EU Twinning Project

IS12/ENP-APFI/08

Support to the Israeli Central Bureau of Statistics in the development of National Accounts, Education Statistics, Survey Methodology, ICBS Website and Coordination of Israel National Statistical System

Component B

Education Statistics

Activity B.3

Study Visit on Education Statistics

Implemented by:

Silvia Liplewski
Head of Branch
Transitions and Follop up Sector
CBS

Aviel Kranzler
Head of the Higher Education Sector
CBS

Edna Shimoni
Senior Supervisor
Education Statistics Sector
CBS

Dan Scheinberg
Senior Supervisor
Transitions and Follow up Sector
CBS

Copenhagen

19-21 May 2014

STATISTICS DENMARK

הלשכה המרכזית לסטטיסטיקה
Central Bureau of Statistics
دائرة الإحصاء المركزية

Authors' names, addresses, e-mails

Edna Shimoni
Senior Supervisor
Education Statistics Sector
Central Bureau of Statistics
66, Kanfey Nesharim
Jerusalem
Tel.: +972 2 659 2514
Email: ednas@cbs.gov.il

Silvia Liplewski
Head of Branch
Transitions and Follow up Sector
Central Bureau of Statistics
66, Kanfey Nesharim
Jerusalem
Tel.: +972 2 659 2533
Email: silvial@cbs.gov.il

Aviel Krentzler
Head of the Higher Education Sector
Central Bureau of Statistics
66, Kanfey Nesharim
Jerusalem
Tel.: +972 2 659 2524
Email: avielk@cbs.gov.il

Dan Scheinberg
Senior Supervisor
Transitions and Follow up Sector
Central Bureau of Statistics
66, Kanfey Nesharim
Jerusalem
Tel.: +972 2 655 2561
Email: dans@cbs.gov.il

Table of contents

External annexes to the report (list of presentations):

Annex B3.4 Dissemination principles and examples

Annex B3.5 eGuidance in Denmark

Annex B3.6 KEA_International

Annex B3.7 UFM-IT and its administrative systems

Annex B3.8 Link to presentation by the Danish Ministry of Higher Education
Danish Ministry of Higher Education 19-05-2014

Annex B3.9 The Education Statistics in Israel

List of Abbreviations

BC	Beneficiary Country (Israel)
ICBS	Israeli Central Bureau of Statistics
SD	Statistics Denmark
MS	Member State
EHG	Education at a Glance

1 Summary

At the outset, The ICBS experts would like to thank Statistics Denmark's experts, the Ministry of Higher Education, Lectio and KEA for their generous hospitality, the interesting visit and valued lessons.

The study visit to Denmark aimed to expose the Israeli experts to the experience accumulated in Statistics Denmark, specifically in the use of administrative sources for producing education statistics.

The visit included a taste of every aspect involved in the SD Education Department such as: data collection strategy and process, meetings with data suppliers and data managers, as well as meetings with Ministry of Education and Ministry of Higher Education representatives.

One of the main objectives of the B.3, in retrospect, was to improve the CBS data collection and data management involved in the education statistics production, as well as the relationship between the department and the data suppliers and data managers.

Part 4 of the report details further recommendations and issues to be considered in the CBS education department.

2 Background

This study visit to Statistics Denmark took place as part of the 'Twinning project to upgrade the CBS education statistics.

This was the fourth activity to be implemented within the Twinning framework for the CBS education department (the first three activities included the visit of Danish experts to ICBS), and the study visit in all comprised of three full working days at Statistics Denmark's site in Copenhagen.

The visit was coordinated by Statistics Denmark in order to incorporate within the study visit meetings around the city of Copenhagen with different actors in the education statistics production in Denmark.

2.1 Mandatory results of component B.3

(a) Detailed plan established for better estimates of early school dropouts

(b) Definition of new indicators of higher education statistics, including completion and non-completion statistics

(c) Plan for development of adult education statistics and its integration into the Register of Educational Attainment

2.2 Terms of Reference - purpose and expected output of B.3 activity

Statistics Denmark's use of administrative sources for producing education statistics.

2.3 Expected output from activity B.3

(a) Participants briefed on the Danish use of administrative sources for producing education statistics.

(b) ICBS report on lessons learned from the study visit.

2.4 Specific meetings in the itinerary

(a) Introduction to education statistics in Denmark
(b) Visit at the Ministry of Higher Education: How do the administrative systems of the Ministry work and cooperate with the data collection at Statistics Denmark?
(c) Visit at a system supplier of administrative solutions for upper secondary institutions

(d) Presentation of IT systems to receive data from the universities – System - to - system solutions
(e) The Danish profile model from a technical perspective
(f) Visit at a system supplier of administrative solutions at university and colleges (Ministry of Higher Education)
(g) Visit at KEA (Copenhagen Business Academy)
(h) Visit at www.UG.dk e-counselling
(i) SD publications and communication strategy; webpage etc.

3 Activity Results

3.1 Introduction to Education Statistics in Denmark

The ICBS experts were introduced to the main registers of Education Statistics in Denmark:

(a) The Education register has a unique identification of educational program. It covers all educational programs, classification (level + Field of Education) and qualification within the program in Denmark from the early 1970's. The Education register is hosted by Statistics Denmark.
(b) The Institution register has a unique identification of institution. It covers all units in Denmark that provide education and contains detailed information about the educational institutions and local counseling centers. The Institution register is hosted by the Ministry of Education.
(c) Education statistics registers - Integrated student register (e.g. grades, applicants), Attainment register (e.g. the highest degree of an individual), etc.

All registers are longitudinal.

From the perspective of the Danish Ministry, a possible definition of a dropout is a student who quit school and didn't get a diploma.

3.2 Visit at the Ministry of Higher Education: How do the administrative systems of the ministry work and cooperate with the data collection at Statistics Denmark?

The Ministry of Higher Education is responsible for the Institutions register. Our hosts presented the coordinated environment system 1977-2013 which contains: applicants, accepted enrolled and rejected applicant.

The target policy: high completion rates.

The Ministry of Higher Education uses the results from the profile model to observe how present enrollment volumes compare with predicted student populations, given changing demographic contexts.

The model is not used in other countries and therefore not comparable to other international policy tools that we are aware of. The model results show significantly higher enrollments when compared with actual observed figures with higher education. The Ministry has detailed information on higher education candidates and is able to manage this supply pool well. However, most of the information on candidates is not transferred to Statistics Denmark. There has seen a very significant increase in the number of applicants and students in recent years. The reasons for this include a weakening labor market for lower-skilled work, which makes higher skilled training found in universities and colleges more attractive. In addition, a promotional campaign carried out by the Ministry to encourage higher educational attendance proved to be very effective. Despite this increase, the Danish predictive model data has not changed its predications significantly and does not reflect the general trend of lackluster demand for higher education.

The Ministry of Education sets goals and objectives and use indicators based on SD generated data.

The issues of student dropouts, employment, enrollment rates are treated similarly in Denmark to the way they are treated in the Ministry of Education of Israel. However, in the Danish case, there appears to be a greater demand for detailed information (data) in order to conduct and evaluate their policies.

Because most dropouts (at the institutional level) do not in fact drop out of the system altogether, but rather transfer to a different institution/field of study, they recommend that the term "dropping out" be substituted for the term "changing studies."

3.3 Visit at a system supplier of administrative solutions (Lectio) for upper secondary institutions (Aviel)

We met with Lectio, a small company; (10 employees in development and 10 in support providers). The company provides data support services to 90% of the high schools in Denmark. Unlike other data support methods that we were introduced to during our visit, this company operates under a "cloud computing" environment, where all the data is off-site, but accessible from any internet terminal. The data system developed by the company enables students to check up on their class schedules, grades, communication with teachers and fellow students under a common internet platform (including mobile internet services).

Furthermore, the information gathered within the system is extremely detailed, allowing for very sophisticated data analysis to be conducted if required. For example, because information such as students' background, student courses, grades, teacher, payroll data (among others) are all gathered and linked together, it is possible to conduct analyses measuring teaching efficacy, teacher survival, replacement, student scholastic achievement, etc. In practice, very little of the data is actually utilized for analysis but serves as the administrative framework under which the Ministry of Education administers the entire secondary-school level system. Some of the data is released in confidential form to researchers of education in the University of Copenhagen.

The company managing the system is a private company and made a very positive impression on us, building and maintaining such a large and complicated system within a short time and garnering 90% of the total high school market.

The data system no doubt is very good at accumulating data information on a variety of levels, all the while, insuring a high degree of data quality. However, issues relating to data security and confidentiality (i.e., privacy) were only slightly touched up in the lecture (and we would have liked to hear more on this topic).

3.4 Presentation of IT systems to receive data from the universities – System-to-system solutions

The IT department in SD developed a system to system solution for data reception/absorption from the different suppliers. It works using a Secure File Transfer Protocol (SFTP, an old protocol predating the Internet).

Communication between the IT department and the data providers is the key to success. To further this aim, all data suppliers from outside the organization need to conform to the IT department's (import) requirements and data parameters. For example, all incoming data needs to be in XML format (XML format is required for further transmission). In addition, incoming data are pre-defined with integrity constraints to insure minimal data quality standards. Data not meeting these standards are not accepted into the system. Consequently, the onus is on the data providers (and not the SD) to ensure sufficient data quality.

Improving the data quality is the provider's responsibility, which reduces some of the burden to check and clean data from SD. As a prerequisite, Statistics Denmark has managed to receive commitments from its data suppliers to work under existing guidelines, enabling the successful free-running transfer of data over the net.

3.5 The Danish profile model from a technical perspective

A lecture on the Danish profile was presented to us by Mr. Torben Lundsvig at 21.5.14, who previously was employed at the Danish Ministry of Education (where he developed the model in the mid-1980s). It was originally intended that two lectures would be delivered on the topic; however this was later changed to one lecture. Unfortunately, no written material of any kind was circulated, nor was the presentation prepared in an electronic format (i.e. PowerPoint) so it was quite difficult to understand the "profile model", or the lecture presented, given its exceedingly detailed character. Furthermore, the lecture did not provide a broader introductory framework that could have assisted greatly in approaching the material, particularly for those without an advanced statistics background. The following is a brief summary of our understanding of this profile model, both from the lecture by Mr. Torben Lundsvig and other information gathered from other sources delivered by our Danish partners.

Statistics Denmark has developed a "profile model" which aims to predict the educational attainment / completion rates of the Danish population at a given time, including up to 25 years into the future. More specifically, the model predicts the educational attainment of 9th grade students across the gamut of educational tracks and options of the Danish educational system (e.g., from 9th grade to Vocational school and Prof. Bachelor, or from 9th to High school, Bachelor and Master, or from 9th to outside of school). Predictions are apparently modeled at the *aggregate level*, based on probability weights predetermined from prior, cross-sectional data sources (more on this later).

Each year, the number of students in each category is calculated, as well as the transitions from one category to the other. The students' behavior is used for prediction purposes. The predicted behavior is successful graduation and examination, against failure and dropout.

The model outputs are meant to provide policy makers in the Ministry of Education with a tool with which to gauge the degree to which the educational potential of the Danish population is being realized at a given point in time, based on the supply pool of the student population. Hence, the Ministry of education uses the model to observe and compare current general population education attainments in reference to both forecasted and policy mandated goals.

From what was described in Mr. Torben Lundsvig's lecture, the profile model appears to be a type of Markov-chain probability model, where conditional probabilities of making a transition into a particular educational program are calculated in a serial fashion, assuming independence of events, which are nevertheless path-dependent under time-homogeneous environment. More specifically, using cross-section data (e.g., the national census) the educational attainments of the Danish population at a fixed time period (i.e., year X) are measured for all age groups (apparently in order to mitigate cohort effects). Next probabilities are calculated for each birth cohort (from 9th grade onward) for all path-dependent transitions. For example, the probability of entering college from an A-level graduation is 0.4, and from college to an advanced college studies program a further 0.2.

By mapping all the probabilities across the entirety of the possible transition trajectories, a "chain" matrix can be calculated. This transition matrix is modeled and re-applied to future data, extrapolating forecasted educational attainment at all levels and frameworks in the educational system, given changing inputs of demographic population data.

It was not clear from the presentation the degree of robustness of the model, given the fact that its development is based on a unitary time-point (cross-sectional data in 1990s). To wit, cohort and period effects may be biased projection outputs if changes in educational preferences occur over time. Furthermore, it is possible that new populations in the country (e.g. new immigrants from the Third World), which were not incorporated at all in the modelling process, require additional modelling to incorporate their distinct behavioral patterns.

3.6 Visit at a system supplier of administrative solutions at University colleges (Ministry of Higher Education)

The ICBS experts were introduced to UFM and its administrative system, a public supplier with a monopoly. The company was established in 2012. It collects data from colleges, universities and students subsidies (which give services to colleges and universities).

Core functionality: Students, subjects, classes, educations, admissions, grades, transfer, etc.

Extra functionality: Practical work registration, scheduling, time keeping for staff, internalization and commercial activities.

The institutions are the owners of their data.

Before sending the data to Statistics Denmark, UFM checks abnormal raises and falls of students rates compared to the previous year. Logical tests make the procedure and the communication with Statistics Denmark more efficient and benefitial.

3.7 Visit at KEA (Copenhagen Business Academy)

In order to understand the data supply chain further, including from this point of view, a study visit to a core data supplier was undertaken. More specifically, a visit to the Copenhagen School of Design and Technology (also named KEA) was embarked upon. The institution is a design school offering over 30 different educational programs for achieving Bachelor's degree and Academy Professional degree levels. KEA has a total of 4,717 full time students and 3,907 part time students. The institution has grown rapidly and also now provides non-academic programs, including part-time studies that are privately funded by the students themselves.

In all, the institution is spread out over 9 different campuses. They have foreign students mainly from the European Union who do not pay tuition (similarly to citizens of Denmark). The emphasis of the college (as well as the higher education system in Denmark) is on studies that prepare for employment and as such, fit their study program to the needs of industry. In addition, the institution also engages closely with industry including placement services within an apprenticeship framework. While the institution maintains some contact with graduates over the short-term, it would like to know more about their graduates over the longer-term. They would be very much interested in cooperating with SD in order to analyze trends in future employment as they are followed-up over the medium to longer-terms, which SD can hopefully provide, given their full coverage administrative databases.

3.8 Visit at www.UG.dk e-counselling

The presentation was done by Ms. Jannie Meedom Nielsen, responsible for the eCounseling system at the Ministry of Education.

In the past few years, the Danish government has tried to accelerate the adoption of digital solutions in the public sector. To help with this, their Ministry of Education developed two main digital tools: eGuidance (www.ug.dk) and www.optagelse.dk.

eGuidance is an online counseling and communication system where potential students receive information and support from Ministry of Education representatives. Its purpose is to help individuals make the best decision on what profession to choose based on relevant factors, such as employment rates, acceptance rates, individual personal interests, etc.

The following can be found on the eGuidance website:
- Information on all higher education and adult education institutions (careers, courses, requirements, etc.)
- An interactive tool for selecting the right career based on individual skills and interests
- Information on employment rates and potential salaries for the different professions
- Communication channels (chat, telephone, email, Facebook and text messages) for individuals to receive counseling by Ministry of Education representatives regarding educational decisions.

The second tool is a centralized application website, www.optagelse.dk. Potential applicants will be able to submit their applications only through this site. Every institution will receive the application through the web, and once a decision is made by the institution, it is sent back to the website so the applicant can find it easily.

Manual applications are no longer accepted in the Danish system (with very few and well-excused exceptions), and applications individualized to specific institutions are no longer permitted. The system is centralized and controlled solely by the Ministry of Education.

3.9 Publications and communication strategy; webpage etc.

The final lecture of our study visit was given by Ms. Annegrate Wulff and pertained to dissemination strategies of Statistics Denmark with regard to of educational statistics. More specifically, Ms. Wulff outlined guidelines (i.e., "Code of Practice") that shape their dissemination policy including the following elements: relevance, timeliness, coherence, and accessibility.
Next, the lecture described the various mediums of dissemination used by S.D including: the internet, publications, data banks, system-to-system data access, and finally even a mobile application internet platform. Some of these platforms were demonstrated directly to the audience.
The first of these platforms to be reviewed was a table generator on higher education student enrollment. The system appears to be very advanced, containing numerous concurring variable cross-tabulations (around 5-6). Noteworthy, is their data-confidentiality policy with regard to the automatic table generation, which differs somewhat from the Israeli policy. To wit, in comparison to Israel, Danish policy is more liberal, permitting publication of cells with smaller number of cases. Finally, the aesthetic and powerful graphic capabilities of the table generator were demonstrated.
The lecture then focused on the search capabilities of their internet site. Following a standard format for EU statistical sites, the S.D. site has a powerful search function, enabling the user to search by a host of different attributes including: subject, publication, release schedule dates, documentation indexes, and the IMF's special dissemination standard.
The lecture concluded by reviewing the "dissemination flow" of their data products. Namely, data is produced/housed in cleaned, micro data registers. From this point it is aggregated in summary tables under database functions. Finally, it is released to the public within a general Statbank using various common publication formats (e.g., HTML, PDF, e-Pub, etc.) across different electronic platforms (internet, mobile (API), special data links, etc.).

4 Conclusions and Recommendations

The following are some of the conclusions and recommendations our team has come up with including:

It is recommended that as in SD case, logical and data integrity checks should be conducted by data suppliers *prior* to their transfer to the ICBS. In addition, data should be supplied in a common, easy to use format such as XML.

In the case of Israeli higher education, all statistical tables are submitted to data providers before general publication to ensure that mistakes are minimized. This process, however could also be expanded to statistical tables that fall under the Ministry of Education (i.e., K-12) topics.

We were very impressed by the profile model used to predict student enrollments in Denmark, however we found it not so suitable for the Israeli context, given the fact that: a) it relies on a complete data coverage integrating seamlessly both secondary and tertiary education level together (something which is not currently available in the ICBS); b) as a policy-oriented tool, it can only be used in the Israeli context at the Ministry of Education since the ICBS does not have a mandate to publish policy papers that may take on political overtones; c) it was not sufficiently transparent to us.

Similar to the Lectio third-party (secondary-school) data supplier, in Israel there is a data company (MANBAS) that processes data for the Israel Ministry of Education. We are currently engaging in negotiations to receive addition data that is processed by this third-party data supplier (relating to latent dropout trends).

After learning about the education counseling site, run by the Danish Ministry of Education, we recommend that such a site be also developed in Israel, using ICBS data. For this, we would like to expand our contacts with other potential users of ICBS data.

Annex B3.1 Terms of Reference

Component B
Education Statistics

Activity B.3 : 19-21 May 2014
Study visit on administrative sources
for education statistics

Mandatory results and benchmarks related to activity B.3

Mandatory result	Benchmark
MR8: Detailed plan established for better estimates of early school dropouts	Plan for improved estimates of early school dropout prepared 6th project quarter
MR9: Definition of new indicators of higher education statistics, including completion and non-completion statistics	Proposal for methods, definitions and sources for higher education indicators, prepared by 6th project quarter
MR10: Plan for development of adult education statistics and its integration into the Register of Educational Attainment	Work plan for the development of adult education statistics prepared by 6th project quarter, including scope, data sources and principles for presenting adult educational attainment within the Register

Subject / purpose of activity B.3
Statistics Denmark's use of administrative sources for producing education statistics

Expected output from activity B.3
- Participants briefed on the Danish use of administrative sources for producing education statistics.
- ICBS report on lessons learned from the study visit.

Annex B3.2 Agenda (meeting programme)

Day 1. 19 May 2014

Venue: Danmarks Statistik, Sejrøgade 11, 2100 København Ø
09:30 Welcome and introduction to Statistics Denmark (International Consulting Division)
10:15 Presentation and introduction to Education Statistics in Denmark
11:00 General presentation of the Israeli statistical education system
12:00 Lunch
12:45 Departure from Statistics Denmark to city

Venue: Uddannelses- og forskningsministeriet, Bredgade 43, 1260 København K
13:15 Visit at the Ministry of Higher Education: How do the administrative systems of the Ministry work and cooperate with the data collection at Statistics Denmark?
Presentation:
http://prezi.com/ibdno-rrn_z_/visit-from-israeli-central-bureau-of-statistics-may-19-2014/

Venue: Macom A/S, Vesterbrogade 48, 1620 København V
15:00 Visit at a system supplier of administrative solutions for upper secondary institutions
16:30 End of day 1

Day 2. 20 May 2014

Venue: Danmarks Statistik, Sejrøgade 11, 2100 København Ø
10:00 Presentation of IT systems to receive data from the universities – system-to-system solutions
11:00 The Danish profile model from a technical perspective
12:00 Lunch
12:45 Departure from Statistics Denmark to city

Venue: Uddannelses- og forskningsministeriets it, Bredgade 42, 1260 København K
13:15 Visit at a system supplier of administrative solutions at University colleges

Venue: Københavns Erhvervsakademi, Campus i Store Anneks på P3, Guldbergsgade 29 N., 2200 KbhN
15:00 Visit at KEA (Copenhagen Business Academy)
16:00 End of day 2

Day 3. 21 May 2014

Venue: UNI•C, Vester Voldgade 123, 1552 København V (lokale: Blå 2)
09:30 Update on the Twinning project – B1 and B2
10:00 Visit at www.UG.dk e-counselling

Venue: Danmarks Statistik, Sejrøgade 11, 2100 København Ø
12:00 Lunch
13:15 Overview of the complete production system, incl. the student register
14:00 Publications and communication strategy; webpage etc..
14:30 Evaluation of study visit (International Consulting Division)
15:30 End of day 3

Annex B3.3 Persons met

Christian Vittrup, Chief Advisor, Education Statistics Division, Statistics Denmark
Peter Bohnstedt Anan Hansen, Senior Advisor, Education Statistics Division, Statistics Denmark
Annegrete Wulff, Head of Dissemination Division, Statistics Denmark
Jesper Ellemose, Chief Advisor, International Consulting Division, Statistics Denmark
Torben Lundsvig, Danish Ministry of Education
Jannie Meedom Nielsen, responsible for the eCounseling system at the Ministry of Education.