LARGE-SCALE STUDY ON THE EFFECTS ON AGRICULTURE AND FOOD INDUSTRY IN JAPAN FROM THE NATURAL CALAMITY IN MARCH 2011

On March 11, 2011 the strongest ever recorded in Japan earthquake occurred (widely known as "The Great East Japan Earthquake") which triggered a powerful tsunami and caused a nuclear accident in one of the world's largest nuclear plant stations (Fukushima Daichi). The triple disaster caused adverse effect on people's life, health and property, infrastructure, supply chains, economy, policies, natural and institutional environment, etc. in the affected regions in and outside Japan.

The recently published book by Prof. Hrabrin Bachev (Institute of Agricultural Economy, Sofia), and Prof. Fusao Ito (Tohoku University in Sendai)[1] is issued in English on the eve of the forth anniversary of the most devastating "natural and man-made" disasters in the world history. It is among the few in-depth studies, in a language different from Japanese, trying to give comprehensive insight on socio-economic impacts of the March 2011 disasters on agri-food chains in Japan.

The two researchers have tried to identify and assess diverse impacts from the March 2011 disasters on the Japanese agriculture and food chains covering: *all types of impacts* (radiation, displacement, health, physiological, production, economic, technological, organizational, environmental, institutional, legal, political, direct, indirect), *all stages* (inputs supply, farming, storage, wholesaling, transportation, processing, distribution, retailing, consumption) and *components* (natural resources, labor, biological assets, material assets, intangibles, technology, production structure, finance, waste disposal, information, management) of agri-food chain, and all *temporal* (immediate, short-term, long-term) and *spatial* (local, regional, national, trans-national) scales.

What is more, the authors have made a good attempt to highlight and evaluate responses of different agents (individuals, households, farms, businesses, communities, consumers, stakeholders, local and central authorities, NGOs, international institutions) as well as the progress and challenges in post-disaster recovery and reconstruction of various agents, regions, and subsectors.

The large-scale and comprehensive investigation has enabled the authors to withdraw numerous lessons from the Japanese experiences, and suggest recommendations for improving disaster risk preparedness and management not only in Japan, but also in other countries with similar conditions like Bulgaria (high risks for natural disasters and industrial accidents, available nuclear power station(s) and dependence from nuclear energy, vulnerable communities and agri-food chains, etc.).

[1] *Bachev, Hrabrin and Fusao Ito* (2015). March 2011 Earthquake, Tsunami, and Fukushima Nuclear Disaster - Impacts on Japanese Agriculture and Food Sector. LAP Lambert Academic Publishing, 408 p.

The thorough investigation of that unique "triple" disaster, involving an earthquake, a tsunami, and a nuclear accident, focuses on implications for agriculture, food sector, and consumer behavior. The authors have tried to overcome difficulties associated with understanding and assessment of individual effects caused by the multiplicity, interdependency, synergy and multidirectional character, surround big uncertainty, shortage and controversy of data, large temporal and spatial scales, multiple agents with different perception, time horizon and interests involved, imperfect methods of assessment and integration. For reaching that goal they extended the commonly applied unilateral ("pure" economic, or sociological, or institutional, or ecological, or medical, etc.) approach and applied interdisciplinary, holistic and multi-sector analyses, interpreting successfully available diverse (research, statistical, survey, expert, case study, annex, forecast) data and assessments.

The two scientists have thoroughly looked for, found and applied a wide range of official (governmental, farming, industrial and international organizations, Fukushima nuclear power plat operator's, etc.) data as well as information from publications in local and international media, research, experts and stakeholders' reports, etc. In addition, they successfully filled the existing "information gaps", improved accuracy, underlined and (partially) overcome controversy with specially organized experts' assessments and numerous in-depth interviews with leading experts and representatives of governments, farmers, food industries, and non-governmental organizations, and affected farmers, businesses and consumers.

The text is also well illustrated with more than 200 figures, tables, maps and photos, while the reference list contains about 400 sources with multiple links to major protected data sources and illustrations (online data base, photos, maps, etc.). All that speaks for itself for the book's research and informative value, good design and modern presentation.

All data and findings in the book are presented in compliance with the high academic standards. At the same time, book is written in a popular style, easy to understand by non-professionals. That makes the study interesting for the large public - from narrow specialists and experts, researchers, educators, students, farmers, businessmen, administrators, policy makers, professionals, non-governmental and international organizations, to consumers, victims, and public at large.

The book contains a preface, introduction, three parts, and a conclusion. The first part begins with a short description of the three events and their immediate effects. The overall impacts on population (human damages, health effects, massive evacuation and migration), economy (property, infrastructure, financial and other damages, implications for supply and demands, GDP, economic resources, compensation and insurance claims, export and import), and natural environment (destruction and contamination of air, lands, waters, living organisms, eco-systems) are identified and assessed.

Next, the impacts on agri-food organizations, products, markets and regulations are evaluated. This part comprises a detailed analysis of affected farms and agricultural resources; state and progress of restoration of agricultural entities,

lands, and infrastructure; diverse impact on food industries companies and productions; state and evolution of radioactive contamination of agri-food products; effects on agri-food markets, consumers behavior, and international trade; effects on food regulation and inspection system; specification of farms and agri-businesses damages from the Fukushima nuclear accident, etc.

In the third part, the overall impacts on agri-food production, distribution and consumption are estimated, distinguishing major types of farms, subsectors and regions in the country. This part includes a detailed analysis of: disasters' impact on farms' number, farmland use, and agricultural employment; impact on agricultural productions, output and income; impact on farm and households economy (agricultural expenditures, income, debt, insurance, public support); assessments of the specific and the overall impacts of March 2011 disasters; as well as the factors for the disasters, effects and recovery, etc.

Finally, a conclusion is made with major findings, lessons learned, and recommendations for improving public policies, and individual, business and collective actions for effective risk management in Japan and around the globe.

The study has found out that agriculture, food industry, and food consumption are among the areas hit worst by the disasters. There is also a great variation of the specific and combined impacts of the earthquake, tsunami, and nuclear disaster on different type of farming and business enterprises (small and medium scale), particular agents (farmers), individual sub-sectors (rice, vegetables, beef), and specific locations (evacuation and neighboring zones, seaside). Moreover, there have been enormous damages and long-term consequences on farming and rural households, important properties (farmland, livestock, orchards), personal ties, established brands, informal organizations and traditional communities. In addition, the 2011 disasters have considerably aggravated some already existing problems of the agrarian and rural regions such as: aging and shrinking population, lack of labor and young entrepreneurs, low competitiveness and efficiency, income and services disparities, etc.

On the other hand, March 2011 disasters have had positive impacts on the development of certain (more resilient, adaptive) sectors in the most affected regions (e.g. horticulture) and some (traditional, prospective) sectors in other parts of the country. The post disaster recovery and reconstruction have given opportunities and induced considerable policies and institutional modernization in agri-food (further liberalization, reforming old cooperative structures) and other (e.g. energy, security) sectors, food safety information and inspection, technological and product innovation (e.g. bio-energy, plant factories, solar sharing for farming and green energy production, information and communication technology applications), jobs creation and investment, farmlands consolidation and enhancement, infrastructural amelioration, organizational restructuring, etc.

The major lessons summarized in the book are:

The triple disaster was a rare but a high impact event, therefore, it is necessary to "prepare for unexpected"; risk assessment is to include diverse hazards and

multiple effects of a likely disaster. The risk assessment should be discussed with all stakeholders. Measures should be taken to educate and train everyone for complex disasters. It is necessary to modernize property rights, regulations, safety standards, and norms. It is important to set up tools for effective public resource allocation and reduction of agents' costs. The different units of agri-food chain have dissimilar capabilityq requiring differential public support. There is a strong "regional" interdependency of agrarian, food and rural assets (and damages) and it is important to properly locate risk and take prevention and recover measures. Before, during and after a disaster all available information from all sources must be published immediately in understandable form by all possible means. Thus lessons could be learned, providing an opportunity to discuss, introduce and implement fundamental changes in agricultural, economic, regional, energy, disaster management policies;

This book presents quite well findings of a "study in progress" summarizing the enormous "current knowledge" and giving the readers a "better" picture about the agri-food chain implications of the March 2011 disasters. Nevertheless, "complete" assessments in many areas are difficult or impossible (e.g. on implications of evolving nuclear crisis, feasible pace of recovery and reconstruction, total long term costs, etc.), which would inevitably make certain data and conclusions outdated in near future when more precise information will be available.

Understandably every research on such a complicated matter is incomplete due to the "short" period of time after the disasters, insufficient and controversial data, difficulties to adequately assess longer term implications, etc. Besides, all efforts of a small team of two on such an enormous subject are presumably insufficient to assess accurately diverse implications in specific conditions of each agent, type of organization, subsector, and location. Therefore, more multidisciplinary, large team and long-term efforts with more "micro-economic" studies would be necessary to identify and "fully" evaluate specific impacts, factors and challenges of the 2011 disasters in agriculture and food sector.

Having in mind the huge experts', media, local and international public interests, and the facts, that most information and publications are in Japanese, and that available assessments are solely made by Japanese or foreigners, this joint work is very timely and has a high academic and practical value. It enables international and Japanese readers to get a better insight on the scale and diverse agri-food implications of the March 2011 disasters, and learn from the Japanese experience for effective disaster preparedness, prevention, recovery and reconstruction.

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