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SHORT COMMUNICATION

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ABSTRACT

An interview with Professor Danny Pfeffermann is conducted during the conference of Small Area Estimation 2018 (SAE 2018), an international conference held between June 16 and 18 at East China Normal University, Shanghai, China. SAE 2018 is also a celebration of Professor Pfeffermann's 75th birthday. Our interview consists of eight questions, which focus on Professor Pfeffermann's personal education background, research motivations, contributions to the development of statistics, opinions on big data and data science, and his future plan. Professor Pfeffermann used interesting examples to express his opinions on the future development of statistics.

Danny Pfeffermann is the National Statistician and Director General of the Central Bureau of Statistics in Israel; He is also Professor of Social Statistics at the University of Southampton, UK, and Professor Emeritus of Statistics at the Hebrew University of Jerusalem, Israel.

Professor Pfeffermann is a highly respected researcher in the broad areas of survey methodology and official statistics. He has worked on many diverse research topics and has made important contributions in the areas of analytic inference from complex sample surveys, methods for seasonal adjustment and trend estimation, small area estimation, observational studies, and informative sampling and nonresponse. He has numerous publications in leading statistical journals and co-edited with Professor C. R. Rao the two- volume handbook on Survey Sampling: Theory, Methods and Applications.

During the SAE 2018 – an international conference on 'Small Area Estimation and Other Topics of Current Interest in Surveys, Official Statistics, and General Statistics: A Celebration of Professor Danny Pfeffermann's 75th Birthday' – held between June 16-18, 2018, at East China Normal University, Shanghai, China, Professor Pfeffermann kindly agreed to let us have an interview with him. Following is the content of the interview.

Professor D. Pfeffermann with the interviewers Kai Tan (left) and Lyu Ni (right)

Q1: *Professor Pfeffermann, thank you for agreeing to have a conversation with us. To start with, could you tell us a short biography about yourself, particularly about your education experience and what motivated you to engage in statistics?*

Initially, I wanted to study mathematics at the university in order to become a Math teacher. In Israel those days, you had to pick up two subjects, so I picked up statistics as my second major instead of physics, which was the common choice – mathematics and physics. For my master degree I had to choose between mathematics and statistics, and there again, I went for statistics. I do not remember why, but this was my choice. In between, I did teach Math at three different high schools in Israel. Later, I was offered a job at the Central Bureau of Statistics in Israel, and at the same time I started my PhD studies. My PhD supervisor was actually the chief scientist of the Central Bureau of Statistics in Israel, and this is how I got acquainted with all the issues surrounding the production of official statistics. Later, I started my academic career. As a professor, I could take a sabbatical year every five or six years to work in another university or a nonacademic institution, and I always spent at least part of my sabbaticals at statistical bureaus in several other countries, so that I got really familiar with all aspects of official statistics. Consequently, my academic research always was and still is, mostly on problems related to the broad area of official statistics.

Q2: *Could you give us a brief description about statistics researches and applications in Israel?*

Israel is a small country, with about one-third of the population size of Shanghai. We have eight and a half million people, while Shanghai contains twenty-five million people. Nonetheless, we have seven universities and many colleges. Each university has a department or at least a unit of statistics, and research is of high level in basically all the areas of statistics. Some of our researchers are world leaders in their fields of research. Also, many companies and institutions such as Intel, Teva (a famous big pharmaceutical company), the Bank of Israel and the big banks have strong research groups in statistics. And, we have the Central Bureau of Statistics which produces most of the official statistics. There are many strong interactions between researchers from Israel and researchers from other countries. They come to Israel and we visit them for joint research. In particular, there are close relationships with researchers from Europe and the USA.

Q3: *As a highly respected statistician, you have published many influential papers in diverse aspects, including survey methodology and official statistics. Could you talk about how you start a new research?*

I think that in most cases, my research actually started with a problem that was brought up to me. People from national statistical offices or universities came to me with problems, and then I started working on them, often jointly with the people who raised them. I should say also that I am more of an applied statistician, trying to find and develop solutions to real, practical problems.

Q4: *Among your published books, which one is your favorite?*

I never wrote my own book. Writing a scientific book takes many years and I never had or made the time for it. What I have done in this respect is that I edited a two-volume book on survey sampling methods with Professor C.R Rao, one of the legend statisticians in the world. The two-volume book (Handbook of Statistics 29A: Sample Surveys: Design, Methods and Applications; Handbook of statistics 29B: Sample Surveys: Inference and Analysis. Edited by Danny Pfeffermann and C.R. Rao. North Holland, 2009) was published in 2009 and it consists of more than 1300 pages in total, covering everything you could think of at the time prior to its publication in the areas of survey sampling and official statistics. I spent a lot of time and effort on editing that book, with full cooperation and enthusiasm of all the coauthors of the 41 chapters included in it.

Q5: *Besides being a professor at the University of Southampton and the Hebrew University of Jerusalem, you also direct the Central Bureau of Statistics in Israel. Have you ever used your research results to solve a real data problem? Do you mind sharing your experience?*

Yes, let me list three examples. I am a consultant for the US Bureau of Labor Statistics. We developed there a model for the US labour force survey (LFS) and they use this model each month for the production of the number of the employed and unemployed people in the fifty-one states of the US. Holland uses a similar model for their LFS and we are currently studying the use of a similar model for the LFS in Israel.

Another example is what I have worked on for many years, namely, how to estimate the variances of seasonally adjusted and trend estimators. A session on this topic is scheduled for the present conference. This again is something that we are trying to apply in Israel.

Someone talked this morning about gross flows which is a measure of the number of people moving from one status to another, for example, the number of people in the labour force, moving from employment to unemployment or out of the labour force. In other word, people who were employed but become unemployed. With my coauthors, we developed models for the probability to move from employment to unemployment or leaving the labour force as a function of education, age, gender, tenure at work etc. Other transitions are obviously also possible, for example, moving from unemployment to employment. So, there are actually many examples that I can mention in answer to your question.

Q6: *Nowadays, BIG DATA is a popular term. Do you think that BIG DATA will change future statistical research?*

To begin with, it is not something that will happen in the future. It is already taking place for several years all over the world. Statisticians and computer scientists are working hard on the use of big data for statistical research.

I am very interested in this topic and in particular, on how to use big data for official statistics, which is a bit different because in official statistics you have to produce estimates of what happens in the entire population. But big data does not necessarily represent the entire population. Consider Facebook data for example. Not every person uses Facebook and not every person that uses Facebook expresses his opinion on topics that might be of interest for official statistics. So, can I just use the data that I get from Facebook and claim that this is what the country thinks? No way. So how can I still use big data for the production of official statistics, even if it is not representative? This is a very hard research problem.

Another problem with the use of big data is how to get access to it. For example, we would like to get data from telephone companies that will tell us where people are at a given time, from where they travelled and where to. Telephone companies have this kind of data and much more. This is a very valuable source of information which we would like to merge with available information on the characteristics of the travellers, but

will the telephone companies provide us this information? The telephone companies are committed to their customers not to pass on any individual information so as to protect their privacy. This is just one example for the problems we are facing in getting access to big data, which we would like to use for the production of official statistics.

Q7: *Data science is becoming one of the hottest topics attracting students everywhere. Could you give some suggestions to these students*?

As you correctly state, there are many universities all over the world and many departments of statistics that offer courses and degrees in what is known as data science. Data science basically integrates statistics and computer science. The Hebrew University in Jerusalem and other universities in Israel also develop this kind of joint programmes. So, this is where statistics is heading to, although I personally think that students will still need to be knowledgeable of what we call classical statistics, such as survey sampling or time series modelling, even in the new era of big data and all the other huge methodological and technical advancements.

I don't know what to say to students who have the necessary mathematical talents to become data scientists. The future is probably in the use of big data, but as I just said, I still think that classical statisticians will be needed, at least in the foreseen future, for example, for the production of official statistics. I cannot see how we shall be able to avoid completely the use of surveys, although some of them may become redundant. Will there continue to be professors researching in classical statistics to teach it? To this I don't have a definite answer.

Q8: *This is our last question. We are here to celebrate your birthday. Would you like to share with us your further plans*?

For the next three years, I am committed to continue my job as Director of the Central Bureau of Statistics in Israel. I shall have to retire from this job afterwards, because it is an eight-year appointment. So when I finish, I will be 78 years old. I don't really know what I will do afterwards. I continue teaching voluntarily at the Hebrew University, and I am a member of staff at the University of Southampton. I hope to stay in good health and continue my teaching and research activities. What I shall definitely do after retiring from my current appointment is to spend more time with my family. They keep complaining that they hardly see me.

Disclosure statement

No potential conflict of interest was reported by the authors.