

CHALLENGES AND AVENUES FOR CHANGES IN STATISTICAL EDUCATION IN TRANSITION COUNTRIES: THE CASE OF BULGARIA

Mariana Kotzeva and Stoyan Tzvetkov
University of National and World Economy-Sofia
Bulgaria

INTRODUCTION

Transition to a market economy has generated increasing importance of both data and analytical statistical tools for business and government. Profound economic reforms changed the underestimated role of statistics under central planning and evidenced the need to use it more actively as basis for carrying out national policy and strategies in all economic sectors. In addition the process of accession of Bulgaria to the European Union requires the harmonization of legislation concerned with statistics and compliance of basic statistical surveys with the EU standards and the main EU policies. As a result during the last 10 years noticeable changes in the organization and methodology of official statistics took place in Bulgaria. This process has been facilitated by the advances in Information Technology (IT). The IT revolution and the Internet in particular has greatly increased the feasibility of easy communication of huge data sets at all levels of summary and enriches the opportunities to apply the sophisticated tools associated with large data sets.

The much more “data-based society” born by the IT progress led to the raising demand for statistical services provided by well trained professionals in the field as well as posed the issue of building-up statistical literacy of non-statisticians using statistics in their professional or daily life. Having in mind that the process of gaining recognition and importance of statistics maybe expected to continue at an accelerating rate in the foreseeable future, now it is time to be thinking about the challenges and avenues for developments in statistical education in the country. Consequently this paper attempts to view the totality of changes, taking place in the society, to reveal their implications for education in statistics and to propose ideas for effective response to them. The paper tries to outline the full set of directions for improvement of both content and delivery education in statistics based on the different target audiences. However, as regards to the proposals for changes that should be implemented in order to provide up-to-date and relevant to the society needs education, the focus is on the teaching and learning statistics at the tertiary level of education. The paper considers the case of Bulgaria but taking into account the similar trends of development some useful lessons can be derived for the other transition and developing countries.

CURRENT SITUATION OF STATISTICAL EDUCATION IN BULGARIA – A GOOD STARTING POINT FOR FUTURE CHANGES

Statistical education in Bulgaria has long history. The extensive experience in teaching statistics provides a solid background for successful response to the challenges brought by the new century. Without going to expandable historical details, this section summarizes the main characteristics of Bulgarian education in statistics that in our opinion clearly show the good starting position of the country for implementing the necessary changes in statistics:

- Bulgarian tertiary education has produced graduated statisticians for more than 50 years and this practice has been unique in the block of former socialist countries and in the region of Balkans. The B.A. and M.A. programs in Statistics are accommodated in the three Higher Economic Schools existing in the country. The B.A. program includes 4 years and the M.A. program 1 year of education. The specific future of these programs is that they provide solid theoretical background but the emphasis is on the applied side of statistics. One of the important goals of training of future professional statisticians is to prepare part of them to work in the system of official statistics. The existence of special programs geared to official statistics is also not very common experience in the both developed and developing countries, but the Bulgarian experience has strongly supported usefulness of such practice for successful performance of national statistics.

- The programs in Statistics offer in their curriculum a rich set of courses that provide theoretical background but also expose students to the issues of applied statistics. The required classes include a block of fundamental disciplines such as Introduction to the Theory Statistics, Statistical Inference, Sample Surveys, Statistics of Relationships, Time-series Analysis and Forecasting, Econometrics, Multivariate Methods, Statistical Packages. A second block of required classes linked tightly to the official statistics includes Macroeconomic Statistics, Business and Enterprise Statistics, Demography, Statistics of Inflation, Financial Statistics, Design of Statistical Information Systems, International Statistical Comparisons, Regional Statistics, Data Preparation and Processing. A set of elective classes such as Statistics in Marketing, Social and Political empirical surveys, Quality Control, Advanced Econometrics, Advanced Forecasting, Experimental Design, Decision Making under Uncertainty, Environmental Statistics, Social Statistics provides opportunity for students to specialize in particular field of statistics.
- Bulgarian tertiary education offers required extensive introductory course of Statistics for undergraduates in non-statistics degree programs. For example students in the economic universities have required introductory course of 120 hours (45 minutes each) dealing with descriptive statistics, statistical inference, ANOVA, measures of association, regression, time series with some variation in the scope and deepness of each of the topics included depending on the major field of the students. Each introductory course includes also selected topics related to official statistics. Most of them focus of the principles and structure of System of National Accounts and on the system of indicators, data sources and methodology applied in the field. Many departments with non-statistics degree programs started to introduce secondary required classes of statistics that cover advanced statistical methods applied in their field and the typical issues arising in the official statistics area. Those courses are mostly thought by statisticians from statistics departments.
- Statistics has been delivered also at secondary level of education. For the secondary economic schools it has been a major required class for more than 40 years. Since 2000 selected topics from Statistics such as descriptive statistics, visualization of data, sources of data has been thought in all secondary schools as part of Mathematics classes.
- The principle of “stand-alone” Statistics departments has been always applied in the country. Despite that some authors have discussed the threats to the future of such separate Statistics departments (Iman, 1994; Kettenring, 1997), from teaching and learning perspective this practice seems to be effective. Additional advantage is that such “stand-alone” departments appear as focal points for easy and close co-operation between theory and practice, where new contributions to the science are created.
- Strategy of continuing professional development initiatives and programs has been applied where a special attention on young faculty members has been paid. One example is the International Summer School in Applied Statistics and Econometrics that was established in June 1999 by the department of Statistics and Econometrics, University of National and World Economy-Sofia. It was aimed at helping young faculty members from transition countries in developing new courses or at improving their pedagogical skills. The first edition of school in 1999 was devoted to the Advances in Time Series Analysis and Forecasting and this year edition is dealing with Modern Approaches in Teaching and Research in Demography in the Regions with Ethnic Minorities.

WHAT FOLLOWS IN THE FORESEEN FUTURE?

The changes that should be implemented in Statistical education in Bulgaria in order to respond to the current society needs maybe classified in the following groups according to the target audience that receives statistical knowledge: training of potential professionals, training of potential academics, training of non-statisticians, using statistics in their professional life; developing of statistical literacy at secondary school level. In the rest of the paper the necessary

changes in both the content and delivery of the teaching in Statistics for each of the group are considered.

- *training of potential professionals* – This area seems to be the one of least concern due to the well established traditions in producing graduates in Statistics. The changes here would most probably be of evolutionary rather than radical character. The tendency of permanent update of the courses' content in accordance with the latest achievements in theory and practice and improvement of the knowledge delivery based on IT will continue. Finding an appropriate balance between theory and applications of methods with the use of IT seems to be the main challenge for training of professionals at the tertiary level of education in the future. There has not been solid empirical evidence on the effectiveness of computer-based classes and this is research area in education that needs further exploration in Bulgaria. One issue of raising concern is the insufficient number of students who would like to specialize in Statistics in last years. The decreasing enrollment in Statistics programs reflects in part the current failure of the profession to communicate the relevance and importance of Statistics. Substantial efforts have to be spent on developing strategy for making young people aware of the content of statistical profession. The required classes in Statistics at secondary school level should include topics considering the vital role that the science, practice and profession play in all aspects of life.
- *training of potential academics as well as post-graduate training of government officials* These are areas that are at very early stage of development. According to the new Law on Statistics adopted in 1996 the process of data collection is not centralized in National Statistical Institute. All governmental bodies are given the opportunity to develop their own information systems, to carry out independent surveys, to collect data and also to produce some analytical reports. Therefore there is increasing demand for statistical knowledge and hence the obvious need for developing of appropriate forms of training experts from the relevant institutions.
- *training of non-statisticians, using statistics in their professional life* – Despite of the increase of departments in universities offering second course of Statistics beyond the introductory classes, their number is still insufficient. Two reasons for limited scope of additional statistics at the tertiary level can be depicted. The first one is related to the reluctance of faculty to offer more statistics to their students, because they do not find it is important to have it. Unfortunately it is also a common practice to incorporate selected statistical methods used in the particular field in other courses and to thought them without the necessary depth and fully understanding of the state of art. As regards to the students they usually do not take more statistics when it is optional for them for a number of reasons. Very often they disliked the too theoretical, full of borrowing computations required classes or they liked them but are still I bit afraid of it discouraged by friends. Variety of innovative strategies for teaching Statistics have been developed in last years (see Moore, 1997 for overview) but the lecture and note taking approach continue to dominate. The students are still passively receiving the knowledge rather than actively participating in the process of constructing their knowledge. The lack of appropriate hardware and software appear to be very serious obstacle for introducing modern approaches and tools of teaching in transition countries. In addition the faculties need special training in using more actively such tools in course delivery.

Another very important avenue for improving quality of statistical education is the enriching of statistical classes with selected topics related to official statistics. The economic changes and IT revolution imposed the need to expose students to the issues that they will meet often in their future professional life while using statistical data. Such topics include issues of confidentiality of data and its management by data providers, spurious significance from large data sets, non-response bias in sample surveys, requirements for comparison across time and regions, assessment of data quality, etc. One way to expose students to the issues associated with official statistics without distracting them too much from the mainstream topics of data analysis and inference is to give them projects involving official data sources. Use of the

Internet allows easy access to large data sets in electronic format. Working with real data sets favors understanding of statistical methods and helps to develop students' interest in the subject.

CONCLUSIONS

The paper considers the main determinants that will drive the future teaching and training in statistics in Bulgaria. Some avenues for changes in the statistical education mainly at the tertiary level are outlined. The main conclusion stemming from the paper is that Continuous Quality Improvement (or CQI, see Hogg, 1999) will have to become a way of life. Serious debate about the future of the discipline and profession has to be initiated in all transition countries. International experience in any aspect of teaching Statistics is welcome but three are the areas where the co-operation and exchange of ideas would be extremely useful – the training of faculty from Statistics departments in the universities in using modern strategies and tools of teaching based on information technologies; establishment of institutional framework for post-graduate training of governmental officials using statistics in their professional life and communication to the others the vital role that Statistics plays in all aspects of life.

REFERENCES

- Cox, D.R. (1997). The current position of statistics: a personal view. *ISI Review*, 65,277-280.
- Hogg, R.V. (1999). Let's use CQI in our statistics programs (with discussion). *American Statistics*, 53, 7-14.
- Hunter, J.S. (1994). Statistics as a profession. *Journal of the American Statistical Association*, 89, 1-6.
- Iman, R.L. (1994). Statistics departments under siege. *Amstat News*, 212, 6-7.
- Kettenring, J.R. (1997). The birth, life and death of statistics departments. *Amstat News*, 245, 9-10.
- Moore, D.S. (1997). New pedagogy and new content: the case of Statistics. *ISI Review*, 65, 123-137.