Falster and the western coast of Jutland. These areas are well known as popular areas for summer cottages. The table below shows five municipalities with the greatest and smallest shares of coastal and maritime tourism. The municipalities with the largest shares of coastal and maritime tourism is identified as being either an island or located at the bay areas. The bottom five municipalities are identified as having none or a considerably small coastline.

The column to the far right indicates the total number of domestic tourists within the municipality. The shares indicate the distribution between coastal and maritime tourists and inland tourists within the municipality.

Figure 6.2 The share of coastal and maritime domestic tourists, distributed by municipality.

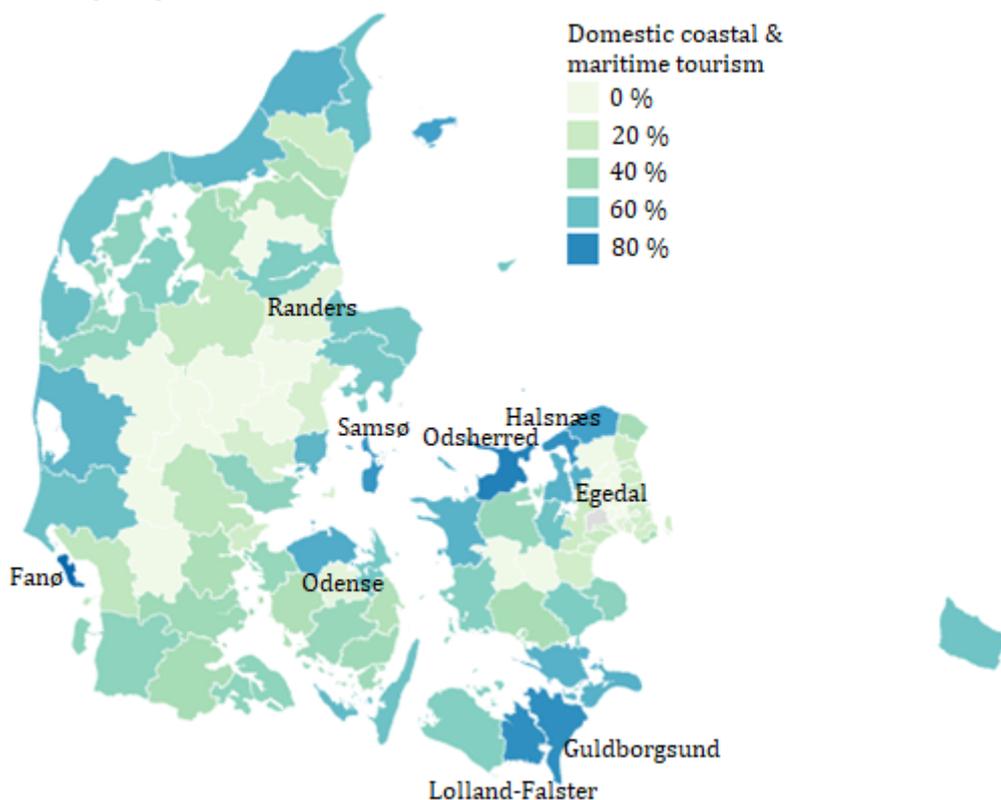


Table 6.2 Top five largest and smallest shares of domestic coastal and maritime tourists.

	Share of coastal tourists	Share of land tourists	Total number of domestic tourists
Fanø	90.04	9.96	51.65
Odsherred	82.21	17.79	716.86
Guldborgsund	78.21	21.79	389.16
Halsnæs	77.61	22.39	262.07
Samsø	75.77	24.23	42.57
Frederiksberg	9.24	90.76	782.79
Randers	8.15	91.85	638.63
Odense	7.67	92.33	1,444.53
Egedal	2.44	97.56	251.57
Vallensbæk	1.50	98.50	172.35

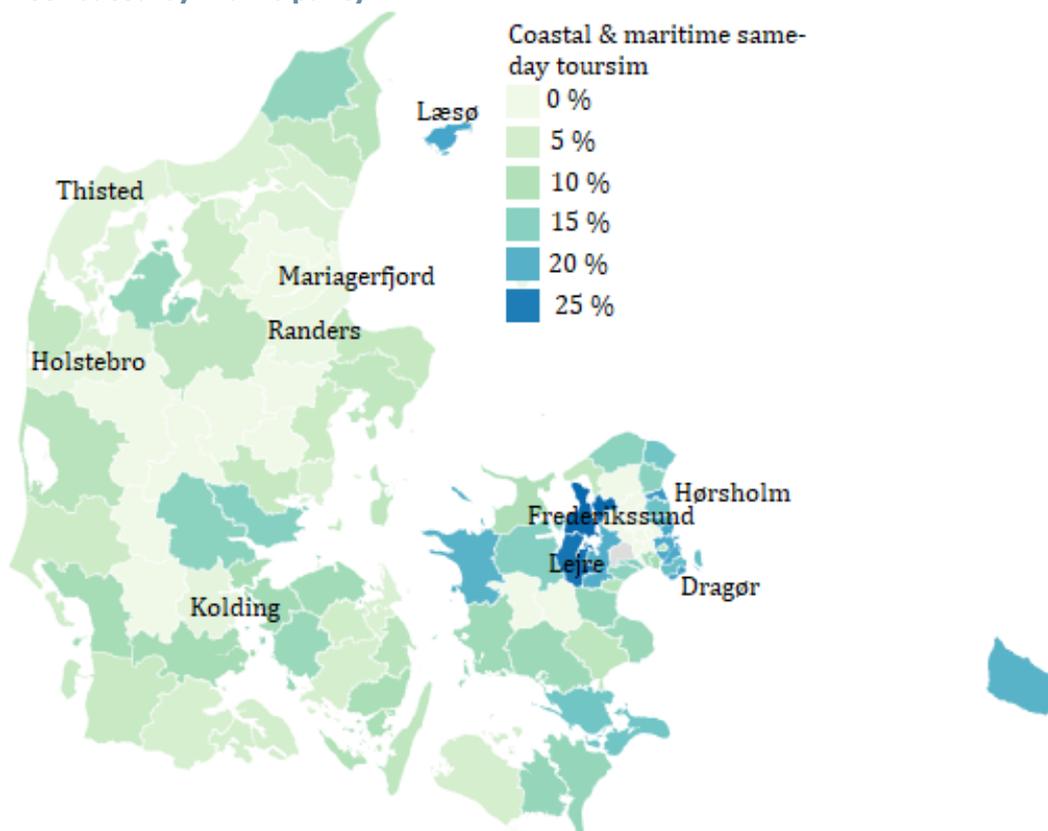
Source: SAM-K/LINE @_COAST/RTSA18(CRT)

6.6 Domestic same-day tourists' demand for coastal and maritime activities

Figure 6.2 shows that a domestic same-day tourist mainly visits the municipalities located at the northern Zealand close to the bay. This area is known for being highly fit for all kinds of water sports and fishing, which makes it a popular destination for the same-day visitors. Table 6.2 shows the top and bottom five municipalities compared on shares of domestic coastal and maritime same-day visitors. Top five municipalities are all located on Zealand close to the bay area. The bottom five municipalities located rather far from the shoreline.

As noted above, the share of domestic coastal and maritime same-day visitors may be underestimated. This is due to the definition of coastal same-day tourism used in the panel survey. If a person is resident in a coastal municipality, and this person serve a visit to the beach within his/her resident municipality, then this person will not be counted as a same-day visitor and will not be considered as tourist.

Figure 6.3 The share of domestic maritime and coastal same-day visitors. Distributed by municipality.



Source: SAM-K/LINE @_COAST/RTSA18(CRT)

Table 6.3 shows five municipalities with the largest and smallest share of domestic same-day coastal and maritime tourists.

	Share of coastal tourism	Share of land tourism	Total number of same-day tourists
Frederikssund	26.92	73.08	575.77
Lejre	25.81	74.19	258.33
Hørsholm	22.73	77.27	233.39
Dragør	22.22	77.78	141.01
Læsø	21.43	78.57	42.52
Thisted	3.25	96.75	340.82
Kolding	2.70	97.3	544.08
Holstebro	2.50	97.50	431.45
Randers	2.04	97.96	638.65
Mariagerfjord	1.43	98.57	349.95

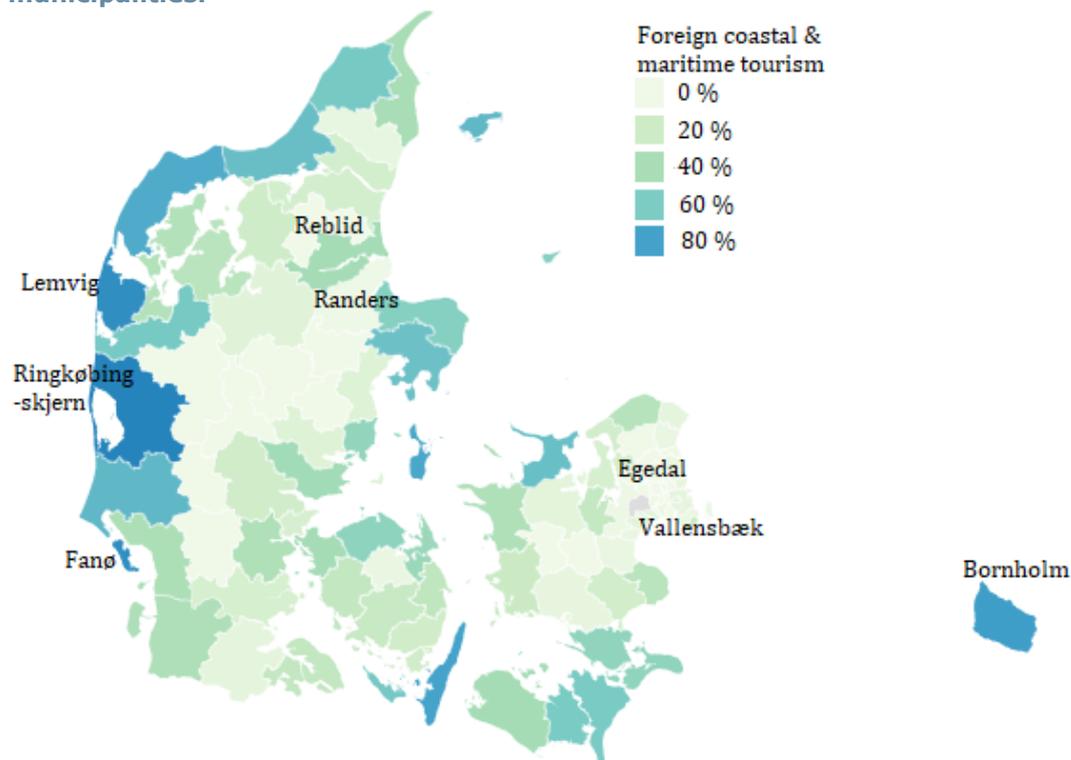
Source: SAM-K/LINE @_COAST/RTSA18(CRT)

6.7 Foreign tourists' demand for coastal activities

Figure 6.4 shows that the largest share of foreign coastal and maritime tourists in Denmark is located at the west coast of Jutland. A possible explanation is that the west coast is easily accessible to foreign tourists coming to Denmark by car from Germany or other close European countries. Table 6.3 indicates which municipalities are the most and least preferable for foreign coastal and maritime tourists. All the municipalities with the largest shares of foreign coastal and maritime tourists are located by the west coast of Jutland. The municipalities with the smallest shares of foreign coastal and maritime tourists are all located on Zealand.

When comparing figure 6.4 and 6.2, it is clearly illustrated obvious geographical patterns of preferences of domestic and foreign coast and maritime tourists. The domestic coastal and maritime tourists are more spread out and prefer the coastal areas of Zealand and western coast of Jutland. Whereby the foreign coastal and maritime tourists are mainly attracted to the destinations in western and northern coast of Jutland, as well as Bornholm, that is located in the Baltic Sea.

Figure 6.4 The share of coastal and maritime foreign tourist. Distributed by municipalities.



Source: SAM-K/LINE @_COAST/RTSA18(CRT)

Table 6.4: Top five largest and smallest shares of foreign coastal and maritime tourists.

	Share of coastal tourists	Share of inland tourists	Total number of foreign tourists
Christiansø	100	0	2.87
Ringkøbing-Skjern	90.32	9.68	3,427.67
Fanø	86.64	13.36	728.56
Lemvig	86.62	13.38	747.94
Bornholm	81.70	18.30	856.25
Randers	2.03	97.97	344.72
Hvidovre	0.71	99.29	364.52
Vallensbæk	0.21	99.79	79.69
Rebild	0.15	99.85	182.96
Egedal	0.02	99.98	305.83

Source: SAM-K/LINE @_COAST/RTSA18(CRT)

7. Economic effects of coastal and maritime Tourism

This section provides an analysis on the regional economic impact of the coastal and maritime tourism. The analysis is based on the feasibility study in the SAM-K/LINE® and Danish Coastal Tourism Model (DCTM). The model is used to calculate the economic value created by coastal and maritime tourism in the municipalities of Denmark.

After 10 iterations the model calculates equilibrium values and the spillover multipliers, which are used to identify, first, the direct effects of the coastal and maritime tourism in local and national economy, and second, the derived (or spillover) effects of coastal and maritime tourism geographically (inter-regional effects) and by sectoral (inter-industry effects). These multipliers are calculated by two methods: the 'technical multiplier' and 'tourism multiplier'.

When the coastal and maritime tourists spend money in one municipality, then the tourism expenditure firstly generates increase in gross output, income and employment locally, in this municipality. Afterwards through inter-regional economic linkages, the effects are derived to the other municipalities, due to inter-regional trade and commuting of the workforce. The initial change in tourism demand can therefore have a much greater final impact on the level of income, employment, etc., both in the given coastal municipality and nationally. The spillover effect is measured by the technical multiplier.

$$\text{Technical multiplier: } \frac{\text{Total effects}}{\text{Direct effects}}$$

The tourism multiplier, on the other hand, shows how income and employment are related to tourism consumption. In the other words, it calculates how many jobs the tourism revenue generates per each million Danish kroner. This measurement gives a direct expression of employment effects from the tourism consumption.

$$\text{Tourism multiplier: } \frac{\text{Employments effects}}{\text{Tourism revenue (mio. kr.)}}$$

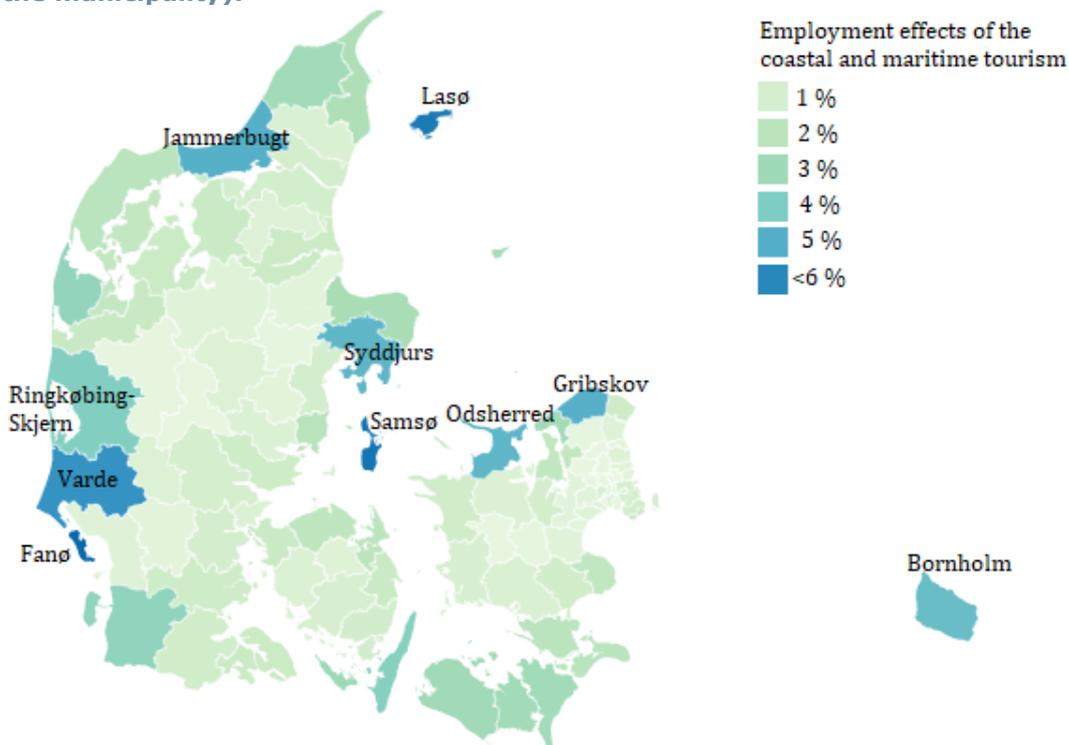
7.1 Labour market effects due to coastal and maritime tourism

The technical employment multiplier for coastal and maritime tourism is calculated to be 1.43, which is the ratio between the total and direct employment effects. This means that for each job employed within the coastal tourism sectors an additional 0.43 jobs are created in other sectors.

It should be noted that there is a great difference between the spillover effects in different municipalities. This is due to differences in the economic geography, location and inter sectoral linkages. As an example, Bornholm, a Danish island, has a great attractiveness on coastal and maritime tourists. Bornholm is isolated from the mainland coastal municipalities, which leads to smaller labour market linkages to other municipalities, therefore spillover effects on employment can be relatively small compare to other coastal municipalities that border each other; e.g. Copenhagen has a high spillover effect on employment in other municipalities, which is due to the greater inter-municipal commuting patterns between Copenhagen and surrounding municipalities. Thus, the higher is the labour market and trade linkages from one municipality, higher is its spillover effect.

Figure 7.1 demonstrates the distribution of the employment effects of the coastal and maritime tourism as a share of total employment at a municipality level. The figure clearly shows that the employment effects of coastal and maritime tourism activities are mainly observed in the remote coastal municipalities and smaller islands. Detailed table 10.3.1 in appendix describes the direct, derived and total employment effects of coastal and maritime tourism by each municipality. The table 10.3.1 shows that 32,537 full-time jobs are created from the coastal and maritime tourism in Denmark, while the direct employment accounts for 22,766 jobs in the whole country. The effects are distributed across the Danish municipalities considering their geographical characteristics, type and size.

Figure 7.1 The total employment effects of the coastal and maritime tourism at a municipal level. (% of total employment effects as a share of the total workforce in the municipality).



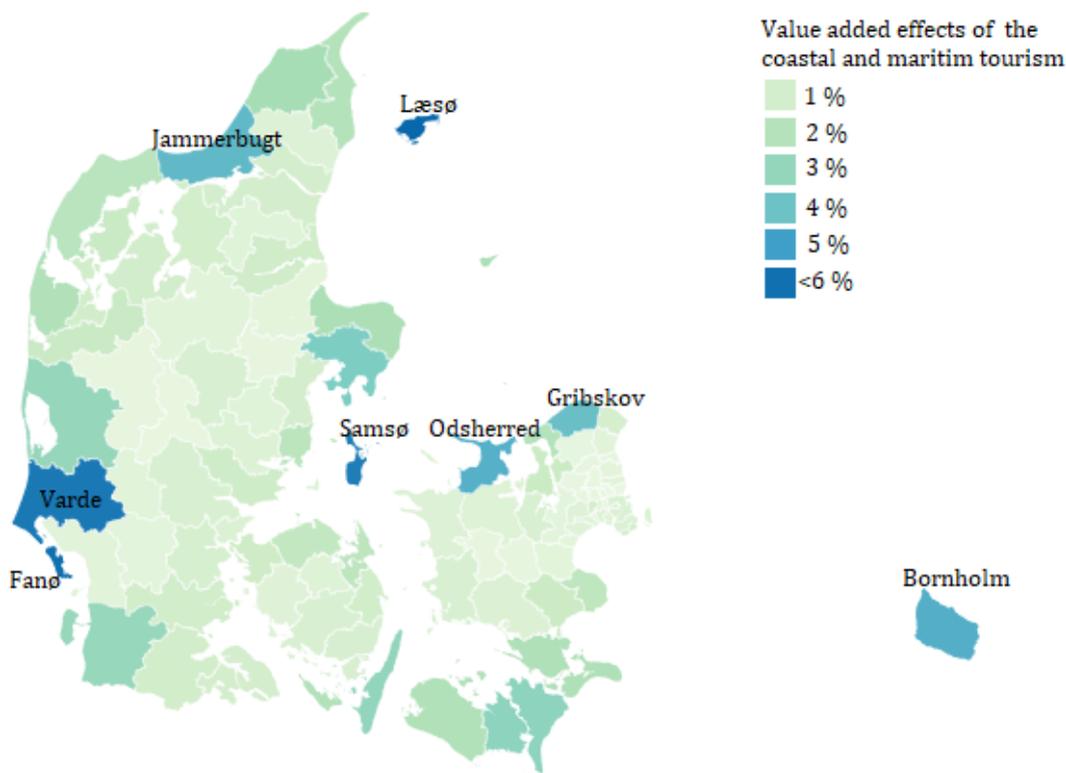
Source: SAM-K/LINE @_COAST/RTSA18(CRT)

7.2 Value Added effects due to coastal and maritime tourism

Economic analyses at the regional and municipality level indicate Gross Value Added (GVA) as one of the economic indicators to measure the economic value in a region. GVA provides the indication in monetary values of how much of the goods and services produced in the area while subtracting all inputs costs of raw materials. The size of the multiplier in this case is mainly depended on the inter-sectoral linkages, i.e. trade. The gross value added multiplier for coastal and maritime tourism is 1.65, which means that for each million DKK of value created by coastal and maritime tourism sectors, an additional value of 0.65 million DKK is spillover to other sectors locally and inter-regionally.

It should likewise be noted that there are great differences in the multipliers between the municipalities. Figure 7.2 shows the distribution of the total effects of gross value added in the municipalities of Denmark. The size of the spillover effects are different considering the size, type and inter-sectoral and inter-regional linkages of the municipalities. According to the figure 7.2 we observe that the added values effects created in the coastal and maritime tourism activities are relatively large in the outskirts coastal municipalities of west and north Jutland and north Zealand. The detailed table 10.3.2 in appendix shows detailed direct, derived and total effects of the coastal and maritime tourism in each municipality in the absolute terms. According to the table, the coastal and maritime tourism directly create 9,972 million DKK of added value in Denmark, while derived effects account for 6,519 million DKK. In total, coastal and maritime tourism contributes to the national economy by 16,491 million DKK GVA.

Figure 7.2 The total value added effects of the coastal and maritime tourism at a municipal level. (% of total GVA effects as a share of the total GVA created in the municipality)



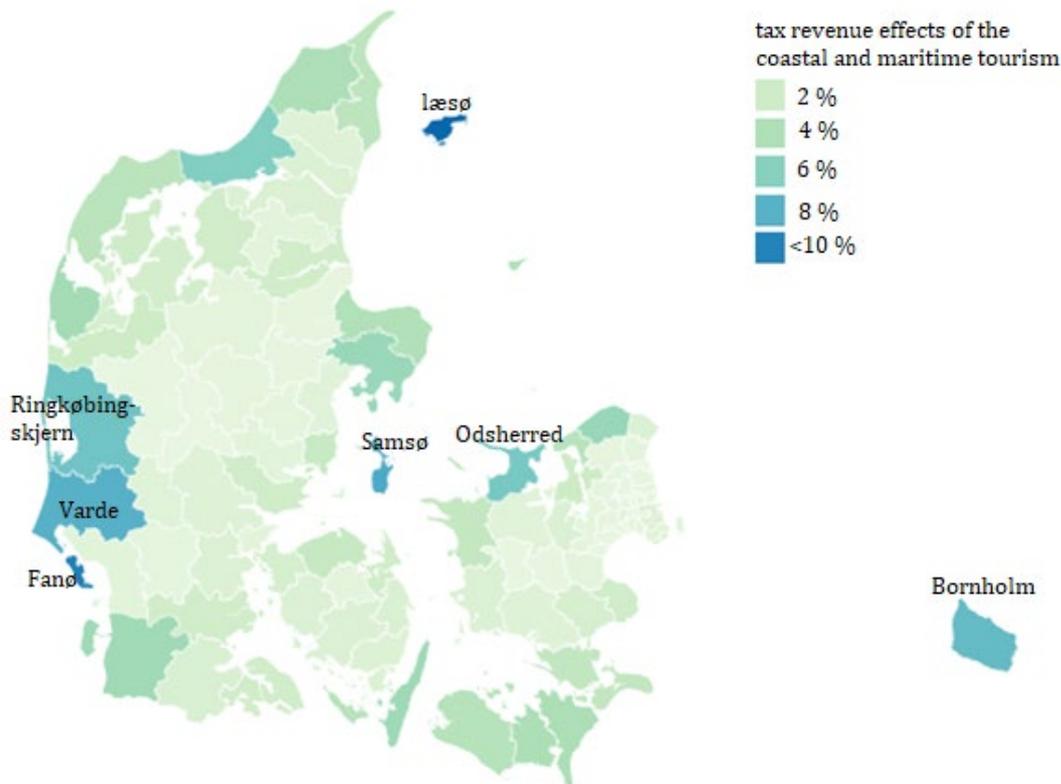
Source: SAM-K/LINE @_COAST/RTSA18(CRT)

7.3 Tax effects due to coastal and maritime tourism

As mentioned in the methodology chapter 4.2, the SAM-K/LINE® model is structured in a way that it can also capture the induced effects on wages and employment. This creates possibility to calculate the effects of coastal and maritime tourism sectors on the tax revenue from the income taxes, business and value-added taxes at the local and national level.

Figure 7.3 shows how the total tax effects from the coastal and maritime tourism sector are distributed to the municipalities of Denmark. The values are given as the share of the total effects of the total tax revenue in each municipality of Denmark. The figure illustrates that approximately 8% and higher shares of taxes from the coastal and maritime tourism are mainly in the small islands of Denmark. Detailed table 10.3.3 in appendix shows total tax effects in absolute terms. The effects are distributed by the municipality and describe separately the total effects on income taxes, business taxes, product and VAT taxes. The calculations show that the total employment effects will contribute by 3,926.20 million DKK to the income taxes. While coastal and maritime tourism sectors contribute totally to the business and product/VAT taxes by 7,472.5 million DKK. The total tax revenue from the coastal and maritime tourism in whole Denmark is about 11,398.73 million DKK.

Figure 7.3 The total tax revenue effects of the coastal and maritime tourism at a municipal level. (% of tax effects as a share of the total tax revenue in the municipality)



Source: SAM-K/LINE @_COAST/RTSA18(CRT)

7.4 Tourism multiplier

As it is explained above, the tourism multiplier specifies the employment effects from the coastal and maritime tourism consumption (in DKK). More specifically, it indicates how many jobs are created per one million DKK in the coastal and maritime tourism consumption.

According to the RTSA and DCTM, coastal and maritime tourists in total spent approximately 39,543.12 million DKK in 2016, which is about 1/3 of total tourism consumption in Denmark. Considering that the coastal and maritime tourism create approximately 32,573 full time equivalent jobs, then the tourism multiplier is calculated to be 0.82. Tourism multiplier in this case indicates that every million DKK spent in the coastal and maritime tourism activities contributes to the creation of 0.82 jobs in Denmark.

8. Summary and conclusion

The regional and socioeconomic effects of coastal and maritime tourism have a significant importance for the Danish local economy and represents 37% of the total tourism revenue in Denmark. The direct effects of the coastal and maritime tourism provide 22,766 jobs and 9,972 million DKK in gross value added to the Danish economy. At a socioeconomic level, coastal and maritime tourism contributes by 11,398.73 million DKK in total to the tax revenue. The direct effects of the coastal and maritime tourism lead to great positive derived effects to the rest of the society. With a positive employment multiplier of 1.43 and a positive value added multiplier of 1.65, the direct effects of the coastal and maritime tourism has the spillover effects between the economic sectors and the municipalities in Denmark.

According to the RTSA structure of the Danish Coastal Tourism Model (DCTM), the foreign coastal and maritime tourists are mainly concentrated at the western and northern coast of Jutland, while the domestic tourism is more spread out in most of the coastal municipalities in Denmark. However, a large share of domestic coastal and maritime tourists favours the popular cottage areas i.e. northern Zealand, the western coast of Jutland and Lolland-Falster. Coastal and maritime tourism capacity is considerably large in Denmark, due to its eight thousand kilometres long coastline and a mild Nordic climate. Approximately 1/3 of the Danish total population resides within the coastal area, and earns about 42% of commercial accommodation sector's primary income.

This study hereby concludes that the coastal and maritime tourism in Denmark has a significant role in the Danish economy, especially for the local areas in the outskirts of west and north Jutland, as well as south and north of Zealand and Bornholm. In these localities tourism is one of the main economic contributors for production of coastal oriented tourism goods and services and for the local labour market.

The coastal and maritime tourist flows in Denmark follow the general growth trend of coastal and maritime tourism in the EU. The EU's Blue Growth strategy, where the coastal and maritime tourism sector have been identified as an area with special potential for growth, might lead to bigger regional and socioeconomic effects of the coastal and maritime tourism in the future and potentials for the local development in the Danish outskirt municipalities.

9. Data and method considerations

The Danish Coastal Tourism Model, is an input-output equilibrium model, programmed to provide credible statistical data calculations for the coastal and maritime tourism in Denmark. However, there might be reasons to believe that the model, in general, underestimates the economic impacts of the coastal and maritime tourism. This is due to the definitions and assumption applied in the model. The results of the model are the best available estimates we have, however, it is important to consider the assumptions, inevitable modelling errors and specific definitions applied in the analyses. In the TØBBE data the tourist is defined as coastal and maritime if he/she have performed one of the following activities during their holiday: Swimming in a lake or the sea, fishing, boating, canoeing or kayaking, scuba diving or surfing. This implies that all tourist, who have taken a walk along the beachside are omitted from this analysis, and the share of coastal and maritime tourism (and the effect of these) might therefor be even larger. Likewise, the same-day visits across the resident's town but within the resident's municipality is omitted from the model, indicating that a larger share of the same-day tourists might be maritime and coastal. The results from this model analysis should therefore been treated with consideration, by understanding that the model and data captures minimum of the regional and socioeconomic effects of the coastal and maritime tourism and allow data and model error.

Despite of these considerations, the model provides valid and credible overview of the coastal and maritime tourism economy and geography in Denmark and can be applied to the monitoring of the sector, to the analytical and research needs and to evaluation of the policies and strategies regarding the future development of the coastal and maritime tourism in Denmark.

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