

Regionalised tourism satellite accounts for Denmark: Methodology and results

Requested comment

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Summary: This paper of requested comments consists of two parts. The first part provides comments on the Central Paper by Professor Douglas C. Frechtling *Measurement and analysis of tourism economic contributions for subnational regions through Tourism Satellite Account*. The comments highlight particularly the distinction the author makes between the Account Approach and the Allocation Approach in the development and implementation of R-TSAs. Furthermore the comments identify a number of pertinent issues involved in moving down the regional path of the TSAs.

The second part consists of a paper entitled *Regionalised Tourism Satellite Accounts for Denmark: Methodology and Results*, which provides a concrete example of the approaches used and experiences made in Denmark while developing R-TSA. The paper clearly illustrates the need to be both ingenious and pragmatic when developing R-TSA. In fact, in a country like Denmark it is necessary to utilize both the Account Approach and the Allocation Approach, but by doing so in a deliberate and assiduous way, the results achieved so far prove significant.

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PART I

OVERVIEW OF THE PAPER

The paper gives an overview of and guidelines for developing regional tourism satellite accounts (R-TSA). The paper starts by addressing the need and interests for developing R-TSA. The regional authorities, public officials, private business owners and local residents have no doubt great interests in and will also benefit from the development of regional TSA. The paper further points out the need to conduct a tourism economic consequences analysis and to estimate direct and indirect impact of tourism on the regions.

The author points out several obstacles to development of regional TSA, for example, lack of a conceptual framework specific for sub-national levels of TSA; lack of acceptable statistical information useful to elaborating the regional TSA; and as well as distinctive characteristics of tourism demand and supply for individual regions. The author calls for all the countries to follow the principles from WTO's guideline, namely the TSA: RMF 2008(UN/Eurostat/ OECD/UNWTO, 2008). He has also provides a concrete list for which TSA tables should be compiled for sub-national TSA purpose. This serves as a very useful guidance for R-TSA development.

In the following sections, the author discusses three conditions under which R-TSA can be developed in a specific country:

- Existence of a valid, up-to-date - Current TSA Condition
- Existence of a valid but outdated TSA – Outdated TSA Condition
- A valid TSA has never been elaborated for the country

For the first condition – Current TSA Condition – two approaches are introduced and discussed. The Regional Account Approach denotes the construction of TSA tables for regions following the TSA coverage characteristics and definitions, which is to be developed by the Central Statistical Office of the country in co-operation with regional authorities. The Regional Allocation Approach, on the other hand, is described as a modeling exercise using a set of regional indicators combined with survey data to allocate the national output of the tourism industries distributed across the country's regions.

In the author's view, the account approach is the preferable one, while the allocation approach suffers from the limitation of not producing "a proper TSA at the regional level". He describes it as an experimental regional TSA (ER-TSA), which "may not accurately reflect the peculiarities of the economic activity of each region" (s.8-9). Any development of ER-TSA should be under the supervision of the CSO in collaboration with regional experts and authorities, and with the aim to "develop R-TSAs beyond this experimental stage".

Finally, the author provides detailed suggestions for R-TSA implementation actions following the two approaches (appendix C-D), and concludes that the benefits of a valid regional TSA are considerable, providing us with measurements of "the contribution of tourism to gross regional product in absolute and percentage terms", "the absolute and relative contribution tourism in the region makes to the national tourism contribution to gross domestic product", and "the absolute and relative contribution of tourism industry employment to all employment in the region" (p. 10).

SUGGESTION FOR TECHNICAL GUIDELINES FROM WTO

Going from the general guidelines and principles of developing R-TSAs to implementation in practice is a challenging endeavor, which Jones has pointed out: “It is clear that constructing the RTSA is far from easy” (Jones, 2006). It involves a lot of detailed technical constructions and estimations for the regional economic and tourism data. For example, are there available detailed tourist overnight and daily consumption data for all the categories that the R-TSAs require? R-TSA must start from tourism and economic data collection. The methodological framework includes at least two considerations. One is the “top-down approach” and another is the “bottom-up approach” for developing Regional TSA. Each country has to decide which approach is adopted according the availability of regional data, as well as the possibilities of collect the tourism and other relevant data.

There is also a need to develop methodologically and technically detailed instructions for construction the regional TSA. As Professor Frechtling states: “The Regional Allocation Approach’ uses a set of regional indicators to allocate the national output of the tourism industries to each of a set of regions covering the entire country, and combination of survey data and regional indicators to allocate tourism consumption among these regions” (p.8). However, it is necessary to make clear which regional indicators should be considered. It will be difficult for the WTO to give guidelines for regional indicators as regional available data are very different from country to country. We suggest that WTO and relevant major multilateral organizations collect and present strategic examples from countries that have developed their regional TSA, whether using the Account or Allocation Approach.

In the absence of methodological guidance for developing R-TSA, especially concerning the concrete technical principles, the following points could be further considered to supplement in the future recommendations for R-TSA:

How to define “usual environment” for regional TSA when the areas are small?

We suggest that the development of regional TSA should also include a definition for the “usual environment”. The concept of “usual environment” is defined “as the geographical area (though not necessarily a contiguous one) within which an individual conducts his/her regular life routines” (IRTS 2008 paras. 2.21. to 2.25). When the regional TSA is constructed, some administrative regions are rather small, making it difficult to distinguish between what are individual regular life routines and what are the tourist related activities. For example, when an individual crosses a region’s border to do shopping, it is not registered as tourism activity. But if he/she crosses a region’s border to visit a museum or a theme park, he is defined as a same-day visitor. Thus, we suggest that the definition of tourists (including the same-day visitors) should combine the definition of “usual environment” and the activities the individual person makes at a destination. If the activities belong to the typical tourism activities, they should be regarded as tourists.

How to deal with domestic business travel both for overnight visitors and same-day visitors?

The definition of visitors covers not only individuals who travel for personal reasons but also covers the individuals who travel for business and conference purposes (TSA:RMF 2008 paras. 2.32). Within a country’s border, there exist many business connections between the regions and involves many business travels every day, both overnight business visitors and same-day business travelers. It is challenging for TSA to include such activities. The spending of overnight business visitors can be found by visitor survey through the accommodation interviews, however, it is quite difficult of estimate the same-day business travelers’ spending. The spending is most likely involved in use of transport and food/catering services.

How to deal with the differences in statistical resources for regions? One of the benefits for developing the regional TSA is to make tourism regionally comparable and consistent within the country. We are faced with problems when the regional data is unavailable, especially when regions have different statistical resources it raises the problem for comparability and consistency of R-TSA.

How to deal with the inter-regional commodity balance within the interregional economies when disaggregating from N-TSA to R-TSA? Even if the regional statistical data are available, it requires an inter-regional commodity balance for all the industries between the regions (Zhang, 2005). This means that both regional supply and demand should be added up to the national total supply and demand for each commodity within each industry. The regional supply of a commodity is composed of supply from its own region, supply from other regions within the country (i.e. inter-regional imports) and imports from abroad. In the same manner, the regional demand is composed of demand from its own region, the demand from other regions within the country (i.e. inter-regional exports) and export to abroad. After these parts of regional data are constructed, the procedure is needed to make an inter-regional commodity balance between the regions.

As the TSA: RMF 2008 recommends and Professor Frechtling highlights in his paper, it is required the R-TSA table 5 to show the regional production accounts for tourism industries and their corresponding tourism products. It is also necessary to have consistent regional production accounts to be sure that regional production data and gross value added data are added up to the national total values.

REFERENCES

- Jones, C. (2006): Tourism Satellite Accounts: The Regional Perspective. Seminar paper.
- UN and UNWTO, (2007): "2008 International Recommendations for Tourism Statistics (IRTS 2008), New York, Madrid November 2007
- UN/Eurostat/ OECD/UNWTO (2008): 2008 Tourism Satellite Account: Recommended Methodological Framework (TSA:RMF 2008). Madrid, Spain.
- Zhang, Jie (2005): Documentation on Regional Tourism Satellite Accounts in Denmark, AKF, Denmark.

PART II

REGIONALISED TOURISM SATELLITE ACCOUNTS FOR DENMARK: METHODOLOGY AND RESULTS

SUMMARY

The World Tourism Organization (UNWTO) and the Organization for Economic and Development (OECD) and other organizations, such as EUROSTAT and the UN's Statistical Commission have asked the member countries to conduct the work of collecting tourism statistics within the framework of tourism satellite accounts (TSA). Many countries have either compiled their tourism statistics, or are in the development process.

The purpose of this paper is to present both the methodologies and results of regional tourism satellite accounts (R-TSA) for Denmark. After a brief introduction of the working procedures for developing regional TSA, data sources and methods for compiling R-TSA are presented in detail. The main methodologies presented include estimations of the regional tourism supply shares, estimations of the tourism supply at market prices, estimations of the regional tourism demand from the tourism survey data and estimations of the regional tourism demand from national supply and use tables. This approach combines both "bottom-up" and "top-down" methods into the R-TSA accounting procedures.

Furthermore, the paper describes the structure of the Danish inter-regional macro-economic model, called LINE. The model is based on the principle of a social accounting matrix (SAM) for the structure of data. The model has two circles: a real circle, in accordance with the Keynesian demand theory, and a price-cost circle, in accordance with moving from production cost to market prices of products.

The results for regional TSA tables are presented in the Appendix, containing both the national and regional TSA tables. For example, TSA table 1 is presented by two tables: one table showing inbound tourism consumption by products and classes of visitors, and the other showing consumption by products and regions.

The case of the Danish regional TSA development illustrates very clearly, that given the variation in data collection and accounting in individual countries, it is very often needed to combine an Account Approach with an Allocation Approach. In Denmark this is achieved by obtaining detailed tourism survey data by regions and components for compiling R-TSA, while the national accounts data are used to supplement the tourism data. The R-TSA accounting and modeling is then merged into one system. The advantages for these methodologies are: 1) R-TSA remains consistent with the national accounts; 2) The national accounts provide supplement data for tourism commodities when tourism data unavailable; 3) The time series in the TSA are brought to the present year by the forecasting function in the model; 4) It is easier to present both R-TSA, economic indicators such as gross value added of the tourism industries (GVATI) and tourism impact analysis, such as tourism direct and indirect gross value added and employment effects.

INTRODUCTION

The United Nations Statistical Commission together with the World Tourism organization (UNWTO), the Statistical Office of the European Communities (Eurostat) and the Organization for Economic and Development (OECD) has issued several documents with regard to the travel and tourism statistics (UNWTO, 1999; OECD, 2000, UNWTO/OECD/EUROSTA, 2001; Eurostat, 2002). More recently, two publications: "2008 International Recommendations for Tourism Statistics (IRTS 2008) (UN/UNWTO, 2007) and "2008 Tourism Satellite Account: Recommended Methodological Framework" (TSA: RMF 2008) (UN/Eurostat/OECD/UNWTO, 2008) were issued and they provide more updated guidelines and recommendations for compiling tourism statistics.

Many countries have begun the process of developing tourism satellite accounts (TSA), either at national level or at regional level. Canada stands out among the countries which publish TSA tables, as well as the national tourism indicators (Delisle, 1999). Canada, France, Norway, Switzerland and United Kingdom, among others, have already made their regional tourism satellite accounts (Frechtling, 1999; Rütter and Berwert, 1999; Brændvang, et al 2001, Statistics Canada, 2002, Jones, 2006).

The aim for making tourism satellite accounts is to measure the tourism economic benefits to the national or regional economies, including gross value added in the tourism industries, tourism direct gross value added, GDP and tourism employment (TSA: RMF 2008). Tourism statistics plays a central role in the tourism analysis. The tourism statistics should be able to give credible, consistent, reliable and comparable statistics, and it should be consistent with the national accounts.

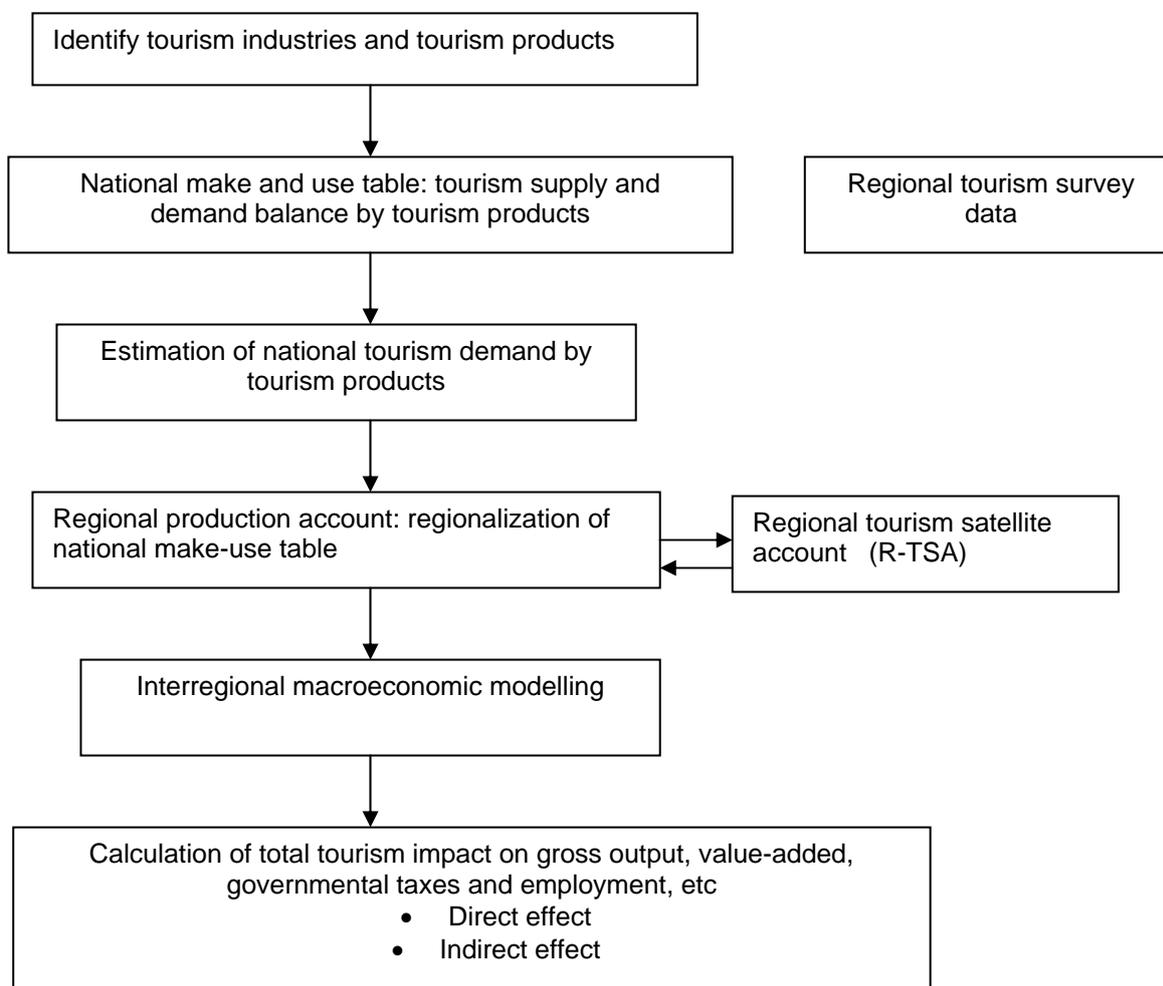
The purpose of this paper is to present both the methodologies and results of regional tourism satellite accounts (R-TSA) for Denmark. Section 2 describes the working procedures for constructing the Danish R-TSA. Section 3 presents the data sources used in the regional model, also for compiling R-TSA. A detailed description of methodologies for constructing R-TSA is presented in section 4. These methodologies include estimation of the regional tourism supply shares, estimation of the tourism supply at market prices, estimation of the regional tourism demand from the tourism survey data and estimation of regional tourism demand from national supply and use tables. Section 5 gives describes the structure of the Danish inter-regional macro-economic model, in which tourism sub-model is a part of interregional model. The results of regional TSA are provided in section 6. The main TSA tables are presented showing tourism consumption both by TSA products and regions.

THE WORKING PROCEDURES

The UN statistical commission and the World Tourism Organization define tourism as the activities of persons traveling to and staying in places outside their usual environment for less than a year and for a main purpose other than to be employed by a resident entity in the place visited (TSA:RMF, 2008). Tourism can be divided into several categories according to the tourist origins, tourism purposes and the duration of the trips. The typical divisions are inbound tourism, domestic tourism and outbound tourism. The Danish TSA follows the above division: the inbound tourism is divided into inbound same-day and inbound overnight tourism; the domestic tourism is divided into domestic same-day, domestic overnight leisure tourism and domestic business traveling. The outbound tourism is, however, not included in the Danish TSA so far.

The working procedures for constructing the Danish R-TSA are described in Figure 1.

Figure 1
Methodological procedure of making R-TSA for Denmark



Identification of tourism industries and tourism products (step 1)

The UNWTO's TSA document gives a detailed description about the definition of tourism products and tourism industries. The tourism products can be classified as tourism specific products and non-tourism specific products. Tourism specific products are defined as those products that are consumed by tourists, and for those, in the absence of tourists, the level of consumption would be significantly reduced. Tourism product identification should be in accordance with each country's national accounts. Different countries normally have different categories for tourism specific products according to their accounting categories.

Tourism industry is defined as a group of establishments whose principle productive activity is a tourism characteristic activity, which means that a tourism industry supplies products and services to tourists. Among the 2 800 detailed product categories in the Danish national accounts, about 32 products are defined as tourism specific products in Denmark. The industries that supply these products and services are defined as tourism related industries. The tourism specific and non-specific products can be groups into the main categories as shown in Table 1 in the Appendix.

Balance for the tourism supply and demand by tourism product (step 2)

The Danish national accounts can be presented by national make and use tables. From the national make table, the information about tourism products supplied by their corresponding industrial sectors can be obtained at basic prices. Domestic production plus import from abroad forms the total supply for every product. The national use table consists of different components in the final demand, such as intermediate consumption, private consumption, public consumption, investment and export. Within the national accounts the total supply obtains a balance with the total demand at each product level.

Although the information on supply for each tourism product is available, the tourism demand remains unknown from the national accounts. This is because in the national use table tourism product consumption is buried either in intermediate consumption or in private (or public) consumption. This means that the national use table cannot tell, for example for restaurant product, which amount of product is consumed by tourists and which amount is used by the local residents.

Therefore, tourism survey data (called TØBBE) (Zhang, 2001; Denmark National Tourism Organisation, 2003) are introduced into the system. The purpose of applying the tourism survey data is to distinguish tourism consumption from the local residential consumption. Without changing the total demand for each product, it is simply to separate the private consumption into two parts: one is tourism consumption and another is local private consumption. It is the same for the intermediate consumption to separate Danish business consumption from the normal intermediate consumption.

Estimation of the national tourism demand by tourism product (step 3)

In the step 2 it is seen that two data sources are merged and compared with each other. The one source is the national use table, showing tourism products consumed by intermediate consumption, private consumption and public consumption; the other source is the aggregated national tourism consumption data, showing the tourism consumption for each tourism product. In case that data are not compatible with each other, we have to decide which data should be applied in the estimation. When some tourism information is unavailable in the TØBBE data, the national make or use tables are used for the estimation. The detailed methodologies applied for estimation is presented in Section 4.

Regionalization of the national make-use tables by the regional production accounts (step 4)

The Danish regional production accounts include the information of regional production value, regional intermediate consumption, gross domestic products at factor costs, and production taxes less subsidies on production, compensation to employees, gross operating surplus and number of employment. With the help of regional production accounts and other survey information, the national make-use tables are disaggregated into regional make-use tables (Madsen et al. 2001a and Madsen et al. 2001b).

Construction of the regional tourism satellite accounts (step 5)

The purpose of constructing the regional tourism satellite accounts is to compile the TSA tables that are required by the UNWTO (See TSA RMF 2008). The following procedures and methods are adopted in order to compile TSA tables.

- Calculate regional tourism supply shares
- Estimate tourism supply at market prices
- Transform the consumption component to product categories for the tourism survey data
- Estimate regional tourism demand from the tourism survey data
- Estimate regional tourism demand from national supply and use tables

These procedures and methods are presented in Section 4 and detailed methodological documentation has published in a special report (Zhang, 2005).

The regional tourism satellite accounts enter into the interregional macroeconomic model (step 6)

The last step is to put the R-TSA data into the Danish interregional model, so that the tourism statistics, after TSA estimations, merges into the modeling system. The advantages of merging accounting and modeling into one system are: 1) the interregional macroeconomic model can function as a forecasting model that brings the TSA time series up-to-date, when the national accounts have a few years time-lag. 2) The interregional model has a spatial dimension. When the regional make-use tables and regional tourism data are available, it is easy to make the regional tourism satellite accounts with one system. 3) It is also possible to directly use the model to calculate the economic consequences of tourism.

DATA

Data sources for the Danish interregional macroeconomic model, LINE, are mainly categorized as five different sources: (1) regional census data, covering population, income and employment statistics; (2) regional production accounts; (3) national accounts: make-use tables; (4) the national forecasting model (ADAM) databank; (5) different survey data, for example, tourism survey, transport survey and trade survey. Three main data sources that are used in constructing the R-TSA are described here.

Regional census data

The regional census data that include population, employment, primary income, and taxes, etc. are obtained from Statistics Denmark. Most variables have at least two of the following dimensions: (a) place of production (by 98 municipalities), (b) place of residence (by 98 municipalities), (c) production branches and sector, (d) education, (e) age, (f) sex and (g) households.

Regional production accounts

It contains variables, such as regional gross production, regional intermediate consumption, regional gross domestic product at factor cost, and indirect production tax less subsidies on production, compensation to employees, implicit gross operating surplus and number of employees. All variables in the data set have the following dimensions (axes): (a) region at municipal level, (b) sector being classified by a standard SNA93 defined industries, (c) price showing both fixed and current prices.

National make-use tables

It shows the relationships between the institution and products. In the make matrix, production data show the relationship between the industry and products, telling us which industries produce which commodities. The make matrix also contains import by industry and commodity. The use matrix shows all the variables in the demand side: intermediate consumption shows the relationship between the industries and products; private consumption, public consumption, investment, stocks and exports show the relationships between the relevant components and products.

Make-use tables have not only axes for fixed and current prices; but they also contain basic prices, retailing and wholesaling margins, non-production tax and value-added tax. Production value in the make matrix is presented only in basic prices. Each product at basic prices obtains a balance between the make and use matrices.

Regional tourism data

The tourism survey data from Denmark National Tourism Organization is also called TØBBE data. It includes the data of both number of tourist nights and tourists' daily consumption. Number of tourist nights is based on the official tourist bed-night statistics from Statistics Denmark, supplemented with interviewing data from the Denmark National Tourism Organization for some special overnight forms. The tourists' average daily consumption is calculated based on a large tourist interview data.

The Denmark National Tourism Organization has been carrying out a tourist survey on regular basis since 1996. The survey covers 16 different forms of accommodations and both foreign and domestic tourists are being interviewed. The survey is conducted in all regions of Denmark, therefore, both tourist nights and tourists' daily consumption data have the following dimensions: (a) regions by tourists' overnight places; (b) form of accommodation; (c) nationalities for foreign tourists and places of residence for domestic tourists; besides, the daily consumption is divided into different consumption groups. Thus, the products of the two sets of data give the regional tourist consumption in Denmark.

METHODOLOGIES FOR REGIONAL TOURISM SATELLITE ACCOUNTS

When compiling regional tourism satellite accounts, we are often faced with a lack of some regional data, either lack of regional economic data or tourism consumption data. Many tourism activities are related to other industries and sectors, such as the railway transport sector, which should be separated into passenger transport and goods transport, and where tourism is related to passenger transport. However, it is necessary to estimate tourism supply shares of the total railway transport sector as it often stands as one sector in the national accounts.

Tourism statistics should mainly be based on the available tourism data. Tourism data is often collected through visitor surveys and accommodation statistics for overnight stays. Tourism satellite accounts should be consistent with national accounts, it is necessary to apply the national make and use tables to control and supplement tourism data when data unavailable. This approach actually combines both "bottom-up" and "top-down" methods into the R-TSA accounting procedures.

Estimations of the regional tourism supply shares

Denmark Statistics' regional census data provide a very detailed data with approximately 800 industrial and service branches. The data is organized by the municipal unit with information of employment number, primary income and other incomes. These data are used, in the R-TSA data compilation, as the distribution keys to redefine the tourism activities within the traditional standard sectors. For example, in the traditional standard sectors, hotel is presented as one sector. But from the detailed sectors information, the hotel sector in Denmark is divided into 7 sub-sectors, such as 'hotels with restaurants', 'conference centre', 'hotels without restaurants', 'youth hostel', 'camping', 'holiday centre' and 'other facilities for short-period stay'.

The detailed industry data (either primary income or employment) can be used to calculate a supply share for a tourism industry. The supply share represents a portion of each sub-sector in the aggregated standard sector within a region. For example, supply share for sub-sector 'hotels with restaurants' is the share of this sub-sector in the 'total hotels and other accommodation sector'. The supply shares in these 7 hotel sub-sectors will add up to one within each region.

Estimations of tourism supply at market prices

The total domestic supply by tourism product is calculated by adding up the total domestic production with the total import at each product level. The production and import are presented by the basic prices. The total supply at basic prices is balanced with the total demand at basic prices. This means that at each commodity level, supply equals demand at basic prices. Implicitly, the total demand at market prices can represent the total supply for commodities at market prices, as there is no information of supply at market prices. In other words, if there is information of the VAT and commodity taxes for each commodity and add these together with the wholesale and retailing margins to the total supply at basic prices for commodities, the total supply at market prices is obtained. The total supply for tourism commodities at market prices is the basis for calculating the tourism ratio on supply.

The tourism ratio on supply represents a share of the tourism demand in the total domestic supply at each product category. For example, for the product of 'camping site' and 'holiday centres', it is assumed that the tourism ratios on supply are quite high, or close to one. This means that most of the services in these sectors are relevant to the tourism demand; their supply is simply to meet the tourism demand. On the other hand, tourism ratio on supply in the other hotel forms, catering sectors and transport sectors cannot be one, as these sectors also have to meet the demand from the local residents.

Estimations of regional tourism demand from the tourism survey data

Tourism demand at national and regional level should be estimated by both the tourism survey information and the national make and use matrices. In the use matrices, there is information about the use of tourism commodities. Tourism commodities are mainly used by private consumption. The private consumption consists of local private consumption, domestic tourism consumption and foreign tourism consumption. However, the national use matrix has neither information concerning tourism consumption versus local private consumption, nor information of regional tourism and local private consumption. Therefore, the tourism survey data is very important information, which can be used to distinguish tourism consumption from local private consumption. Tourism data is also regionalized; therefore the regional tourism demand can be estimated.

The tourism survey data is presented by consumption components, namely, by the groups of commodities. It needs to be transformed from components to commodities (i.e. products). The private consumption in the national use table shows the relationship between the components and commodities. By applying this relationship the tourism consumption with its components can be also transformed into tourism products.

Estimations of regional tourism demand from national supply and use tables

The tourism consumption data from tourism survey can be different from the national private consumption for some specific tourism products. This is because the average number of daily tourist is collected and calculated through tourist interview samples. The tourism consumption is a part of private consumption and it should not exceed the private consumption. Therefore, the tourism consumption data at some specific tourism products, such as hotel and other accommodation products will be adjusted by the national private consumption. On the other hand, the tourism demand in other important tourism specific products, such as “travel agency”, “tourist bureau” and “car rental” is unavailable in the survey data, they have need to be supplemented by the tourism supply data.

In order to give an accurate estimation of the tourism demand that covers all the tourism products, it is necessary to use a method that combines both the demand estimation from the survey data (bottom-up approach) and the demand estimation from the national make-use tables (top-down approach). The regionalized national supply and use tables are applied both for controlling tourism data to be consistent with the national accounts and for supplementing tourism data.

The principles for applying the mixed methodology to estimate the tourism demand are: a) when the tourism survey data are available, the tourism survey data are applied as the tourism demand; b) when the tourism survey data are not consistent with the national use table, especially when the tourism demand data from the survey exceed the national private consumption data, the tourism survey data are adjusted in accordance with the national use data; c) when the tourism demand data are not available in some important tourism product categories, the tourism supply information is used to estimate the tourism demand.

REGIONAL MODELING

LINE is an interregional general equilibrium model for the Danish local economies developed by AKF (see Madsen et al. 2002a, 2002b, 2004). The LINE model is built in the computable general equilibrium framework; though, several features are added in the model. Firstly, spatial dimensions are built into the model, distinguished by place of production, place of residence and place of demand. Because of this feature, sub-models for commuting, tourism, shopping and inter-regional trade can be constructed inside the LINE model. Secondly, make and use matrices are appropriately applied in the LINE model. The make matrix shows which productive sectors produce what kinds of commodities; and the use matrix shows which commodities are bought by sectors from intermediate demand, and which commodities are demanded by different components of final demand. Therefore, sectors on the production side and components of the final demand side can be linked with each other by commodities in the commodity market.

The third feature is that data construction is based on a social accounting matrix (SAM). The SAM for Danish municipalities (SAM-K) contains five accounts: “productive sectors”; “qualification groups”, such as age, gender and education; “institutions”, such as households, firms, government and others; “components of final demand” and “commodities”. The fourth feature is that the model structure is represented by two circles:

a real circle, in accordance with the Keynesian demand theory, and a price-cost circle, in accordance with moving from production cost to market price. The fifth feature is that the model has a time dimension. The data of production and final demand are built based on the data from Statistics Denmark. With some historical input-output data, the model can be extended to more than a thirty-year period from 1970 to the present (2006). In addition, the model applies the Danish national forecasting model, ADAM, to forecast this interregional model to the year 2020.

Figure 2 illustrates the LINE model by its real circle. The structure of the LINE model is described by two dimensions. The horizontal dimension shows the spatial dimension: “place of production” (A), “place of residence” (B) and “place of demand” (D). The vertical dimension shows the SAM-K structure by “sector” (E), “qualification group” (G), “institution” (H), “component” (W) and “commodities” (V).

Figure 2
Simplified version of LINE: The real circuit

	Place of production (A)	Place of residence (B)	Place of demand (D)
Activities (sectors) (E)	Gross output GDP at factor costs Intermediate inputs		
Factors of production (education, gender, age) (G)	Earned income Employment	Earned income Employment Unemployment Taxes and transfers Other income Disposable income	
Institutions (households, firms, public sectors) (H)		Earned income Taxes and transfers Disposable income	
Demand (components) (W)		Local private consumption Residential consumption Public consumption Tourist expenditure	Intermediate consumption Local private consumption Danish tourist expenditure Foreign tourist expenditure Public consumption Investment
Commodities (V)	Local production Exports to other municipalities Exports abroad		Local demand Imports from other municipalities Imports from abroad

————— Constant prices
 - - - - - Current prices

The real circle goes clockwise, as shown in Figure 2, corresponding to the Keynesian demand theory. It starts from the upper left corner, where production generates factor incomes in basic prices including the part of income used to pay commuting costs. The factor income is transformed from place of production by sector (AE) to place of production by group (AG), then further to place of residence by group (BG) through a commuting model. Employment follows the same path from place of production by sector (AE) to place of production by group (AG), then eventually to place of residence by group (BG). Employment and unemployment, earned income and income transfers, taxes and disposable income are determined in this quadrant.

Disposable income is calculated in current prices where taxes are deducted, and income transfers and other incomes are added. Disposable incomes are distributed from factors (BG) to households and firms (BH). Disposable income is the basis for determination of private consumption in market prices, by place of residence (BW). Private consumption is assigned to place of demand (DW) by use of a shopping model. Private consumption, together with intermediate consumption, public consumption and investment, constitute the total local demand for commodities (DV) in basic prices through a use matrix. In this transformation from market prices to basic prices (from DW to DV), commodity taxes, value-added taxes and trade margins are subtracted from the market prices. Local demand is met by imports from other regions and abroad in addition to local production. Through a trade model, export to other regions and production for the region itself are determined, i.e. from DV to AV. Adding export abroad, gross output by commodity is determined. Through a reverse make matrix the circle returns to the production by sector (AV to AE).

The price-cost circle goes anti-clockwise, corresponding to a mark-up procedure where additional cost elements are added to the price of the commodity en route from place of production to the market and the buyer.

The tourism sub-model is fully integrated into the LINE model, as tourist consumption, covering both domestic tourism and foreign tourist expenditure in Denmark, is part of the private consumption. Private consumption by residence is determined by the disposable income of residential households. The model for private consumption is composed of four sub-models: 1) residential local private consumption, 2) Danish tourist consumption, 3) foreign ordinary tourist expenditure in Denmark, and 4) foreign same-day tourist expenditure in Denmark. The document for tourism sub-model in LINE can be found in Zhang (2001) and Zhang and et al (2007).

When tourism demand data enter into the interregional macroeconomic model system, the tourism statistics is merged into the final demand by the different components. Through interregional trade model and by subtracting the trade margins, commodity taxes and value-added taxes, the tourism demand by commodity together with other final demand is met by the commodity supply from the production side.

The LINE model actually functions as both a forecasting model and a solution model. The forecasting part means the model applies Danish national forecasting model, ADAM, to bring the time-series of the model from the final data year (such as 2004 for national accounts) to the present year (2006 for tourism data). The solution part means that the model can calculate the economic consequences of any economic activity (such as tourism) at regional level.

RESULTS

The national and regional TSA tables are presented in the Appendix for the most updated year (2006). The end year of national make-use is 2004; however, the regional production and regional tourism data are available for 2006. It is possible to make regional TSA tables by the model system shown above for Denmark. Danish outbound tourism (i.e. Danish tourist consumption outside the territory of Denmark) has not been included in the TSA compilation.

Table 1 (i.e. TSA table 1) shows the national inbound tourism consumption in Denmark in 2006. The table shows the tourism consumption by products (row) and categories of visitors (column). The products are classified by two types: tourism characteristic products and other consumption products. The categories of visitors are foreign same-day visitors and foreign overnight tourists. The total inbound tourism consumption in Denmark in 2006 is estimated to 32 619 million DKK (4 374 million EURO). The tourism consumption from the foreign same-day visitors accounts for 22% of the total consumption, while the foreign overnight tourism consumption accounts for 78% of the total inbound tourism consumption.

Table 2 shows the total inbound tourism consumption by products and five regions in Denmark. The Danish regional TSA tables are made for 98 municipalities after Denmark has carried out municipal reform in recent years. Regional TSA tables presented here are five regions at EU NUTS 2 level. From this table, it shows that inbound tourism in the Capital Region of Denmark accounts for about 43% of the total inbound tourism consumption. Region South Denmark accounts for about 20% of the total consumption.

Table 3 (i.e. TSA table 2) shows the national domestic leisure tourism consumption in 2006 by products and types of visitors. The domestic leisure tourism consumption covers only the Danish private tourism consumption; it does not include the consumption from the domestic business visitors. The domestic leisure tourism consumption is also classified by two types: the domestic same-day visitors and the domestic overnight tourists. The domestic leisure tourism consumption in 2006 is estimated to 16 176 million DKK (2 169 million EURO). The domestic same-day visitors consumed 20% of the total, while the domestic overnight tourism accounts for 80% of the total leisure tourism consumption.

Table 4 shows the total domestic leisure tourism consumption by products and five regions in Denmark. Table shows domestic tourism in the Capital Region of Denmark accounts for about 29% of the total domestic leisure tourism consumption. Region South Denmark and Region Central Jutland account each for about 20% and other two regions contribute about 14 percent each to the total domestic leisure tourism consumption.

Table 5 (i.e. TSA table 4) is the internal tourism consumption by products and types of tourism. The second column of the table (internal tourism consumption) is the sum of the total inbound tourism consumption from Table 1 and the total domestic leisure tourism consumption from Table 3. It shows the internal tourism consumption without domestic business tourism consumption is estimated to 48 795 DKK (6 544 million EURO). The domestic business tourism consumption is a part of intermediate consumption in the national accounts. According to the TSA RMF document, the domestic business tourism consumption should be included in TSA Table 4. Domestic business tourism consumption in column 3 is estimated 19 467 DKK (2 611 million EURO). The last column shows that the total internal tourism consumption in Denmark is 68 261 DKK (9 154 million EURO). It shows that the tourism characteristic products accounted for 57% and other consumption products accounted for 43% of total internal tourism consumption.

Table 6 provides the internal tourism consumption without domestic business tourism consumption by the five regions. From this table, it shows that total internal tourism in the Capital Region of Denmark accounts for about 39% of the total tourism consumption. Region

South Denmark accounts for about 21% of the total tourism consumption. Each of the rest three regions accounts about 10-15% with totally accounting for 40% of total tourism consumption in Denmark.

Table 7 (i.e. TSA table 5) is the production accounts of tourism sectors and other industries in 2006. It shows the relationships between the tourism industries and the products (both tourism characteristic and non-specific products). The columns are tourism industries, from hotels, restaurants and different transport sectors to recreation and cultural activities. All the other industries and service sectors are aggregated into two columns for the presentation purpose. There are both more tourism-related and none-tourism related industries in the model in order to give a more detailed description of economic linkage in the regional economies. The production is also regionalised at municipal level.

The value in production accounts is in basic prices; that means the market prices are needed for the supply side of the products in order to calculate the tourism share for each product. The supply of the products should also include import of the products at basic prices. Transformation from basic prices of the supply to the market prices of supply of products should take account of net commodity taxes less subsidies, value-added taxes, and trade margins of the products. The information on the net commodity taxes less subsidies, value-added taxes and trade margins can be obtained through demand side of the data, as each use matrices contained basic prices, commodity taxes, VAT and wholesaling and retailing margins which is added up to market prices.

CONCLUSION

The purpose of this paper is to present the working procedures and the methodologies for constructing the regional tourism satellite accounts for Denmark. The paper gives a detailed description of data, estimation methods for region TSA and the model structure of the Danish interregional macroeconomic model. The regional TSA tables, mainly TSA table 1, 2 and 4 are presented in the paper. Each of the TSA table has two sub-tables: TSA tables by products and classes of visitors and TSA tables by products and regions.

To conclude the Danish regional TSA project, we believe that the advantages for this work are: 1) it is made in accordance with the official documents and recommendations from UNWTO and other international organizations; 2) it merges the TSA accounting part with the modelling part, and both of them are constructed based on data from the national accounts. The Danish TSA is consistent with the Danish national accounts; 3) it has time series and it has possibility for forecasting the TSA tables to the present year; 4) it is regionalised TSA, therefore it is easier to apply the model for the tourism regional economic analysis.

Several aspects in compilation of the Danish regional TSA have to be improved in the future work. The Danish outbound tourism has not yet been compiled due to lack of data. The domestic business tourism still need to be further improved. The Danish national tourism organisation is already focusing on the meeting industries and business tourism (both foreign and domestic tourism) plays an important role in the tourism economy. The final adjustment for regional TSA is still needed in order to have better consistency in the regional supply and demand data. Besides, some information is still unavailable from the tourism survey, such as the tourism consumption in car rental and in use of tourism bureaus; the domestic tourists (or visitors) use of private car for the tourism purposes.

Finally, the case of the Danish regional TSA development illustrates very clearly that it is very often needed to combine an Account Approach with an Allocation Approach. Professor Frechtling's preference for the Account Approach is commendable, however, the

strategic role this assigns to the Central Statistical Office to ensure the collection of the necessary account data at regional level, is not the feasible in many countries. The examples given of Andalusia and Wales are, in administrative and jurisdictionary terms, to large extent autonomous regions with extensive authority, including statistical matters.

In contrast, Statistics Denmark collects primarily national data and due to the administrative and jurisdictionary structure of the country has little influence (and interest) over what is done at regional level in terms of data collection, particularly not in terms of tourism. Thus, in developing R-TSA for Denmark, this is achieved by obtaining detailed tourism survey data by regions and components for compiling R-TSA, while the national accounts data are used to supplement the tourism data. The R-TSA accounting and modeling is then merged into one system.

However, efforts have been made to set up a Danish R-TSA working group, consisting of Statistics Denmark, Visit Denmark, regional authorities and the Centre for Regional and Tourism Research. In doing so, Denmark is entering into the detailed and useful action plan suggested by Professor Frechtling for the Regional Allocation Approach, although as indicated this will be combined with central elements from the Account Approach. Thus, a further development and qualification of the R-TSA is currently being implemented in Denmark.

REFERENCES

- Brændvang, A.K., P. Dybedal, S. Johansen and K. Sørensen (2001): Regional satellite accounts for tourism – data, concepts, methods and applications. Paper presented at the 41th European congress of RSA at Zagreb.
- Denmark National Tourism Organisation (2003): Turismens økonomiske betydning 2002 – nationalt og regionalt, Danmarks Turistråd.
- Denmark National Tourism Organization (2004): Turismens økonomiske betydning 2003 – nationalt og regionalt, Danmarks Turistråd.
- Denmark National Tourism Organization (2006): Turismens økonomiske betydning 2005 – nationalt og regionalt, Danmarks Turistråd.
- Delisle, J. (1999): The Canadian national tourism indicators: a dynamic picture of the satellite account. *Tourism Economics*, 5 (4), 331-343.
- Eurostat (2002): European Implementation Manual on Tourism Satellite Accounts – based on the internationally approved “Tourism Satellite Accounts: Recommended Methodological Framework”, final draft version 1.0.
- Frechtling, D.C. (1999): The tourism satellite account: foundation, progress and issues. *Tourism Management*, 20 163-170.
- Jones, C. (2006): Tourism Satellite Accounts: The Regional Perspective, Seminar paper.
- Madsen, B, C. Jensen-Butler, P. U. Dam and H. Johnson (2001a): The LINE-model, AKF, Denmark.
- Madsen, B, C. Jensen-Butler and P. U. Dam (2001b): A Social Accounting Matrix for Danish Municipalities. AKF, Denmark.
- Madsen, B and C. Jensen-Butler (2004): Theoretical and operational issues in sub-regional economic modelling illustrated through the development and application of the LINE model. *Economic Modelling*, Vol. 21 (3), 471-508
- Meis, S.M. (1999): The Canadian experience in developing and using the satellite tourism account. *Tourism Economics*, 5 (4), 315-330.
- Nordström J. (1996): Tourism satellite account for Sweden 1992-93. *Tourism Economics*, 2 (1), 13-42.
- OECD (2000): Measuring the Role of Tourism in OECD Economies – The OECD Manual on Tourism Satellite Accounts and Employment.
- Rütter, H. and A. Berwert (1999): A regional approach for tourism satellite accounts and links to the National Account. *Tourism Economics*, 5 (4), 353-381.
- Statistics Canada (2002) The Provincial and territorial tourism satellite accounts for Canada, 1996.
- UN and UNWTO, (2007): “2008 International Recommendations for Tourism Statistics (IRTS 2008), New York, Madrid November 2007

UN/Eurostat/ OECD/UNWTO (2008): 2008 Tourism Satellite Account: Recommended Methodological Framework. Madrid, Spain.

UNWTO (1999): Tourism Satellite Account (TSA) – the Conceptual Framework. World Tourism Organisation, Madrid.

UNWTO/Eurostat/ OECD/UN (2001): Tourism Satellite Account: Recommended Methodological Framework, Luxembourg, Madrid, New York, Paris, 2001.

UNWTO (2004): Tourism Satellite Account (TSA)- Implementation Project, Madrid.

Zhang, Jie (2001): The Impact of tourism on the Economies of Danish Regions. AKF, Denmark.

Zhang, Jie (2002): Tourism impact analysis for Danish regions. Tourism Economics, No. 8 (2), 165-188.

Zhang, Jie (2005): Documentation on Regional Tourism Satellite Accounts in Denmark, AKF, Denmark.

Zhang, Jie, Bjarne Madsen and Chris Jensen-Butler (2007): Regional Economic Impact of Tourism: The Case of Denmark, Regional Studies, 41 (6), 839-853.