Soraj Hongladarom *Editor*

Food Security and Food Safety for the Twenty-first Century

Proceedings of APSAFE2013

Springer

Food Security and Food Safety for the Twenty-first Century

Soraj Hongladarom
Editor

Food Security and Food Safety for the Twenty-first Century

Proceedings of APSAFE2013

Springer

Editor
Soraj Hongladarom
Department of Philosophy and Center
for Ethics of Science and Technology
Chulalongkorn University
Bangkok, Thailand

ISBN 978-981-287-416-0 ISBN 978-981-287-417-7 (eBook)
DOI 10.1007/978-981-287-417-7

Library of Congress Control Number: 2015936193

Springer Singapore Heidelberg New York Dordrecht London

Printed on acid-free paper

Springer Science+Business Media Singapore Pte Ltd. is part of Springer Science+Business Media (www.springer.com)

Preface

The following volume is a collection of some of the papers presented at the First International Conference of the Asia-Pacific Society for Agricultural and Food Ethics, or APSAFE2013, which was held at Chulalongkorn University from November 28 to 30, 2013. The Asia-Pacific Society is a sister organization of the European Society for Agricultural and Food Ethics (EurSAFE), which has held a series of conferences regularly for the past few decades. As food and agriculture obviously are among the most important parts of our lives no matter where we live, ethical considerations of food and agriculture are then very important, and the issue has gained worldwide interest not only as a newly emerging academic discipline but also as an important issue in the globalized world of today where food travels across nations and cultures at amazing speed. What you have here is a fruit of a long collaboration effort involving many nations spanning the globe, effort of scholars, scientists, and philosophers who are concerned about food and agriculture in their various dimensions. These scholars came from a large variety of disciplines, and they look at the central topic through a large array of disciplinary lenses. Moreover, those who joined forces for the conference were not only scholars but also included members of the agribusiness sector, who clearly have a stake in the global deliberation on food. We also had the participation of the Food and Agriculture Organization (FAO), a United Nations organization that focuses on food security worldwide.

The conference was jointly organized by the Center for Ethics of Science and Technology and the then Office of the Commission on Agricultural Resource Education (OCARE), which has just assumed a new name, School of Agricultural Resources (SAR). The SAR is a new organization at Chulalongkorn University that concentrates on providing education to Chula students on agricultural and related topics. The Office of the UNESCO in Bangkok is also providing close collaboration. Funding for the conference is partially supported by a research grant from the National Research Council of Thailand.

The idea of establishing the Asia-Pacific Society for Agricultural and Food Ethics originated at a meeting organized by the UNESCO in Bangkok in December 2011. The President and Vice-President of the European Society, Prof. Matthias Kaiser

and Prof. Kate Millar, were present at the meeting, together with Dr. Soraj Hongladarom, Director of the Center for Ethics of Science and Technology, Chulalongkorn University, Dr. Kriengkrai Satapornvanit from Kasetsart University, and Dr. Pakki Reddi from India, both of whom had been collaborating with Profs. Kaiser and Millar on a project funded by the European Union on ethics of food production. Dr. Darryl Macer, Regional Advisor for Science and Human Science in the Asia and the Pacific, UNESCO, Bangkok, was also present.

It was resolved during the meeting that the Asia-Pacific Society for Agricultural and Food Ethics be established in order to provide a forum of exchange of research findings and networking among scholars and scientists working on the ethical implications of food and agricultural production. Agricultural and food ethics is an interdisciplinary field consisting mainly of applied ethics, sociology, political science, economics, food science, environmental science, and others whose main concern is the relation between food and agriculture on the one hand, and the socio-economic and cultural milieux in which food and agriculture find themselves on the other. Among the questions investigated in this field are: Are genetically modified food a viable alternative as a source of food for the present century? What are the ethical considerations surrounding the practice of aquaculture, such as safety issues, global justice, threats to the environment, and so on? Surely these questions are very important in today's interconnected world and need to be studied very closely.

It is for this reason that the Asia-Pacific Society for Agricultural and Food Ethics has decided to organize its first international conference, and the Center for Ethics of Science and Technology, Faculty of Arts, Chulalongkorn University, was deeply honored to have been formally invited by both the APSAFE and the EurSAFE to organize the meeting in November 28–30, 2013. The congress will represent the first attempt by scholars and scientists in the Asian and the Pacific regions to get together to share thoughts, insights, and research findings and to create and deepen networking among scholars in Asia and elsewhere.

More than 80 scholars and scientists from more than 20 countries across the globe came to share their research findings at the conference. This is highly satisfactory for us organizers because usually the first conference of anything typically has problems attracting participants because people do not know of the organization or the association that organizes the event before and naturally it takes time to build up the level of trust that is required before scholars can decide to invest their time and effort into traveling across continents to participate. Despite the obstacles a strong number of participants showed up, and they made acquaintances and collaborative effort with one another once they got to meet. Out of the 80 or so papers presented, a total of 27 papers were selected as parts of these proceedings.

The main theme for the November 2013 conference was the balance between food security and food safety. As is well known, the two concepts do not naturally go along with each other well. Enhancing one could diminish concern of the other. As the highly publicized baby powder milk scandal in China (where the chemical substance melamine was found in the milk) shows, the rush toward profit motive can result in very serious health risks for the consumers, and food is certainly life and death issue, not counting, of course, the problem of malnutrition and famine.

In any case, it was thought that a balance needed to be found between food security and food safety. As food production has become mechanized and industrialized, increasing food supply in order to meet the demand of the growing population has to be balanced with the use of technology to ensure safety for the consumers. Hence, there is no other way to go except to realize that food safety and security have to go together and both are clearly indispensable.

The November conference divided the main theme into four issues, namely, ethical considerations pertaining to the production of food, ethical considerations pertaining to the distribution and trading of food, environmental aspects including sustainability and other contextual issues, and food policy and regulatory issues in Asia and beyond. For these proceedings the papers are divided into two broad categories, namely, ethical issues surrounding production of food and those surrounding food distribution. Amartya Sen has famously said that food shortage problem is not due to that there is not enough food, but lack of proper distribution of food. This may or may not be wholly true, but in any case it points to the need for further research into ethical considerations of both production and distribution of food. The papers discuss both production and distribution in a variety of ways that merit close study and at least serve as a source of references and a springboard for further research on the issue.

The conference received tremendous help from all the staff of the SAR, most importantly Prof. Dr. Annop Kunavongkrit, who was the Secretariat of the conference and was a key person in making the conference a reality. Without his untiring effort and his special connection in finding local sponsors, it is very doubtful that the conference could ever be held. Apart from Prof. Annop all other members of the School of Agricultural Resources joined hands in making the conference a success. These include Dr. Kiattisak Duangmal, Dr. Supawan Visetnoi, Dr. Pimpinan Somsong, and many others. Special thanks are owed to every member of the SAR here. Furthermore, the conference also received help from the Faculty of Veterinary Medicine and the Center for Peace Resolution and Conflict Studies, Chulalongkorn University.

It is expected that the APSAFE Conference will be held for the second time some time in 2015 or 2016. Thus, the momentum of pushing forward scholarly reflection and scientific studies of the social, cultural, and ethical forces around food and agriculture will certainly continue for the benefit of us all in this interlocking and globalized world.

Bangkok, Thailand Soraj Hongladarom

Contents

Part I
Keynote Paper

Chapter 1
Can Food Science Reduce World Hunger?

Ken Buckle

Abstract The world has seen bewildering changes in population, food production, preservation technologies, world food trade, food safety challenges, climate change and ethical issues during the past 200 years. UN predictions indicate that at the current rate of population increase, world population may reach 9B by 2050, yet suitable arable land will likely decrease and population drifts to cities will see over 6B people in urban areas. Demands on food production and food preservation will be huge. Currently we can feed a population of about 7B, but food and feed losses during production and postharvest storage and transportation are unacceptable. Nearly 1B people are chronically hungry, and food-borne illnesses have not disappeared despite increases in the understanding of microbial physiology and the factors contributing to food-borne illnesses. The global distribution of food, and an increased desire for more exotic and 'less preserved' foods, has kept food microbiologists and public health officials busier than expected with significant numbers of consumers still affected by both morbidity and mortality from food consumption. Consumers' knowledge about modern foods has not kept pace with such developments. There are major decisions ahead for the food, feed and health industries, as well as education institutions and political systems, to make appropriate decisions to tackle such difficult questions. Can science and technology advances, including GM food production and 'modern' food preservation and storage technologies, keep pace and make an impact on the global food supply and the obesity epidemic? Are we up to the challenge?

Keywords Food security • Food waste • Postharvest losses • Food preservation

K. Buckle (✉)
Food Science and Technology Group, School of Chemical Engineering,
The University of New South Wales, Sydney, NSW 2052, Australia
e-mail: k.buckle@unsw.edu.au

S. Hongladarom (ed.), *Food Security and Food Safety for the Twenty-first Century*, DOI 10.1007/978-981-287-417-7_1

1.1 Introduction

We are all 'experts' on foods as we consume them several times a day. The advent of the Internet, home/portable computers and smart phones and related technologies has provided a huge amount of information at the fingertips of consumers, most of whom know very little about the science and technology of food production, processing, packaging and food-borne illness. Yet their views and perceptions about foods, whether right or wrong, can have significant impacts on politicians and the policies they develop and process through government institutions.

Food is constantly in the news, whether it is stories about food waste or malnutrition, developments in processing technologies or genetic modification, court cases concerning deaths or severe illness from food consumption or governments developing national food plans to combat obesity.

Ethical issues about food are not new. Organisations such as PETA and Greenpeace constantly draw attention to issues about humane animal use, or production/modification of foods, that have a place in community debate, provided that facts are presented without bias and preconceived perceptions.

Currently we can feed more than 7B people, although the distribution is such that we have more who are overweight and obese than are chronically undernourished. This imbalance is one of the major challenges in the decades to come. Science and technology must have a major role in that debate, and consumers need to be better educated about modern foods to make appropriate and informed choices.

1.2 Food Security

1.2.1 Millennium Development Goals

The UN Millennium Development Goals were based on the UN Millennium Declaration, signed by world leaders in September 2000. They commit the international community to combating poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women. Each of the eight goals has specific targets and indicators, and Goal 1 (to eradicate extreme poverty and hunger) included the following targets: to halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day and to halve, between 1990 and 2015, the proportion of people who suffer from hunger.

1.2.2 Current Food Security Situation

The UN Food and Agriculture Organization (FAO) has defined food security in the following terms: 'Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences

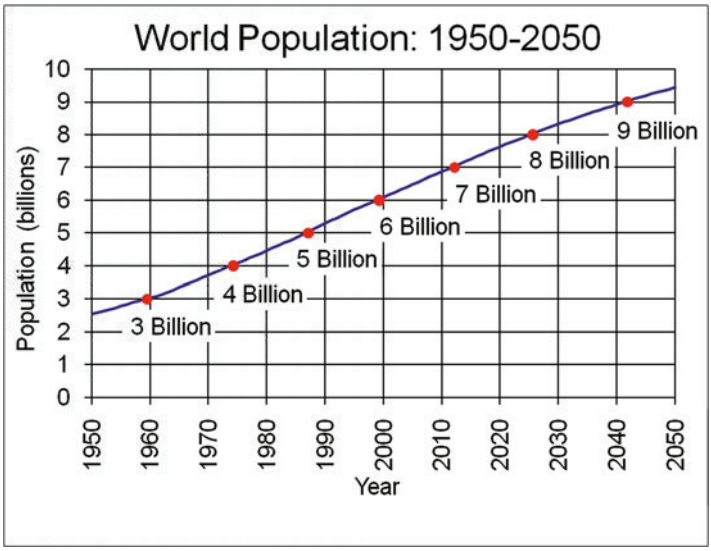

Fig. 1.1 World population growth 1950–2050 (Source: U.S. Census Bureau, International Data Base, June 2011 Update)

for an active and healthy life'. There is little doubt that for many people, food security is not available at all, or for extended periods, especially when crop failures occur as the result of catastrophic environmental conditions and/or when significant price hikes occur for basic food commodities.

World population has increased dramatically in the past 200 years, especially in the past 50 years (Fig. 1.1), with 7B reached in October 2011 and projections of 9B by 2050 and 10–11B by 2060. For the first time there are more people living in cities and urban areas than in rural areas. If 2011 fertility rates continue, the UN reported that by 2100 there would be a world population of 27B and significant population changes in Africa (1–3.6B), India (1.2–1.6B), China (1.3–940M), Nigeria (158–730M), Afghanistan (32–111M) and Australia (22–36M).

The global financial crisis of 2007–2009 resulted in significant increases in food prices, which soared again in the period 2010–2011. During the period January–March 2008, major food commodity prices were the highest for 30–50 years; the FAO Food Price Index increased from 6–9 % (2006) to 44–57 % (March 2007–March 2008), and grain reserves decreased from 115 days (1999–2000) to 53 days in 2007–2008. Rising food prices caused severe hardship, suffering and unrest and had significant social impacts with 100M moving deeper in poverty, there were riots in 23 countries, and governments restricted exports, decreased import tariffs and introduced price controls, consumer subsidies, food rationing and food stamps.

There is capacity to produce sufficient food for everyone in the world; nevertheless, in spite of the progress made over the past 20 years, about 870M people still suffer from chronic hunger, and among children, estimates are that over 170M under 5 years of age are chronically malnourished (stunted), over 100M are underweight,

Table 1.1 Number of undernourished (millions) in different regions

Region	1990–1992	2010–2012
Developed regions	20	16
Southern Asia	327	304
Sub-Saharan Africa	170	234
Eastern Asia	261	167
Southeastern Asia	134	65
Latin America and the Caribbean	65	49
Western Asia and Northern Africa	13	25
Caucasus and Central Asia	9	6
Oceania	1	1
Total	1,000	868

From FAO (2013a)

and 55M are acutely malnourished. Despite these grim statistics, the situation has improved over the past 22 years, especially in Southern, Eastern and Southeastern Asia (Table 1.1, FAO 2013a).

For developing countries as a whole, the prevalence of undernourishment has fallen from 32.2 to 14.9 % over the period 1990–2010, while the incidence of poverty has declined from 47.5 to 22.4 % and that of child mortality from 9.5 to 6.1 %. There are impressive gains, but over 12 % of the world's population is still chronically hungry, and there is still a long way from meeting Millennium Development Goal 1.

1.2.3 Can We Feed 9B by 2050?

In the next 50 years we will consume as much food as we have consumed for the past 500 years. While we can feed 7B people now, there is a lot of waste through spoilage and deterioration. Some countries such as Australia produce far more food (for ~60M people) than can be consumed by their inhabitants (~23M), but threats on the horizon include climate change and increased severity of natural disasters, mining threats to agricultural land and water and increased sales of agricultural land to offshore buyers.

But can we realistically feed 9B by 2050? Yes, but it will not be easy. Julian Cribb, in *The Coming Famine* (Cribb 2010), highlights many of the significant problems to be tackled in the decades ahead if this aim is to be achieved, including doubling the food produced using half the water (6B will live in moderate/severe water shortages by 2050) on far less land, which is degrading at about 1 %/year – the total city land area in 2050 at current predictions will be the size of China and contain >7B people; we must deal with the major problems of diminished oil and the need for additional energy sources, especially for peak loads, while phosphorus, an important component of fertilisers, is becoming scarce and much more expensive.

1.3 The Role of [Food] Science and Technology

Science and technology have made major impacts on developments in food preservation technologies over the past 300 years. The 1700s saw the beginnings of scientific agriculture and feed production. The industrial revolution of the 1800s saw the introduction of mechanisation of food processing and preservation to match increased urbanisation; the development of canning, freezing, chilling and specialised driers; the discovery of the microbiological basis of food spoilage and food and beverage fermentations and the discovery of vitamins and their role in human health. Developments in the 1900s, often the result of the impacts from major wars, saw further developments in drying, freezing, control of water activity (a_w), storage atmosphere, flexible packaging, food additives, irradiation and the introduction of 'novel' or nonthermal technologies to provide consumers with what they are seeking: foods that are high(er) in quality, are more 'natural' and less severely processed, contain fewer chemical preservatives and additives, are nutritionally healthier (less salt and sugar and saturated and *trans* fats and more fibre, calcium and phytochemicals) and are as safe or safer than traditionally preserved foods, which are not an easy task!

At the 12th World Congress of the International Union of Food Science and Technology (IUFoST) held in Chicago, USA, in 2003, Dr Ismail Serageldin, the IUFoST Distinguished Lecturer and at that time the Vice-President of the World Bank, outlined his seven-point answer to food insecurity:

- Increase food and feed production to increase productivity and sustainability
- Make greater use of technology, especially biotechnology and genetically modified (GM) foods
- Develop crops resistant to climate changes (e.g. increased drought and salt tolerance) and able to grow on more marginal soils
- Decrease postharvest and postslaughter losses
- Develop new-generation biofuels based on cellulosic grasses and wastes that will not compete for the same land, water and nutrients as traditional foods
- Agree to a fair international trading system to dampen price spikes
- Encourage public health campaigns to encourage healthy eating and reduce disease

These issues are still relevant and present challenges to all food technologists and those associated with food production, processing, distribution and to consumers.

1.3.1 Increase Productivity and Reduce Food Wastage

Some of the world's highest rates of population growth are predicted to occur in areas that are very dependent on agriculture (crops, livestock, forestry and fisheries) and where there are high rates of food insecurity; hence, growth in the agriculture

sector is one of the most effective means of achieving food security and hence reducing poverty. A key component of increasing agricultural productivity is to invest more funds in agricultural research and development that gave us the Green Revolution four or more decades ago. Increased yields, and crops able to grow on previously marginal soils, increase disposable income, providing greater access to food and education and social harmony.

Food wastage can vary enormously, from near zero to 100 % for different food commodities at particular times of the year, but can average 20–30 % or more for many key commodities. If wastage can be substantially reduced, we can feed hundreds of millions, if not billions, more people now. This is not easy but reductions can be made if there is the will by consumers, food producers and processors and governments.

A recent FAO report (FAO 2013b) is one of the first to analyse the impacts of global food wastage from an environmental perspective. Each year food that is produced but not eaten uses a volume of water equivalent to the annual flow of Russia's Volga River and contributes 3.3 Bt of greenhouse gases into the atmosphere, the third highest emitter after the USA and China. The environmental consequences (excluding fish and seafood) amount to about $750B annually (based on producer prices), equivalent to the GDP of Switzerland. Of the 6 Gt of total agricultural production, about 1.6 Gt of 'primary product equivalents' from 1.4 BHa of land are wasted, of which 1.3 Gt are edible parts of food. About 54 % of the world's wastage occurs upstream during production, postharvest handling and storage, while 46 % occurs downstream at the processing, distribution and consumption stages. Developing countries generally suffer more food losses during agricultural production, while food waste at the retail and consumer level tends to be higher in middle- and high-income regions (31–39 % of total wastage) than in low-income regions (4–16 %). The later a food product is lost along the agri-food chain, the greater the environmental consequences (FAO 2013b).

The report also highlights global environmental hotspots related to food wastage for consideration by decision-makers eager to reduce impacts, including: wastage of cereals in Asia, especially rice, due to the high carbon intensity of rice production methods (paddies are high emitters of methane) and rice wastage; wastage of meat which generates a substantial environmental impact due to land occupation and carbon footprint, especially in high-income areas; fruit wastage which is a hotspot for Asia, Latin America and Europe and vegetable wastage which is high in industrialised Asia, Europe and South and Southeastern Asia.

An FAO 'toolkit' (FAO 2013c) details three general levels where action is required: reduce food wastage overall, by better matching production to demand; when food surpluses are made, reuse within the human food chain through secondary markets or by donating food to vulnerable members of society, and only then use for livestock feed; and where reuse is not possible, recycling and recovery should be used via anaerobic digestion, composting or incineration with energy recovery.

While there is no Nobel Prize for food and agriculture, the World Food Prize (WFP) is regarded as its equivalent. Founded in 1986 by 1970 Nobel Peace Prize

Laureate Dr Norman Borlaug, the father of the 'Green Revolution' of the 1960s and 1970s in Mexico, Asia and Africa, the WFP is the foremost international award recognising the achievements of individuals who have advanced human development by improving the quality, quantity or availability of food in the world. The Prize recognises contributions in any field involved in the world food supply – food and agriculture science and technology, manufacturing, marketing, nutrition, economics, poverty alleviation, political leadership and the social sciences – and emphasises the importance of a nutritious and sustainable food supply for all people (WFP 2013). In a first for food science, the 2007 WFP was awarded to Dr Philip Nelson of Purdue University, for his group's pioneering work in developing bulk aseptic processing, storage and transportation technologies for fruit and vegetable products for ambient storage in containers ranging from 1 to 500 L flexible pouches up to 2–3 ML epoxy-coated steel tanks. We need more of this type of innovative, wide-reaching technology with global impact.

The 2013 Prize was jointly awarded to three scientists (Dr Marc van Montagu, Belgium, and Drs Mary-Dell Chilton and Robert Fraley, USA) for their independent, individual breakthrough achievements in founding, developing and applying modern agricultural biotechnology, making it possible for farmers to grow crops with improved yields, resistance to insects and disease and the ability to tolerate extreme variations in climate. The revolutionary biotechnology discoveries of these three individuals unlocked the key to plant cell transformation using recombinant DNA. Their work led to the development of a host of genetically enhanced crops, which, by 2012, were grown on more than 170 MHa around the globe by more than 17M farmers, over 90 % of whom were small resource-poor farmers in developing countries.

1.3.2 Develop Better Postharvest Technologies and Reduce Postharvest Losses

Despite advances in preservation and storage technologies, postharvest losses are still unacceptable. We need:

- Better preservation combinations to extend shelf life, maintain quality and prevent growth of food-borne disease and food-poisoning organisms, and especially simple but better traditional technologies adapted for the humid tropics.
- Minimal, low-cost, effective packaging.
- More novel, low-energy and nonthermal preservation technologies to supplement the high hydrostatic pressure and pulsed electric field preserved products currently in the market place.
- A campaign by scientists and those concerned about world hunger for a greater acceptance of GM foods, ingredients and technologies, crops that are higher yielding, more resistant to stress and pests, have better nutrient profiles and yield more functional and bioactive ingredients.
- Improved micronutrient fortification technologies with improved bioabsorption and bioactivity.

All require excellent R&D and targeted outcomes to get the biggest return for the minimum investment and, of course, the scientists and technologists, NGOs and governments that have the will and inspiration and money to make a difference.

The call to reduce postharvest losses of perishable crops is not new. The United Nations General Assembly in September 1975 held a special session focussed on world food challenges. Then US Secretary of State Henry Kissinger strongly recommended that FAO, in conjunction with the UN Development Program and the World Bank, set a goal for reducing losses, which was adopted by the General Assembly in the following words: 'The further reduction of postharvest food losses in developing countries should be undertaken as a matter of priority with a view to reaching at least a 50 % reduction by 1985. All countries and competent international organizations should co-operate financially and technically in the effort to achieve this objective' (Bourne 1977). Following this resolution a number of agencies expanded existing or initiated new programmes directed towards reducing losses in cereal grains, oilseeds and grain legumes. A 1978 report by the US National Academy of Sciences pointed out the need to consider losses other than the cereals, particularly roots and tubers, fruits and vegetables (NAS 1978). Since then other major reports (e.g. FAO 1981; Gustavsson et al. 2011) have shown that food losses are high (up to one third of food produced) but that there are still major gaps in the knowledge of where global food loss and waste occur.

The words of Marsh (2008) unfortunately are largely still true:

> Most efforts to reduce hunger concentrate on agricultural production. Food losses due to a variety of biological, chemical and physical forces are addressed much less frequently. Very encouraging work has been done at a country level, but with little international cooperation. An organised international postharvest effort could make the difference between meeting the Millennium Development Goal on hunger and falling short of that goal

Recently the Chicago Council on Global Affairs (2013) in an extensive report called for action to utilise the Millennium Challenge Corporation, the World Bank and regional development bank resources for rural infrastructure projects in developing countries *to "…*halve postharvest losses by 2023 *…."* Let us hope that more success is evident within the next decade than in the past.

1.3.3 Produce Healthier Foods and Beverages to Help Reduce Chronic Diseases and Poor Lifestyles

The food industry has made enormous strides in the past 100 years to help reduce food-borne disease, provide safe and wholesome foods at modest cost and provide a vast array of choices to enable a varied and satisfying diet. Nevertheless, the food industry can do more to help reduce dietary influences on chronic diseases such as cardiovascular and coronary heart disease, hypertension, diabetes, obesity, strokes and some cancers. It is not an easy task as even minor changes to a product's taste,

odour, flavour, texture or mouthfeel can lead to rejection or reduced sales in the market.

But changes are possible, as demonstrated by the 'Tick' scheme developed by the National Heart Foundation of Australia (NHF 2013), a not-for-profit charity that aims to reduce morbidity and mortality from heart attacks and related cardiovascular problems by encouraging healthier alternatives for families. The 'Tick' programme for over 20 years has encouraged the Australian food industry to modify products and processes to produce a range of healthier alternatives, containing less energy, sodium (salt) and saturated and *trans* fats and increased fibre, wholegrains, vegetables and calcium. The red 'Tick' on labels is permitted provided that the product(s) meet stringent compositional standards which are regularly checked. Manufacturers of products that fail to meet these criteria are encouraged to modify formulations and/or processes to meet the healthier standards. Since inception the 'Tick' programme has reduced fat and salt consumption by many tonnes, with considerable consumer benefits. Tick not only 'sign-posts' a healthier choice but also educates consumers about general nutrition via its communication initiatives in conjunction with the industry.

1.4 The Role of Education

Education is a key component in the fight against poverty, disease and hunger, and that is why government and nongovernment aid agencies place education as a top priority in the distribution of aid to the Third World. Australia's Agency for International Development (AusAID) claims that 'Education is essential to achieving the Millennium Development Goals and is an enabler of development' (AusAID 2013).

Australia is a lucky country with over 20 years of solid economic growth, and development aid has increased by about 50 % since 2006. The Australian Government has outlined a desire to provide 0.5 % of GDP for aid in the future, and it is important that this aid is targeted to achieve maximum and optimum outcomes. Australia's aid is targeted in the Asia Pacific region, and >$1.1B is proposed for education activities, the largest sector, in 2013–2014, with about two thirds on East Asia and the Pacific.

But in addition to child education, we need more trained food scientists, technologists and engineers and more investment in science and technology in the whole agri-food chain from production to consumption. We especially need consumers, and politicians, more educated about food issues, and the science and technology of food production, processing and storage. It is encouraging to see the huge expansion in food science and technology programmes in Thai universities in recent years.

1.5 Conclusions

Can [food] science and technology reduce world hunger? None of the answers to this challenge can be met by [food] science and technology alone, but it is equally clear that they cannot be met *without* knowledge and application of [food] science and technology. While some progress has been made since 1990, there is still a long way to go.

References

AusAID. (2013). *Education*. Australian Agency for International Development (AusAID). Available at: http://www.ausaid.gov.au/aidissues/education/Pages/home.aspx

Bourne, M. C. (1977). *Post-harvest food losses – The neglected dimension in increasing the world food supply*. Ithaca: Cornell University International Agriculture Mimeograph #53. ISBN 92-5-101028-5.

Chicago Council on Global Affairs. (2013). *Advancing global food security: The power of science, trade and business* (136 pp). Chicago: The Chicago Council on Global Affairs. Available at: http://www.thechicagocouncil.org/UserFiles/File/GlobalAgDevelopment/report/2013_Advancing_Global_Food_Security.pdf

Cribb, J. (2010). *The coming famine: The global food crisis and what we can do to avoid it* (264 pp). Melbourne: CSIRO Publishing. ISBN 9780643100404.

FAO. (1981). *Food loss prevention in perishable crops* (FAO Agricultural Services Bulletin No. 43). Rome: Food and Agriculture Organization of the United Nations.

FAO. (2013a). *FAO website*. Rome: Food and Agriculture Organization of the United Nations. http://www.fao.org

FAO. (2013b). *Food wastage footprint: Impacts on natural resources* (63 pp). Rome: Food and Agriculture Organization of the United Nations. ISBN 978-92-5-107752-8.

FAO. (2013c). *Toolkit: Reducing the food wastage footprint* (119 pp). Rome: Food and Agriculture Organization of the United Nations. ISBN 978-92-5-107741-2

Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R., & Meybeck, A. (2011). *Global food losses and food waste: Extent, causes and prevention* (38 pp). Rome: Food and Agricultural Organization of the United Nations.

Marsh, K. S. (2008). A call to action on world hunger. *Food Technology, 62*(3), 128.

NAS. (1978). *Postharvest food losses in developing countries* (207 pp). Washington, DC: Board on Science and Technology for International Development, National Research Council, US National Academy of Sciences.

NHF. (2013). *Heart Foundation tick*. National Heart Foundation of Australia. Available at: http://www.heartfoundation.org.au/healthy-eating/heart-foundation-tick/Pages/default.aspx

WFP. (2013). *The World Food Prize*. Available at: http://www.worldfoodprize.org

Part II
Production and Consumption

Chapter 2
No Food Security Without Food Sovereignty

Hans van Willenswaard

Abstract While efforts are made to forge a balance between food security and food safety, due attention should be given to food sovereignty in the first place. Without attributing a central position to the values implied in food sovereignty, a balance between food security and food safety would result in policy development based on a false conceptual compromise which would not adequately address the challenges of the twenty-first century.

Keywords Food security • Sovereignty • Buddhist economics

2.1 Introduction

The major question explored in this paper is how a policy development framework for Asia and the Pacific can be conceived that would pave the way for empowerment of emerging independent small-scale farmers' networks that adhere to food sovereignty, in order to enable these networks to match the enormous influence that the mainstream business sector and nation-states exert on agriculture and food distribution policies. The paper argues that without this threefold 'balance of power', full food security and full food safety cannot be achieved.

As the quest for such a policy development framework is undertaken in the context of the Asia-Pacific region, and the paper is written from a Thai perspective, a contemporary view on the ethical construct of 'Buddhist economics' will be elaborated, within the limitations of initial explorations undertaken by the School for Wellbeing Studies and Research. The School for Wellbeing was established as a small-scale independent think tank and action-research platform in 2009 by three organisations: Chulalongkorn University and the Sathirakoses-Nagapradipa Foundation, both based in Thailand, and the Centre for Bhutan Studies, Thimphu, Bhutan.

H. van Willenswaard (✉)
School for Wellbeing Studies and Research, Suan Nguen Mee Ma Social Enterprise, 77, 79 Fuang Nakorn Road, Bangkok 10200, Thailand
e-mail: hans@schoolforwellbeing.org

S. Hongladarom (ed.), *Food Security and Food Safety for the Twenty-first Century*, DOI 10.1007/978-981-287-417-7_2

2.2 Organisation Development in Thai Context: Green Market Network

The Sathirakoses-Nagapradipa Foundation (SNF) was established by Thai social activist and critic Sulak Sivaraksa in 1968. From the SNF foundation a cluster of independent organisations emerged: the Spirit in Education Movement (SEM), Ashram Wongsanit, the International Network of Engaged Buddhists (INEB) as well as a social enterprise named Suan Nguen Mee Ma in 2001. The social enterprise was an initiative that resulted from the *Alternatives to Consumerism* international conference and festival convened by Sulak Sivaraksa in Buddhamonthon – the centre of Thai Buddhism – near Bangkok, 1997, shortly after he received the Right Livelihood Award. One of the activities of the Suan Nguen Mee Ma social enterprise is the *Green Market Network*. The social enterprise also takes care of the secretariat of the School for Wellbeing.

The *Green Market Network* facilitates intensive networking between producers of organic food, responsible traders and ethical consumers, including 'green hospitals'. It supports consumer awareness with campaigns, training, publications and media relations.

> The paradigm shift that pro-organic advocates seek to promote is that organic products are not in fact too expensive, but that conventional food is too cheap because of 'externalities' and hidden government subsidies that enable non-organic food to be sold at lower prices. (van Willenswaard; in: Pierre Jacquet Ed., 2012)

The *Green Market Network* advocates that social return on preventive-health investments in organic food-producing rural and peri-urban communities, by means of guaranteed purchase by 'green hospitals' that also benefit from the healthy food supply for patients in the curative context, would be considerable. The savings by cost reduction on environmental degradation, deterioration of public health due to the hazards of industrial food production as well as often contaminated, low-quality, industrial food for consumption – and including mental health caused by lack of social cohesion and by work-related stress due to excessive urbanisation – would liberate resources to support '*organic food for all*' (poster presentation, IUHPE conference *Best Investments for Health*, Pattaya 2013). This would address in a largely uncharted way the growing incidence of non-communicable – or food- and lifestyle-related – diseases (WHO 2013).

In 2010 Vandana Shiva, ecological activist and advisor of the School for Wellbeing, advocated that the work pioneered by the *Green Market Network* should be upscaled to an international level. Her advice resulted in the *Towards Organic Asia* (TOA) programme administered by the School for Wellbeing. The TOA programme initiated the Young Organic Farmers' (YOF) movement in the Mekong region + Bhutan, initiated an action research and organised the international forum on *Innovating Alternative Markets* with Asia- and Pacific-wide participation (School for Wellbeing Report 2013).

2.3 Food Security, Food Safety and Food Sovereignty

Food security, as defined by FAO, 'exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life' (World Food Summit 1996).

Food safety encompasses actions aimed at ensuring that all food is as safe as possible. Food safety policies and actions need to cover the entire food chain, from production to consumption, according to the WHO. Contradictions between the aims of security and safety occur within the conceptual framework of food security.

During the World Summit on Food Security, November 2009, organised by FAO, the High-Level Expert Forum on How to Feed the World in 2050 was established. It concluded:

> (And) while agriculture will be forced to compete for land and water with sprawling urban settlements, it will also be required to serve on other major fronts: adapting to and contributing to the mitigation of climate change, helping preserve natural habitats, protecting endangered species and maintaining a high level of biodiversity. As though this were not challenging enough, in most regions fewer people will be living in rural areas and even fewer will be farmers. They will need new technologies to grow more from less land, with fewer hands.

Food security seems to be defined here in a context of an unchallenged sociopolitical system (continued economic growth defined by GDP, overall inequality), emphasis on 'resources' rather than on the farmers' population, prices determined by uncontrolled market mechanisms, irreversible rural-urban migration, unspecified technology needed for increase of production (not excluding genetic engineering, owned and protected by big corporations and the hidden agenda in the statement), in order to match unlimited consumption including biofuel and industrial use and a resulting research agenda prioritised by these policy assumptions.

The concept of *food sovereignty* has been formulated in the Nyéléni Declaration (Mali 2007):

> Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime, and directions for food, farming, pastoral and fisheries systems determined by local producers and users. Food sovereignty prioritizes local and national economies and markets and empowers peasant and family farmer-driven agriculture, artisanal – fishing, pastoralist-led grazing, and food production, distribution and consumption based on environmental, social and economic sustainability. Food sovereignty promotes transparent trade that guarantees just incomes to all peoples as well as the rights of consumers to control their food and nutrition. It ensures that the rights to use and manage lands, territories, waters, seeds, livestock and biodiversity are in the hands of those of us who produce food. Food sovereignty

> implies new social relations free of oppression and inequality between men and women, peoples, racial groups, social and economic classes and generations.

Food sovereignty is guaranteed if producers have unobstructed access to their rights, including land rights; they can work together at human-to-human level and primarily at local and national scale: among producers' communities and with participating consumers in a context of intergenerational responsibility. Technology is appropriate and is generated among the producers with access to research facilities and fair influence on the research agenda. 'Food sovereignty' drives a global movement of small-scale farmers.

2.4 The Organic Agriculture Movement and La Via Campesina

Is it possible to integrate food security, food safety and food sovereignty in one policy framework? To a high extent that is what the *organic movement* stands for. Drawing on centuries of tradition and contemporary innovation, it formally manifested itself as the *International Federation of Organic Agriculture Movements* (IFOAM), established in Versailles, France, in 1972. After a 'romantic' pioneering stage, IFOAM gained recognition as a worldwide organisation guarding organic standards and regulating certification practices. The global market for organic food was estimated in 2012 at 44.5 billion euros (Organic agriculture worldwide. FiBL 2012).

The total organic area in *Asia* is nearly 2.9 million hectares. This constitutes 9 % of the world's organic agricultural land. Two hundred thirty thousand producers were reported. The leading countries are China (1.6 million hectares) and India (1 million hectares). *Oceania*/*Pacific* includes Australia, New Zealand and island states. Altogether, there are 7,222 producers, managing almost 12.1 million hectares. This constitutes 2.6 % of the agricultural land in the area and 38 % of the world's organic land (Organic agriculture worldwide. FiBL 2012). Asia, apparently, is characterised by small holders while the average farm size in Australia and New Zealand is much bigger.

Interestingly, in the last decade IFOAM moved from a primarily regulatory ('third-party' certification) towards a more value-driven global network. The growing application of Participatory Guarantee Systems (PGS) is based on self-organisation, often including producers and consumers alike, matching the needs of small-scale farmers (School for Wellbeing, TOA *Innovating Alternative Markets* Report 2013).

The four basic principles of IFOAM are:

- Health
- Ecology
- Fairness
- Care

Although food sovereignty became also a major concern of IFOAM and had been from the beginning, the need for economic viability in an alien economic landscape forced much of the organic movement into mainstream business models that sometimes contradict its principles. Therefore, the birth of La Via Campesina, 'the International Peasant's Movement', in 1993 was a welcome addition to self-organised institution building. More than IFOAM, La Via Campesina took an activist position, including a strong profile during the series of World Social Forum gatherings which started in Porto Alegre, Brazil, in 2001.

Twenty years after its establishment, recognition of La Via Campesina followed:

> Today, during a meeting between La Via Campesina and FAO's Director general Jose Graziano da Silva an agreement of cooperation was formalized which acknowledged the essential role played by small holder food producers. Their role was recognised as most important in the eradication of world hunger. The cooperation will focus on various key areas: strengthening peasant based agro-ecological food production, protecting small holders' rights to access land and water, as well as improving farmers rights over seeds in accordance with international and national seed laws. This cooperation's framework will lay special emphasis on the key role played by youth and women in food production as well as the need to improve their access to land and other productive resources. (FAO, Rome, 4 October 2013)

2.5 A Policy Development Framework Inspired by Gross National Happiness

A policy framework for sustainable development, with agriculture at its heart, cannot only be constructed by values and value systems. *Food ethics* require that relations between values regarding food production and consumption, and social structures must be clarified in order to operationalise improvement. This is why Helena Norberg-Hodge, author of *Bringing the Food Economy Home* (Norberg Hodge 2002), promotes localization:

> Localizing turns out to be fundamentally in the opposite direction to what the governments are currently promoting, which is the globalization. The latter has certain systemic characteristics. First of all, it is about separating producers and consumers and separating investors from what they invest in. That is already very dangerous. The investor over here doesn't even have any idea about how the money is affecting over here. That alone means structurally that you can't have a good ethical practice.
>
> Shortening the distances, so that you see the impact of what you do, both as a producer and as a consumer, and you know what has happened and what you are. Then you can be more ethical. What also happens in the shorter distances, is that businesses become more visible and accountable to society. And what starts to happen is that culture and ecological value can shape business, rather than businesses do now, shaping culture and ecology and shaping government. (Interview with Helena Norberg-Hodge, ISHES)

In the interview Helena Norberg-Hodge not only refers to the challenges of the tension between localization and globalisation. She distinguishes business, culture,

government and ecology as four interacting societal systems, competing for influence.

Here we may turn to the 'four pillars' underpinning Gross National Happiness, a leading philosophy brought about in Bhutan. Gross National Happiness (GNH) was coined by the King of Bhutan in 1974 and later included in the first constitution of Bhutan, 2008. It was shaped as a monitoring instrument for government policies. Communication on GNH with the world beyond Bhutan was supported by a series of international conferences ('GNH3' was organised in Thailand in 2007 and resulted later in for the *School for Wellbeing initiative*). This resulted ultimately in an academic and policymaker's dialogue in the framework of the United Nations on 'Wellbeing and Happiness: Defining a New Economic Paradigm' (Royal Government of Bhutan, http://www.2apr.gov.bt/).

The four pillars of GNH are (paraphrased):

1. Cultural integrity
2. Good governance
3. Equitable economic development
4. Environmental preservation

2.6 Threefold Development in Historic and Contemporary Perspectives

The four pillars of GNH have been compared (while observing due respect) with, at one hand, the Three Jewels of Buddhism (Buddha, Dhamma and Sangha) and at the other hand with the values of the French Revolution: freedom, equality and fraternity. Both have to be understood, from a twenty-first century perspective, within the all-encompassing challenge to actively care for nature (van Willenswaard, *Critical Holism* 2008). A justification for a search for resonance between these two foundations for a contemporary ethical framework can be found in the works of Dr. Ambedkar (1891–1956), who drafted the constitution of independent India, adopted in 1949. Dr. Ambedkar however makes clear that it was not the French Revolution that influenced him, but he recognised Buddhist insights in the core values freedom, equality and fraternity:

> Let no one however say that I have borrowed my philosophy from the French Revolution. I have not. I have derived them from the teachings of my master, the Buddha. I found that his teaching was democratic to the core. (Quoted in: Lionel WIJESIRI *BUDDHA DHAMMA*: *Liberty*, *equality*, *fraternity and Buddhism*)

More recently the principle of a threefold dynamics of values has been made understood by Philippine philosopher and activist Nicanor Perlas as a new balance of power between the state, the business sector and the civil society (Perlas 2000. And: School for Wellbeing Report, International Exchange Platform on *Re-thinking*