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## FOREWORD

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In 20–24 June 2016, 33 scientists and policymakers from the United States, Asia, and Europe met in Vienna, Austria, for a conference called ‘Vulnerability of Agricultural Production Networks and Global Food Value Chains Due to Natural Disasters’. The conference was organised by the Economic Research Institute of ASEAN and East Asia in cooperation with the Technische Universität Wien, and supported by the OECD Co-operative Research Programme: Biological Resource Management for Sustainable Agricultural Systems.

The host country of the conference has increasingly been experiencing more extreme weather events including storms, floods, frost, hail, snowfall, and droughts. The annual damage in various economic sectors increased from less than €100 million annually during the 1980s to over €700 million during the first decade of this millennium. For a long time, agriculture and food value chains were spared major damage. The year 2016, however, brought serious challenges for the agricultural sector and damage amounting to several hundred million euros in the first half of the year alone. I welcome the initiative of many distinguished international scholars to shed more light on this topic.

Global food production will need to increase by 80% before 2050 to guarantee the appropriate supply of food for the expected nine billion people on earth. We face challenges in food quantity, food quality, increased natural hazards due to climate change, a deterioration of the natural resource base such as productive soils or fresh water resources, and an increasingly globalised food market with value chains that are both more efficient and more fragile.

Agricultural value chains have become more sophisticated and larger in scale with more stakeholders. Due to the increased complexity and dependences, the vulnerability of agricultural production networks is increasing. More disasters coincide with higher levels of vulnerability. These increase damage and loss in individual units of the agricultural value chain and demand sophisticated countermeasures even at places not hit by

disasters. Increases in prices for agricultural products and higher premiums for insurance against extreme climate events are just two perceivable consequences.

The wide perspective of related topics discussed in Austria and outlined in this report will help create an appropriate awareness on this issue and support planning for benign actions in many countries. For our sector to prosper, we must ensure that all actors – producers, intermediates, and consumers – face a secure future and are given the perspectives they need to continue their valuable work in uncertain times.



**Andr  Ruppachter**

Federal Minister of Agriculture, Forestry,  
Environment and Water Management



## FOREWORD

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The global interdependence of food supply chains is well known. When one part of the agricultural production network is affected by natural hazards or climate-induced disasters, the consequences reverberate globally: supply decreases and food prices increase. In agricultural production systems, food supply, supply chain infrastructure, and transport to and from local markets are vulnerable to natural hazards. These reduce the availability and affordability of food in the region.

In the developing countries of Asia, for example, 22% of the total economic impact of natural disasters was in the agriculture sector: crops, livestock, fisheries, and forestry. Data, however, are scarce, so little is known about the substantial impact of natural disasters and climate change on the agricultural value chains and the disproportionate burden placed on people who rely on agriculture for their livelihood. No consistent accounting for direct and indirect agriculture losses from natural hazards exist in any of the primary global hazard databases, although some national databases separately record losses in agriculture.

To further understand the vulnerability of global food value chains and to assess policy implications from this understanding, the Economic Research Institute for ASEAN and East Asia (ERIA) co-organised with TU-Wien (the University of Technology Vienna) an international workshop on 20–24 June 2016. This event was sponsored by the Organisation for Economic Co-operation and Development (OECD) Co-operative Research Programme on Biological Resource Management for Sustainable Agricultural Systems. The workshop brought together leading academics from OECD countries and other international organisations to describe several approaches in building resilience to food value chains, share knowledge, and understand risk reduction more from different disciplinary perspectives. ERIA is happy to collaborate in that knowledge initiative.

I acknowledge the support of the Government of Austria's Federal Ministry of Agriculture, Forestry, Environment and Water Management and OECD for their efficient organisation and helpful support in planning and running the workshop. The essence of this joint effort

can be captured in the recommendations that follow each chapter. These are collected in the summary section.

This book is based on papers presented and discussed in that workshop. It comes at a critical time as we are looking for innovative approaches to support the implementation of the Sendai Framework for Disaster Risk Reduction and the ASEAN Community Vision 2025. The chapters assist in clarifying resilient pathways in the vital process of disaster risk management and adaptation to climate change. As the authors continue to research, debate, analyse, and propose an enabling environment to food value chain resilience, new publications like this bring fresh insights into policy development.

Here we emphasise the need for holistic actions: for improved resilience of global food value chains rather than narrowly drawn sectoral approaches, for innovative disaster risk management measures rather than reliance on established patterns, and ensuring that governments and the private sector take the powerful lead in implementing robust institutional frameworks rather than entrusting the task to communities and international agencies. I am confident that this book will contribute to policy development and academic understanding in an area where new acumen is urgently needed.



**Hidetoshi Nishimura**

President  
Economic Research Institute for  
ASEAN and East Asia



# PREFACE



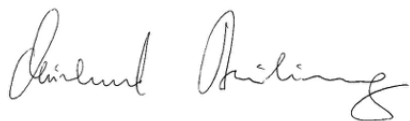
‘Vulnerability of Agricultural Production Networks and Global Food Value Chains Due to Natural Disasters’ was a conference organised by the Economic Research Institute of ASEAN and East Asia (ERIA), a Jakarta-based international institute, and TU Wien, and supported by the Organization for Economic Co-operation and Development Co-operative Research Programme: Biological Resource Management for Sustainable Agricultural Systems. It was attended by 60 participants and involved specialists in economics, natural resource management, and risk research from academia, industry, and public administration, as well as local stakeholders from the Wachau Region in Lower Austria, a rural wine-producing region some 80 km west of Vienna, Austria. Just a few weeks before the conference, the stakeholders had been affected by late frost events that damaged almost the entire 2016 harvest. This meant that nobody needed to be convinced about how timely the topic on our agenda was. However, perceptions of the problem by the participating individuals can be different for many reasons, including their professional orientation, country of origin, practical or theoretical approach, and kinds of risks and disasters experienced.

The topics of the four scientific sessions were: 1) the nexus of agricultural production networks and global food value chains and natural disasters; 2) natural disasters and agricultural production: numbers, models, measures, and current policies; 3) lessons to be learned for agricultural production networks and food value chains; and 4) decreasing vulnerability to natural disasters in agricultural production networks and food value chains. There were 30 contributors for the conference, 24 scheduled in the programme, two bus lectures during study tour, and two ad hoc presentations during session 4 by policymakers from Austria. In addition, there were four stakeholder presentations during the study tour in the Wachau Cultural Landscape.

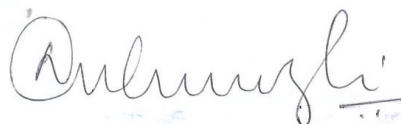
In particular, the conference shed light on the fact that we are still at an initial stage with our subject and that it will occupy us much more during the coming years or even decades. Concerning agricultural production networks and global food value chains, our speakers referred to three polarities: a) having food or not; b) having expensive, high-quality food or inexpensive, high-quantity food; and c) generating higher value through organic food or high-tech food production strategies. In the first, we have yet to find a value chain. Here, the satisfaction of basic demands is in focus and there is no choice of strategy. The second case takes us further to the level of decision making. When basic demands are met, we can aim for just food or set our targets on quality food. It becomes

additionally important that food is healthy and free from chemical residuals; tastes good; and has fresh appearance, a special aroma, a certain content mix (such as low fat, sugar free, amino-acid rich, etc.), and in general, standards that consumers request and producers can fulfil. The third case relates to different philosophies on how one can reach quality food standards, either by kinds of organic (or integrated) agriculture with less inputs of pesticides and industrial fertilisers and more human inputs, or with technology-driven innovations where growth conditions and resource consumption are optimised. Regarding the value chain, the second case represents the start of an agricultural value chain while the third is the alteration and multiplication of the food value chain in different strategic directions.

With regard to disasters, the three cases can be seen as follows: a) historically, in the first case investigated, hunger or lack of food was thought of as a natural disaster but was actually more indicative of limitations in the food supply networks; b) producing high quantities and food surpluses means both robustness against famine as deficits can be balanced by food imports and limitation due to decreased soil fertility or less availability of good-quality water; c) greatly reduced disaster vulnerability due to quality food production either by increasing local resilience through organic agriculture production methods or by decreasing the external influence of adverse factors through better information and controlling growth parameters in information and communication technology or smart farming applications.



**Meinhard Breiling**



**Venkatachalam Anbumozhi**

