1. The globalisation of agriculture: introducing the Handbook

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INTRODUCTION: GLOBALISATION AND THE AGRI-FOOD SYSTEM

In the last four decades there has been a radical restructuring of the scope and character of the production and distribution of many goods, including food. This process has been termed ‘globalisation’, shaping people’s lives in profound cultural, ideological and economic ways. The term has become part of the standard vocabulary of the social sciences, as it has been widely recognised that the world is experiencing a new and qualitatively different phase of capitalist development (Galbraith, 2002; Stiglitz, 2003; Steger, 2009). The characteristics of globalisation include the worldwide spread of modern technologies of production, particularly including in communications but also into farming, the agricultural supply sector and food processing. This involves money, production and trade as part of what has been termed ‘the borderless world’, and the networking of virtually all the world’s economies, fostering ever-closer functional integration (Yeung, 1998; Ohmae, 2005; Snyder, 2009). It also refers to the linking and interrelationships between cultural forms and practices that develop when societies become integrated into and dependent on world markets as part of the congruence and homogenisation of capitalist economic forms, markets and relations across markets (Cowen, 2004).

So globalisation is the process whereby the world is becoming ever more interconnected through new forms of trade and cultural exchange. This is increasing the production of goods and services, often involving transnational corporations (TNCs) that have established subsidiaries in many countries. The freer movement of capital, goods and services is making people more dependent on the global economy, with brands like McDonald’s, Starbucks and Levi’s jeans becoming recognised worldwide. The process is being driven by improvements in transportation and communications, greater freedom of trade, and greater availability of cheap labour and skills (especially in and from developing countries). This is increasing inward investment in certain countries, especially through the activities of the TNCs, which in turn is producing profound economic, social and cultural changes (Ietto-Gillies, 2012; Jenkins, 2013). Whilst many of these changes are positive, increasing choice and generating wealth, there are recognisable negative consequences, such as increased discrepancies between rich and poor (including between the developed and developing worlds), increased competition for small businesses unable to take advantage of economies of scale, negative impacts on cultural diversity and the environment, and wholesale transfers of capital and jobs to certain favoured locations (Dreher et al., 2008).

Globalisation has been greatly facilitated by the advance of instantaneous information flows via the Internet, producing what has been termed time-space compression

and time-space shrinkage (Harvey, 1999). The information flows reflect economic processes embracing links and dependencies extending well beyond local, regional or even national environs. In part this has given rise to the growth of global brands and products that essentially offer a uniform experience wherever they are consumed in the world. This interconnectedness in terms of product availability and consumption is part of trends towards greater social and cultural homogenisation, though this has not eliminated small, private traders selling locally made goods, including locally produced foods (Jackson, 2004).

Accompanying interconnectedness is flexible accumulation, in which flexibility applies to production, labour utilisation, consumption and relations between the state and the economy (Scott, 1988). Flexibility has been interpreted as the search by capital for new technological, social and spatial solutions to the economic problems arising in the 1970s and 1980s. It has global dimensions that have dramatically increased the circulation of goods, objects and cultural artefacts. The pace of change has accelerated because the goods being produced and circulated are not only material goods such as grain, oil and manufactured items, but also information and items with cultural or aesthetic characteristics (Kraidy, 2005). The consumerism with which this globalisation is associated focuses on cultural images, symbols and signs, of which agri-commodities are a component part. For example, labels such as 'green', 'fresh', 'organic' or associations with particular localities or traditional images have become part of 'the aestheticisation of consumption' (Lash and Urry, 1994).

The development of globalisation is qualitatively different from the internationalisation of world trade that developed in the nineteenth century. Globalisation implies a degree of purposive functional integration amongst geographically dispersed activities. In the case of TNCs this integration is aimed at reaching a global market, irrespective of where the company headquarters is located or from where resources are sourced and manufacturing plants are located. Thus, production transcends the locus determined by the physical limits of the nation state. One of the effects has been to intensify agricultural specialisation on individual farms and within regions whilst it has also brought increased transformation of agricultural products from items destined for immediate consumption into inputs for the greater food and industrial manufacturing system. In addition, the impacts of globalisation have varied across the wide range of agricultural products. For some commodities it is the processing corporations that are globalised; for others it is the retailers that are global but the production has a local, regional or national focus.

In referring to the advance of globalisation in recent decades it should be recognised as a complex, uneven and fragmented set of processes producing considerable geographical variation. However, it has tended to reinforce the 'global triad' of North America, Western Europe and Southeast Asia/China where trade and capital investment is increasingly being concentrated (Dickin, 2015; Glaenzel et al., 2008). This contrasts with most parts of the developing world, but there is also pronounced differentiation of 'the South' as parts of Central America, Sub-Saharan Africa and the Caribbean become progressively more marginal to the world economy. This suggests that globalisation should be seen as partial rather than overarching and inexorable. Marginal areas have increasingly become providers of cheap labour and sites for capital investment in 'alternative' ventures such as tax write-offs and low-yielding primary production (Giddens, 2002; Goldberg and Pavcnik, 2007).

The creation of global markets has been a chief outcome of globalisation processes in agriculture. This is well illustrated in the expanding trade in fresh fruit, fresh vegetables and cut flowers. This market now exceeds 5 per cent of global commodity trade, comparable with that of crude petroleum (Diop and Jaffee, 2005). New players in this global trade have appeared, notably from countries where there are low costs of production, complementarity to the seasons in the prime markets of North America and Western Europe, relatively short flight times, and development of reliability in meeting the guaranteed quality and quantity required by international markets. This has favoured producers in parts of Africa and Central America, but in particular through exploitation of other key aspects of global agri-food networks. For example, the majority of the UK's fresh horticultural imports from Africa are made through supermarkets that control 80 per cent of all food sales (Barrett et al., 2004; Dolan and Humphrey, 2004). The policies and operations of supermarkets are vital to this trade, as offering year-round supplies of fresh produce lines requires sourcing from different areas around the world. This highlights the significance of the changing nature of retailing and consumption patterns as part of the globalisation process (Coe and Wrigley, 2009). However, these cannot be divorced from other parts of the globalisation process, including increased flow of investments from developed countries to developing countries, which can have the potential to be used for economic reconstruction.

This Handbook recognises that a key area in which globalisation processes have had massive impacts is the agri-food sector where the complexities of supplying food to the ever-increasing world population have grown. The Handbook seeks to elucidate the complexities of globalisation within the agri-food sector, throwing into sharp relief the key conflicts and critical outcomes. It utilises a judicious mix of overview and case study to detail both globalisation processes and the various forms of resistance apparent to illustrate that there are definite alternatives to the homogenisation associated with globalisation. As a result it provides an innovative introduction to the impacts of globalisation on world agriculture, highlighting the challenges faced by those involved in the agri-food sector, including consumers, producers, retailers and regulators, who are increasingly faced by a choice between mass-produced foods sourced from around the world and local produce associated with 'alternative' systems of production.

STRUCTURE OF THE HANDBOOK

This Handbook is arranged in four parts that detail the various impacts of globalisation via a combination of state-of-the-art analysis and original case studies. Part I illustrates how agriculture differs from most other economic activities by being reliant upon the physical environment for a number of vital inputs. Of course, it is how these inputs have been shaped and modified by human activity that has created the variety of different farming systems, and global forces have affected the extent to which the environmental underpinnings of agriculture have been modified. One unintended global consequence is human-induced climate change, both affecting and affected by agricultural activity (Dinar and Mendelsohn, 2012). However, it is the intended consequences of human input that are primarily considered here, especially in terms of biotechnical inputs constituting large-scale modifications to soils and water supply and so creating distinctive

agro-ecosystems (Jarvis, 2010). In addition to considering ‘environmental fundamentals’ within world agriculture, this part of the book also illustrates a significant debate about the nature of agro-ecosystems. This is namely whether globalised technology, championed as the prime ‘conventional’ means for increasing food production, can be challenged by different models that are focused on organic and more sustainable forms of production not linked to applications of oil-based inputs such as inorganic fertilisers, herbicides, pesticides and petrol-/diesel-driven machinery (Etingoff, 2014).

Part II comprises a series of studies that examine how globalisation processes are regulated and governed by policy regimes operating at various levels. This includes studies that chart the changing nature of global regulation, acknowledging the rising importance of supranational bodies, such as the International Monetary Fund (IMF) and the World Trade Organization (WTO), operating within codified rules of governance. This has moved some power away from the nation state, changing the ability of individual countries to regulate trade and offering new opportunities for TNCs to operate on a global basis (McGrew and Lewis, 2013). This part emphasises the importance of the evolution of US and European Union (EU) trade policies in shaping the nature of global agri-food systems. However, it also highlights ways in which rapidly growing economies outside the traditional power blocs of the developed world, notably China, India and Brazil, have challenged established trade patterns. Many individual countries still maintain subsidies for their agricultural producers, but in general these have diminished in recent decades and hence competition for lucrative markets has increased. Sometimes relatively small changes in global regulation or the policies of an individual country can have significant consequences, both short and long term. For example, changes to EU and other regulations have contributed to a fall in UK self-sufficiency in food grown in temperate climates from 87 per cent in 1991 to 73 per cent in 2013 (National Farmers’ Union, 2014).

Part III covers the growing importance of TNCs not only in driving world trade, but also in shaping the nature of every aspect of the agri-food chain, and especially producing inputs (e.g., biotechnology), processing, distribution and retailing. TNCs are organisations that own or control production or services in one or more countries. They may have a ‘home’ base, but are in many ways stateless and possess an ability to respond to local circumstances without the restrictions that may apply to a company based in a particular country. TNCs have a worldwide approach to markets and production that can enable them to respond flexibly to new opportunities, maximising scale economies and sourcing both materials and labour globally (Jenkins, 2013). The agri-food industry has proved a particularly lucrative sector for TNCs because of global opportunities to combine particular aspects of production, processing, distribution and retailing. Fast food companies are good examples – for example, McDonald’s and Yum! Brands – often exploiting globalisation’s role in exporting Western culture around the globe. TNCs have been seen as key drivers of globalisation, with their strong autonomy helping to shape political agendas and so determining the very nature of globalisation processes (Capra, 2002).

Part III also includes reference to various changes in developing countries that have contributed to the evolution of globalisation in the agri-food sector. In particular it contains contributions that examine the emergence of the so-called Green Revolution, which has been integral to the spread of biotechnology from the West into different parts of the world. The pros and cons of this revolution are debated (see also Evenson and

Gollin, 2003) and the latest stages examined in terms of the ongoing spread of genetically modified (GM) foods. The arguments in favour of this development are advanced as well as alternative points of view. The unevenness of spread, spatially and temporally, of both the Green and GM Revolutions is highlighted, further accentuating the differentiation that has been associated with globalisation. Within the developing world the nature of this differentiation has evolved as the Chinese economy has grown dramatically in recent decades, presenting profound implications for world trade. The story of this Chinese economic and agricultural revolution is one of the aspects covered in this part. Other significant developments are also addressed, notably the growing role of developing countries in meeting the demand for fruit and vegetables in developed countries. The key role of TNCs is highlighted with respect to the growth of intellectual property (IP) regimes, the so-called ‘financialisation’ of farming and the role of private agri-food governance (Burch and Lawrence, 2013). In addition there is reference to how the global division of labour has been affected by globalisation processes, and specifically the impacts on the use and role of female labour in the agri-food processing sector.

Part IV addresses some of the current challenges to globalisation of the agri-food sector. In particular, these chapters pursue ‘alternative’ models to the dominant agri-industrial system in the developed world, reflecting initiatives taken not only by farmers but also right across the agri-food sector and including different patterns of consumption within society. At the farm level, there have been moves to reduce artificial inputs to create more environmentally friendly outcomes from farming, contributing to systems that are more ecologically sustainable (Robinson, 2009). This part considers key issues relating to the search for sustainability and the extent to which eschewing industrial-style farming methods can deliver sufficient outputs to meet the challenges posed by rising global food demand. The growth of ‘alternative’ farming systems is also reflected in ‘downstream’ alternatives as illustrated by food marketing that avoids using major supermarket chains and consumption in which the emphasis is on buying locally produced foods and avoiding ‘fast’ foods. This part introduces examples of environmentally friendly farming in both developed and developing countries, and includes references to policy supports for such farming, including the EU’s initiatives on multifunctional agriculture (Van Huylenbroeck and Durand, 2003). It discusses alternative food networks (AFNs) and alternative food economies (AFEs), which comprise several different possibilities for the development of agri-food systems that have reduced reliance on globalisation processes. These possibilities can also be seen in the developing world where the cooperative production of milk in India represents the productive utilisation of the family-farming sector to greatly increase output and meet rapidly growing urban demand (Scholten, 2010).

The following sections discuss the contributions to this Handbook in more detail.

Part I: The Physical Basis of Agriculture

In contrast to most economic activities, the physical environment is of fundamental significance to the nature of farming systems, even where farmers have used their capital to modify physical characteristics of the land upon which farming is based. So farming is strongly shaped by the natural ecosystems from which agricultural systems are derived, and hence the recognition of the agri-ecosystem in which there is a reciprocal

relationship between environmental factors and agricultural activity. This relationship injects elements of risk and uncertainty into farming unknown to other areas of economic activity. Some of the key characteristics of this physical basis to agriculture are explained in Chapter 2 by Taylor and Entwistle. They outline the origins of agriculture using standard classifications and focus on the environmental context for agriculture by covering key climatic, edaphic, site and biotic factors. Particular attention is given to the role of carbon dioxide in the agro-ecological systems.

Taylor and Entwistle highlight significant human modifications of the physical basis of agriculture for their importance within the production process, for example, irrigation, various modifications to the microclimate including greenhouses, addition of fertilisers and pesticides, and modifications to the soil structure and composition. They also acknowledge that not all of the changes associated with creation of agro-ecosystems have been positive, with issues such as salinisation, nitrate run-off into watercourses, destruction of major ecosystems, and loss of biodiversity all constituting ongoing problems attributable to agricultural development. However, in considering the question of the sustainability of agriculture they focus on a global phenomenon affecting all agro-ecosystems, namely human-induced climate change. They acknowledge that, whilst climate change will certainly affect agriculture, agriculture also has a key role to play in the potential mitigation of climate change by reducing emissions of greenhouse gases and adopting land management options to increase soil organic carbon.

A key challenge is the ability of agriculture to supply sufficient output to meet the world's demands for food whilst maintaining ecological diversity. Globalisation has helped spread industrial-style farming systems that have generally been antithetical to maintaining biodiversity. Hence in recent decades there has been growing concern about the impact of some farming systems and a countermovement in favour of more environmentally friendly farming systems. Some of the latter are commonly referred to as 'organic farming' with one of the key arguments championing attempts to increase its extent being its claimed positive impacts on preserving or improving biodiversity. This claim is investigated by Gomiero (Chapter 3), who notes how agriculture in general has had various deleterious influences upon biodiversity, especially through the impacts of agri-chemicals. Human population increases are exacerbating negative consequences as measurements of the ecological footprint of human activity indicate ever-growing habitat destruction as well as a dangerous reliance on a few selected varieties of crop and livestock species (Rees and Wackernagel, 1998). Gomiero systematically examines the effects of organic agriculture upon soil characteristics and soil biodiversity, above-ground biodiversity (including vegetation, arthropods and pollinators), the relationship between biodiversity and agricultural landscapes and pest control. In general, his meta-analysis reveals that organic production is better for preserving or improving soil quality with regard to both biophysical and biological properties. However, some similar results might be obtainable from conventional agriculture if inputs of agri-chemicals are reduced and crop production is better integrated with soil protection and maintaining diverse landscapes.

The organic movement has a relatively recent history of formal organisation, and its characteristics in terms of agricultural production vary tremendously, from low-intensity grazing throughout 'outback' Australia to closely regulated production, free of artificial pesticides and fertilisers within the EU. Hence, making international comparisons

is difficult and, in effect, organic production represents a range of different systems worldwide, with varying environmental consequences. A major criticism is that organic production gives rise to lower yields than conventional agriculture (Badgley et al., 2007). Even if the reduction on average is only 20 per cent, this could have a major impact on world food supplies, though if allied to reductions in food waste, more direct consumption of grain (rather than feeding to livestock) and reductions in the growing of biofuels, it could have positive impacts on food consumption and health (Seufert et al., 2014). The caveat here is that, despite all the technological inputs and ability to hugely increase food production in recent decades, around one billion people still go hungry each day and live on the edge of starvation. Changing to more sustainable production systems would have to be accompanied by various structural changes in the agri-food system if it is to have a serious impact on these figures.

Bringezu, Schütz and O'Brien (Chapter 4) examine the global footprint associated with the growth of food consumption, and specifically the global use of cropland. They argue that this provides a good measure of the degree of sustainability (or the lack thereof) of agricultural production. They observe that although the amount of cropland has increased relatively little in the last half-century, the amount of production has trebled. This would seem to indicate substantial increases in efficiency of production, but it has not been without negative consequences, including environmental deterioration and human health issues. Also, it is unrealistic to expect the growth of output to continue in the face of diminishing returns from increased investment and limitations imposed by climate change and other environmental constraints. Furthermore, demand for land to produce crops for biofuels and biomaterials will remove land from producing crops for food, and the changing diets in favour of meat in the developing world will reduce direct human consumption of grain, reducing the conversion rate of grain output to food consumption (Popkin, 2004).

The chapter by Bringezu and colleagues examines the agricultural footprint of countries, focusing primarily on the EU, and the potential for expanding the cropped area. The authors' estimates and those from other studies suggest that population pressure alone will produce further deforestation and conversion of grasslands to crops. So, faced by the prospect of this expansion, they ask: what constitutes safe operating limits for the maintenance of global biodiversity? Their calculations imply that over 100 million ha above the 2005 level of cropland might be 'safely' attained. They consider the consequences of this for the EU, acknowledging the need to factor in the continued expansion of biofuel production and crops grown for animal feed. However, they also acknowledge that there may be changes in patterns of consumption in favour of healthier and more sustainable options that will translate into effects on agri-food production and the area under crops. The iterative steps within this change in consumption are outlined and they discuss the possible policy changes that will promote greater sustainability over the next quarter century.

One of the 'solutions' suggested to meet the growing world demand for food is for there to be continued intensification of production (i.e., greater productivity per unit area) but in a sustainable fashion, termed 'sustainable intensification' (Pretty, 1997). Russell and Omer (Chapter 5) consider this proposition, formulating it in terms of a scenario 'in which increasing input use and ecological services jointly contribute to food production even as ecological degradation is balanced by induced conservation'. They

set out the challenges posed by the need to expand the output of food and then assess the various conditions to be met by the application of sustainable intensification. This is a complex equation, in part dependent on population projections, but also reflecting changing diets and hence patterns of consumption across the world allied to the Earth's finite resources that make attaining an acceptable balance between production and maintenance of biodiversity extremely difficult.

Russell and Omer consider the technological and social underpinnings for sustainable intensification, which includes a closer interrogation of the concept itself (and its historical antecedents), using input and output approaches. They employ a simple model of the decisions facing a self-interested agricultural producer seeking the highest levels of utility consistent with available resources, technology and ecosystem quality. This uses mathematical equations to consider the impacts of different production systems (including use of artificial inputs) on the environment over time and space. The analysis enables different 'regions' to be recognised, including those where a balanced adjustment between intensification and maintaining biodiversity is impossible. They consider how equilibrium might be obtained between intensification and ecosystem degradation, and demonstrate how a process of sustainable intensification could be a natural outcome of self-interested managerial decisions. However, this depends on the initial starting point in terms of the existing stock of natural capital, with the potential to add to low stocks by combining some environmentally friendly activities with intensification. The types of ecosystem present are also extremely important, as only some can be sufficiently resilient to the impacts of intensification to avoid damage. The modelling raises issues regarding the extent to which policies supporting agri-environmental schemes eliminate or reduce voluntary pro-environment actions (Whitfield, 2006).

Part II: Globalisation and Policy Regimes

Globalisation has been fostered by new institutional mechanisms of control and cooperation in the global movement of capital. So the IMF has assumed increased importance as several aspects of policy-making have been displaced from state to supranational institutions following the demise of the Bretton Woods system in the 1970s (contributing to the ending of national currency regulation via the gold and dollar standard). This declining significance of national regulation has also applied to agricultural production where many domestic tariffs on key national produce have been cut, in part through the outcomes of the 1990s Uruguay Round of the General Agreement on Tariffs and Trade (GATT). This promoted trade liberalisation, as has the new trade organisation emerging from the Uruguay Round, the WTO, and it has further assisted institutional mechanisms and norms of a system of global regulation (McMichael, 1994; Landau, 2001; Lanoszka, 2009). This should benefit global accumulation strategies of TNCs, further enhancing control of markets and production sectors by major companies. Yet, regulations of trade have by no means disappeared, with new measures protecting domestic markets emerging in the USA and the EU. These measures can be seen as an evolution of post-war state support for agriculture, which has been widespread across the developed world. However, this support was also geared towards increasing production, often with a focus on investment in research and development, and hence the term 'productivism',

characterised by agricultural intensification, concentration and specialisation (Ilbery and Bowler, 1998; Wilson, 2001).

Grant (Chapter 6) notes that trade in agricultural goods provides both an indication of the extent of globalisation and also the extent of resistance to it. He examines the different types of national interest that conflict in international negotiations, and how these differences affect the politics of subsidies. The latter are often related to ‘agricultural exceptionalism’ and the difficulty in attaining a balance between supply of and demand for food. Exceptionalism (meaning that agriculture is treated differently to other areas of the economy) is closely related to the powerful presence of the family farm in many national psyches, including the USA and many parts of Europe (Grant, 1995; Daugbjerg and Swinbank, 2008). The protectionism of family farming associated with the EU’s Common Agricultural Policy (CAP) has its roots in a previous era when the farm lobby was more politically powerful and when agriculture was more prominent in national economies. Meanwhile, growing prosperity in China and India is both altering consumption patterns in those countries and presenting new challenges for those advocating greater freedom of trade in agricultural produce. However, Grant observes that within negotiations on world trade the dominant neoliberal paradigm continues to encourage reductions in subsidies, though the global financial crisis has reduced the effectiveness of some of the neoliberal arguments (Anderson and Nelgen, 2012).

Grant concludes that despite a gradual erosion of agricultural exceptionalism it appeared in different guises in the Uruguay Round and the Doha Development Round of world trade negotiations. He charts the key elements in these two rounds, acknowledging that the dominance of US and EU interests gave way to more multilateral concerns and some binding commitments to reduce subsidies. Yet, several key elements remain for further negotiation, including possible recognition of ‘sensitive’ products for some countries, to enable retention of protectionism. And indeed protectionism remains an ongoing presence for some products and for some countries/trading blocs, distorting trade and restricting the advance of globalisation processes. In part this reflects a cooling towards further liberalisation on behalf of the USA, but also with the stance taken by other countries that contributed to the demise of the Doha Round of world trade negotiations (though a dispute settlement mechanism remains in place) (Richter, 2014).

Winders (Chapter 7) discusses the contribution of US agricultural policy to globalisation. He notes how past concerns with price supports, production controls and export subsidies effectively ended with the 1996 Federal Agriculture Improvements and Reform (FAIR) Act, mirroring worldwide moves away from national regulation and support for agriculture (see Guyomard et al., 2000). He examines the evolving complex interrelationship between US policy and world agriculture throughout the twentieth century, including more recent policy directions and the consequences of the shift away from supply management. He focuses on the relations between class, state and market, especially for the key crops corn, wheat and cotton, using the concept of food regimes. This links international relations of food production and consumption to forms of accumulation and regulation under capitalist systems from the 1870s onwards (Robinson, 1997). Usually three regimes are recognised: one running from the 1870s to World War I, based on grain and meat exports from family farms in New World settler colonies; a second from the 1920s to the 1980s based on supplying food for mass consumption in the developed world; and an evolving third regime (post-Fordist agriculture) focused on globalisation

of production and consumption but recognising the emergence of 'fresh', organic and reconstituted foods (Holt Giménez and Shattuck, 2011).

Winders argues that trade liberalisation, underpinning the most recent manifestations of globalisation, contributed to US policy ceasing to regulate agricultural prices and production, but in the context of new supranational regulation (e.g., the WTO). This has produced greater international and sectoral competition but accompanied by increased export opportunities, in turn making world agriculture more vulnerable to market fluctuations and creating greater instability in agricultural prices. This has prompted calls for the reintroduction of regulation and protests at the rising power and importance of the major food TNCs (Desmarais, 2007; Thomas, 2007). However, the USA retained fixed income farm supports until the 2014 Agricultural Act (the 2014 US Farm Bill), which has placed income caps on farm subsidies and ended direct payment subsidies that had cost USD5 billion per annum. Some of this money will be added to the government-subsidised crop insurance scheme (United States Department of Agriculture, 2014).

Anderson (Chapter 8) extends the analysis of trade in food and fibre by examining the impacts of neoliberal trade reforms in the last three decades, though he notes that there remain policies subsidising agricultural production in developed countries whilst in the developing world farmers exporting 'plantation crops' are often directly taxed for doing so. He focuses on policies distorting prices faced by farmers in developing countries over the past half-century and the ongoing need for further pro-poor policy reforms worldwide. He summarises how policies distorting farmer incentives have evolved, starting with how Britain used export taxes and licences to control prices of domestic food for six centuries prior to the Industrial Revolution. In general in the twentieth century the trend in the developed world has been increasingly to assist agriculture relative to other industries. Meanwhile, post-1945 many developing countries imposed direct taxes on exports of farm products. For OECD member countries producer support has risen since the mid-1980s, though it has fallen as a share of overall returns to farmers. Anderson argues that full trade liberalisation offers the prospect of developing countries increasing both their share of world food exports and outputs in an expanding world trade market. Latin America would account for nearly half of this projected increase. Net farm incomes could rise considerably in some parts of Africa and Latin America but with falls elsewhere because of the growth of other sectors of the economy.

Anderson also assesses prospects for further reductions in trade-distorting measures, noting how China acted unilaterally to dismantle its supports in recent decades. Elsewhere favourable loans from international financial institutions have encouraged India and others to effect reductions. The GATT multilateral Uruguay Round Agreement on Agriculture had a positive effect, though many developing countries remain reluctant to implement further reductions. Indeed, some may be tempted to follow Japan, South Korea and Taiwan into high agricultural protection, yet investment in public agricultural research and development would probably produce far greater returns.

It is often argued that globalisation processes are restricted or modified by actions imposing regulations and introducing subsidies that distort the free market. Dorward and Morrison (Chapter 9) investigate this particular aspect of globalisation by considering how agricultural subsidies impact on food security and the reduction of poverty

in developing countries. They differentiate between output price supports (e.g., import restrictions, export promotion and intervention prices), output price subsidies to producers or consumers, and production subsidies (e.g., credit or input subsidies). They conclude that agricultural subsidies had significant positive influences on the Green Revolution in Asia by encouraging farmers to adopt new technologies, thus overturning conventional wisdom from the 1980s and 1990s that said agricultural subsidies were largely ineffective and inefficient policy instruments. However, they stress that subsidies in developed countries depress the earnings and welfare of small producers and societies in poor countries. Subsidies in the Global South can be used for misappropriation of government resources or alternatively they fail to produce the desired outcomes if prior and complementary investments are not made. Yet, they argue that under the 'right' circumstances subsidies in different countries may actually be crucial in promoting substantial food security and poverty reduction by supporting supply chains and rural input and output markets (see Dorward et al., 2004; Poulton et al., 2006). The authors produce a framework to show the particular role of subsidies in the processes and conditions for agricultural transformations whilst recognising that it can be harmful to expand and continue with market interventions and subsidies when they are no longer necessary.

The final chapter in this part by Long, Liu and Li (Chapter 10) deals with some of the most dramatic changes to occur in a single country within the last half-century, namely China. Here there are some of the best examples of how global influences can shape the whole of the agri-food sector when allowed to permeate a previously highly protected and controlled economy. The policy change that brought about the opening up of the Chinese market was profound, ending long isolation and allowing global forces both to shape the Chinese economy and, in turn, to be shaped by China's own rapid economic advance. The very nature of globalisation in the twenty-first century now owes much to decision-making in Beijing and the way in which China will interact with the rest of the world. Long and colleagues show how China's dramatic recent industrialisation has been closely allied to rural transformation in which agriculture has responded to globalisation and marketisation following the implementation of economic reforms from 1978. This has produced strong competition for prime farmland, with rampant urban sprawl contributing to the loss of farmland and decreased national grain production, exacerbated by the 'Grain for Green' programme aimed at preserving biodiversity in sensitive areas (Uchida et al., 2005; Lin and Yao, 2014). The reforms have also promoted rapid adoption of mechanisation in agriculture, substituting machinery for labour and intensification of production involving more capital investment to increase output in response to growing demand for food. This has involved a growth in multiple cropping (Waldron, 2010; Yilong, 2014). Long and colleagues highlight some key geographical variations in measures of farm output and intensity of land use, which are giving rise to major policy issues for the country and beyond. Indeed, the need to feed China's 1.3 billion population is having global impacts as Chinese interests purchase land and food processors in different parts of the world, especially in the last decade in East and West Africa, as a potential source of additional food that can be exported to China (Cotula, 2013). In China itself the policy challenge is reflected in a growing amount of legislation under the overriding agenda of 'building a new countryside' (Long et al., 2010).

Part III: Globalisation and Transnational Corporations

Many analysts of the overall impacts of globalisation contend that the benefits are largely confined to those in control of key parts of the process or with particular connections to it. Elsewhere the majority of humanity has received few benefits or has actually been impoverished. This has furthered the world divide between the developed and developing worlds, and within the latter between small wealthy urban elites and the countryside. However, the situation is not static, with globalisation contributing to rapid and sustained economic growth in parts of China, India, Brazil, the oil-rich Middle Eastern states and the so-called Southeast Asian ‘tiger’ economies. These successes have led some to argue that developing countries will be able to take increasing advantage of markets in the rich North for primary produce, processed foods and cheap manufactured goods. Others contend that the mixture of freer trade, protectionism practised by the USA and the EU, and economic controls under the WTO, IMF and World Bank will undermine the competitive abilities of farmers in the Global South, recreating neocolonial relationships dominated by major TNCs who control the processing and marketing sectors of the agri-food industry (Swinnen, 2007; McCulloch et al., 2008). Indeed, one of the principal impacts of globalisation upon agriculture has been the growing dominance of international corporations both downstream (processing, retailing) and upstream (supply of machinery and other purchased farm inputs), so that farming has been ‘repositioned’ within this wider agri-food system (Pimbert et al., 2001). To compete within this system many farms have had to invest heavily in machinery and acquiring more land to benefit from scale economies and by increasing production. The latter has often led to negative environmental consequences occasioning corrective policies to promote ‘environmentally friendly’ actions on-farm (Sage, 2011).

The potential trajectories under globalisation will be operating on very different systems of agricultural production around the world. At one level there are major contrasts between the Global South and the higher capital investment in machinery and purchased inputs in agriculture in the developed world. Similar patterns of investment have also contributed to increases in output in China and in some tropical regions where increases in labour input have been accompanied by dissemination of improved crop varieties, for example raising the global production of *padi* rice and maize. However, continuing reliance on a large farm labour force has been unable to provide jobs for all of the rapidly growing rural population of the tropics, and large-scale rural to urban migration has continued for many decades. As numbers of city dwellers have grown, so too has the need for farmers to produce food for the burgeoning urban market. This has placed increased pressure on subsistence production systems in parts of the tropics as food production solely for purposes of consumption by farmers and their families is inexorably displaced by production for sale, and even farmers remote from metropolitan centres become part of the global agri-food system (Mertz et al., 2009; Gudeman, 2013). This process has produced greater wealth for some, but there have also been negative outcomes (see Rigg, 2006), including the abandonment of ecologically beneficial traditional farming practices; increased environmental destruction; the demise of traditional social and cultural institutions as a result of intensified production; the shedding of farm labour, which adds to rural unemployment or swells the numbers migrating to rapidly growing cities; and increased production of non-food crops like cotton, coffee, tobacco

and palm oil, where processing (and sometimes crop production too) is largely dominated by the TNCs.

An additional component producing key changes to the smallholder sector in some parts of the world was the impact of the so-called Green Revolution, first popularised in the 1960s, consisting of high-yielding crop varieties (HYVs), fertilisers, pesticides, machinery and irrigation, and promoted largely by funding from the West. Basu and Klepek (Chapter 11) directly assess the geographies and histories of the Green Revolution. In terms of the revolution's role in advancing globalisation of agriculture, they highlight the links between global imperatives and transfers of new agricultural technologies, the importance of place and environment in shaping outcomes, and its role in increasing the 'corporatisation' of the agri-food sector. The key role of the USA in sponsoring the spread of Green Revolution technology is well known, but the pre-1940s roots of this international focus are traced alongside the stimulus posed by the Cold War and US attempts at asserting its global influence. The authors discuss the ongoing role of the Consortium of International Agricultural Research Centers (CGIAR) alongside key United Nations' agencies as a means of providing an institutional framework for the globalisation of the Green Revolution. Despite its undoubted impact on grain output in certain parts of South and Southeast Asia and Latin America, the negative environmental and social consequences of the Green Revolution are also well known (Leaf, 1987; Conway and Barbier, 2013). Case studies from Mexico and India are used as illustrations.

Basu and Klepek also address the emergence of biotechnology and especially GM foods as the latest phase of the Green Revolution, making it a Gene Revolution (Fukuda-Parr, 2012). The authors note how the USA has again been the leader in exporting the new GM technology, especially to Brazil and Argentina, but largely through US-based TNCs, such as Monsanto, Dow and DuPont. The growth of intellectual property rights (IPRs) and global regulation through the WTO has helped cement the role of TNCs in this dissemination process, as has US involvement in bilateral and multilateral trade agreements with developing countries. Set against these developments are oppositional forces concerned with GM's environmental effects, the need to protect biodiversity, and promote free trade in biotechnology products, for example, the Cartagena Protocol on Biosafety (CPB) and the Convention on Biological Diversity (CBD), the latter not signed by the USA. So GM crops remain the subject of intellectual dispute (Weis, 2007). The relative lack of Green Revolution developments in Africa is considered in this chapter, whilst acknowledging ongoing attempts to disseminate new biotechnology, as in the case of the Alliance for a Green Revolution in Africa (AGRA) established in 2006 (Sanchez et al., 2009). However, here the links between the spread of biotechnology and land grabs by non-African governments suggest that benefits may not accrue to local communities, but rather may primarily serve the global economy.

The spread of biotechnology and GM foods is further addressed by Nicholson (Chapter 12), who argues strongly that GM foods are unlikely to provide a solution to world hunger. They have the potential to be a transformative technology, but to date the high costs and corporate controls have restricted their impact on global food supplies. Nicholson contrasts some of the rhetoric associated with GM foods against the ongoing presence of food shortages across the developing world, and protests in the form of so-called 'food riots' in the face of rising prices for staple grains. He highlights 2008 as

a pivotal year with respect to both food riots and meetings to decide on new strategies to tackle hunger. The latter have repeated previous emphasis on biotechnology solutions, moving GM foods firmly to the top of the global agenda, reflecting the fervour with which GM technology has been championed in some quarters. The potential of GM technology in this context is contrasted with ecocentric alternatives, termed here as the 'organic option' (see Harris, 2012). Nicholson investigates some of the key debates presented about GM foods, dispelling several myths, but primarily in the context of 'solving' world hunger by referring to standard Malthusian explanations, Amartya Sen's (1981, 1999) entitlements explanation, and the work of Jenny Edkins (2002). Nicholson reassesses the 'food riots' of 2008, many of which sought political and structural changes, regarded by many observers as the antithesis of the growing control of GM technology in the hands of a small number of major corporations. Hence at present the development of GM foods is doing little to address the needs of those suffering from hunger and malnutrition.

Some have seen globalisation as representing another form of colonialism, introducing the tyranny of the global market instead of the controls exerted by a colonial power. Yet the legacy of the latter can still be seen vividly in the ongoing widespread cultivation of 'plantation' crops across the tropics, such as rubber, cotton, sugar, bananas, coffee, tea and palm oil. This colonial impost created a dual economy between the colonial-run plantation sector and locally operated smallholdings producing food crops, which was at its peak in the first half of the twentieth century (e.g., Barker, 1993; Hayami, 2002). However, blurring of the sectors has occurred for many decades, now fostered by globalisation as plantations have passed into local hands and the smallholders too have grown some plantation crops, often on holdings subject to structural change through land reforms, such as those operating for over a century in Mexico. Globalisation has introduced some new 'plantations', notably the huge cattle ranches created across large parts of Amazonia, and exports of high-value foods, such as fruit and vegetables, which now exceed the value of exports of coffee, tea, sugar, cotton, tobacco and cocoa from developing countries. Pre-existing agribusiness TNCs have taken advantage of this growing trade whilst for some commodities, notably bananas in Central America and the West Indies, neocolonial patterns of production and trade are still dominant, involving companies such as Del Monte, Chiquita Brands International and Geest, who have developed vital relationships with individual retail chains in targeted countries (Raynolds, 2003).

Kalfagianni and Fuchs (Chapter 13) tackle this key element in globalisation, in exploring the role of private agri-food governance in the form of TNCs, whose global reach has extended enormously since 1945. These TNCs are now dominant players in areas of agricultural inputs, trade and processing, and retail distribution, and private governance is increasingly influencing governmental regulation. Examples of governance have included the implementation of codes of conduct, quality assurance, certification and labelling programmes, and product and process standards. However, the role of private governance is not necessarily a benign force when examining negative externalities of the agri-food system, and it presents various challenges including issues of democratic legitimacy and equity. The authors discuss four areas of contention: uptake boost, regulatory capture, weakening of standards, and barriers for small-scale capital. They examine three prominent private governance institutions showing how there has been uptake in

the market, though unequally dispersed geographically, with the Global North dominating. Regulatory capture, marginalising the vulnerable and actors representing broader social interests, is clearly evident, accompanying a weakening of standards towards less stringent goals and creation of barriers to participation by small-capital actors.

Parfitt and Robinson (Chapter 14) examine another emerging aspect of globalisation, namely intellectual property (IP) regimes, which are contributing to a concentration of capital in a small number of private companies. These rights have emerged as a concern for governments from the 1980s, but now with globalising effects impacting on agricultural production and agri-food systems (Maskus, 2000). In part this reflects the growing role of the WTO and its ability to promote enforcement of IP internationally. For agriculture, the IP focus relates to patents and plant breeders' rights. Parfitt and Robinson discuss the nature of IP rights within the agri-food sector, recognising that GM plants can be covered by several patents. They contend that the USA has been able to maintain influence worldwide over IP rights through bilateral and regional arrangements encouraging greater convergence with respect to plant-related intellectual property. This may be having an adverse impact on farmers' rights, though treaties established in the last decade have started addressing this – for example, the International Treaty on Plant Genetic Resources for Food and Agriculture (2004) and the putative Nagoya Protocol, though with limited impacts to date.

As described by Parfitt and Robinson, plant breeding has accompanied major biotechnology developments in world agriculture, both before and during the Green Revolution. By 2011 this was a multibillion-dollar industry, but with two-thirds of the global proprietary seed market controlled by just a few companies, and with consolidation of private power in particular markets (Borowiak, 2004). Close links of such firms to government and universities have helped those companies impact public policy, further emphasising the changing role of farmers as lessees of patented seeds, plants, fertilisers and pesticides. Farmers' rights movements, such as La Via Campesina, are championing 'food sovereignty' or the right of peoples to healthy and culturally appropriate food produced through sustainable methods and their right to define their own food and agriculture systems (Desmarais, 2007). However, such aims often bring farmers into conflict with the holder of IP. Parfitt and Robinson provide examples of these conflicts, including organic producers affected by neighbouring farmers growing GM crops.

Lawrence, Sippel and Burch (Chapter 15) examine one aspect of the subsumption of farming into other sectors of the economy and specifically finance. In the past, agriculture has generally been deemed too big a risk for serious investment and hence finance has focused on real estate, shares and bonds. However, various aspects of globalisation are making agriculture more attractive to major investors, including the growth of biofuels, the scarcity of prime farmland in the developed world, and changing food demands in India and China. Furthermore, major farm commodities are becoming assets ripe for speculation. The authors refer to this new attention being devoted to agriculture as part of 'financialisation' or the rising importance of the finance sector in the operation of economies and governing institutions. It is a process that has grown from the 1970s under neoliberalism, favouring short-term speculation, especially in commodity markets, though this has increased economic volatility and contributed to the recent global financial crisis (Russi, 2013). Lawrence and colleagues chart the preconditions for and the drivers of the financialisation of food and farming. They identify three

forms of financialisation in the sector: takeovers of food manufacturers and retailers, commodity speculation, and direct investment in farmland. A key player in the process of farmland investment is the sovereign wealth funds, usually derived from sales of oil and other natural resources and held by sovereign states, especially oil-rich Middle East countries. These have increasingly been invested in foreign countries to tackle food security through acquisition of land. Investments are still small but several African countries have been targets (Cotula and Vermeulen, 2009; Von Braun and Meinzen-Dick, 2009). The investment may have positive effects by 'liberating' underutilised land for productive use. However, other views refer to 'land grabs', and neocolonialism that marginalises local knowledge and exploits local people. Various resistance movements have been created to oppose foreign land grabs and protect the livelihoods and rights of farming communities. This is a challenge also taken up by one of the most well-known rural rights organisations, La Via Campesina (Borras, 2008).

Major food retailers have increasingly helped to shape farm-based production through forward production contracts, and especially those concluded with larger enterprises located close to processing facilities (Watts and Little, 1994). Fruit, vegetables, pigs and poultry have been most affected by such contracts, though farms have largely remained in the hands of families rather than large corporations. Some exceptions have occurred in the USA, notably where gigantic beef feedlots have been assembled by processors such as ConAgra and EXCEL. Contracts between retailers and farmers have also become increasingly important, with major supermarkets generally able to determine the market price for both food processors and farmers. However, these three-way relationships are also occurring on a global basis so that processors and farmers are experiencing new levels of competition. This is especially so for certain types of produce, notably fruit and vegetables, and is illustrated by Sippel (Chapter 16), who uses the example of Morocco to demonstrate how farmers outside the developed world have to juggle competing demands of global and local markets. Sippel notes that the Global South has accounted for 40 per cent of the increasing volume of the global fruit and vegetable trade in recent years as agri-food networks have been extended. This has often replicated traditional colonial ties but with greater complexity that reflects the role of new players, for example major supermarket chains, new multinational shipping firms and transnational food processing giants.

Focusing on the fertile Souss region, the heartland of Morocco's exports of vegetables, tomatoes and citrus fruits, Sippel recognises significant differentiation within the region's farming sector. Production for export is dominated by a small group of actors that include some family businesses and a mixture of Moroccan and European investors. They are organised in export groups and cooperatives or are contractually affiliated to packing stations that export fruit and vegetables. However, in the last two decades foreign investment has entered this sector, encouraging counterseasonal production during the European winter months. Joint Moroccan–European ventures have proliferated as private export enterprises, controlling every level of the value chain and developing high compliance standards. Increased export production has led to overexploitation of water in the region, so there are real concerns over the future sustainability of the industry. The export industry utilises cheap local labour and in-migrants who have swelled the ranks of wage labourers. Many of the export businesses, though, are not owned by locals and there is a new phenomenon of absentee landlords. Sippel concludes

that there is a range of negative outcomes from the export model adopted, not least the move to greater reliance on wage labour (Gertel and Sippel, 2014).

Bryant (Chapter 17) addresses the impacts of globalisation on the food processing sector, drawing upon Australian examples to show how many of the labour requirements of the sector have tended to accentuate low-skilled jobs occupied by women, though government policies have often introduced programmes supporting new technologies, training to raise skill levels, and strategies to address skills shortages to increase productivity. Yet, there has been a widespread tendency by firms to develop employment conditions based on low-wage, low-skill, under- or non-unionised employees, reliance on temporary labour from agencies (mostly migrant labour), and high proportions of female workers. This has been true for different enterprises in the sector, including meatworks, dairy, fruit and wine processing, where ‘inequality regimes’ have been established that maintain class, gender and racial inequalities (Bryant and Pini, 2011). These have paralleled similar inequalities within the production sector associated with the growing use of cheap, unregulated labour on farms to undertake low-skilled tasks, such as fruit picking (Hoggart and Mendoza, 1999; Martin, 2002). Bryant provides an overview of work-skilling policies employed across the food processing industry in Western economies, starting from some of the arguments presented by Manuel Castells (1996) regarding the globalisation of labour markets, emphasising the importance of a highly skilled, creative and autonomous labour force at the heart of productivity and competitiveness. This has given rise to debates about how best to ensure that the workforce is ‘properly skilled’ and the need for policies to minimise ‘skills shortages’. However, training to upskill the workforce can be viewed as a cost by employers who see their needs met by a particular type of worker and might ignore people who possess skills not deemed congruent with particular industry needs. Alternatively, the industry has ‘deskilled’ many jobs associated with assembly and batch production.

Rickson, Rickson, Hoppe and Burch (Chapter 18) investigate how global agri-food companies interact with local communities. They consider major issues relating to who obtains the economic benefits from these interactions and how the social and environmental risks are distributed. There are complex power relationships involved between the companies and the locals, often based on who owns resources and how access to land and resources is obtained. Often different global players are in competition for land, especially where mining interests may desire land also targeted by the agri-food sector. The authors discuss the various strategies adopted by companies to secure access, noting that it is not always the company that succeeds in obtaining control and that legislation can sometimes protect local interests. They refer to various concepts and programmes that apply to companies, including corporate social responsibility and the ‘triple bottom line’ in which social and environmental concerns are addressed rather than just a narrow focus on profit (Foran et al., 2005). They also note that many companies are not rigid ‘top-down’ vertical structures but are characterised by ‘structural heterogeneity’ in which local managers have more authority and autonomy to deal with local communities. Hence there can be tensions between ‘standard’ company policy and localisation. Community responses can also be highly variable, complex and not necessarily monolithic as there may be several competing interest groups demanding that their interests are satisfied.

As discussed by Rickson and colleagues, the farmers’ lobby may be one of several

competing for attention. One of the major changes in recent decades has been the nature of the relationship between some farmers and major agri-food companies. The farmers have become contract suppliers, especially to processors and supermarkets, often having to meet stringent compliance standards (Wrigley et al., 2005; Wrigley and Lowe, 2014). In most of the contracts the power resides with the company, and farmers often complain about this power imbalance, and how this most adversely affects their profit margins. Compliance represents one way in which companies increasingly exert control over day-to-day operations on farms, so that family farm labour and land become organisational assets. Farmers frequently refer to their relationship with the companies in stark terms, complaining of ‘ruthlessness’, ‘betrayal’ and ‘powerlessness’. This feeling of being on the receiving end of company power is often greater for women farmers – embodying a lack of consultation by the companies. However, there are also examples of how farmers are meeting this global challenge by mobilising themselves into lobby groups and cooperatives (e.g., Franks and McGloin, 2007).

Part IV: Challenges to the Globalisation of Agriculture

The rising costs of farm inputs and the narrow margins imposed upon farmers by processors, wholesalers and retailers have had major implications for farm incomes. Amongst responses to this ‘price–cost squeeze’ has been diversification of the activities of farm families, including new on-farm enterprises (e.g., new crops/livestock, farm-based tourism, on-farm processing and direct marketing to consumers) and off-farm income generation (e.g., haulage, contracting, non-farm employment) (Robinson, 2004; Barbieri et al., 2008; Maye et al., 2009). This has produced significant variety amongst farm families, but with a tendency for a dualism between small marginal operations, often located in limiting physical conditions, and large heavily capitalised businesses often in favourable physical environments. The latter has on occasion involved accumulation strategies pursued through corporatisation of agribusiness development, involving complex relationships with finance and industrial capital (Paarlberg, 2013). However, family farms have proved resistant to being subsumed by other sectors of the economy, and many ‘agribusinesses’ remain family owned and family operated (Johnsen, 2004; Smithers and Johnson, 2004).

Family farms have remained dominant in the developing world, and have increasingly produced not only food crops for local consumption but also plantation crops whereby they engage with global processes. Hence, although greater control on ‘plantation’ production is now exerted by major corporate retailers and the global retail market, the segmentation of the latter has given rise to new opportunities for small producers through new market niches – for example, exploiting the growth of concern over ethical aspects of production and trade, including the treatment of workers and producers within farming systems. ‘Ethical trade’ has included fair trade agreements, safe working conditions for disadvantaged producers and employees, and sustainable and environmentally safe natural resource management (Nicholls and Opal, 2005). This largely reflects consumer concerns and power in developed countries, giving rise to so-called fair trade products (e.g., fair trade coffee) and new links between producers and consumers (e.g., Cafédirect), favouring agreements between retailers in the developed world and small producers in the Global South (Raynolds et al., 2004; Renard, 2005).

This development combines both the creation of new global links and the emergence of a more local dimension to consumption patterns, sometimes termed ‘relocalisation’, in which mass consumption is mediated by local specificities. Amongst the characteristics of relocalisation are concerns for the place or region of origin of food as part of a desire for authenticity, greater variety and concerns over the standards of mass production and processing practices (Ricketts Hein et al., 2006; Marsden, 2010). While global chains of supply have grown as a result of globalisation, so too have ‘alternative’ food networks that reflect local manifestations of growing global concerns, including social movements related to concerns with the environment, sustainable agriculture, health issues, conservation of genetic resources, animal rights, social justice, consumer preference, organic foods, non-traditional medicine and ethnic cuisines (Sonnino and Marsden, 2006; Jarosz, 2008; Goodman et al., 2012).

Changes on farms have been integral to these alternative developments, including increased direct marketing from farmers to customers, producing for niche markets (such as organic and speciality foods), and placing greater emphasis on environmentally friendly production as part of what has been termed post-productivism. First popularised as a term in the 1990s, this refers to adjustment strategies pursued by farmers, partly in response to the challenges posed by globalisation. It has frequently been linked to the adoption of agri-environmental measures, especially in the EU but also in other developed countries, and a raft of other changes has been highlighted. These include the diminished political power of the farming lobby, changing views of the countryside (in which food production is only one of many activities), new forms of rural/agricultural governance (including growing environmental regulation and measures promoting sustainability, but also progressive withdrawal of support for agriculture), commodification of former agricultural resources (including land, wildlife habitats, barns and cottages), new forms of agricultural production (often emphasising quality not quantity), and various farm adjustment strategies (Tilzey and Potter, 2008). Yet the emphasis on many farms remains predominantly productivist, even on holdings pursuing organic production or combining ‘traditional’ crop and livestock output alongside a more diversified business (Walford, 2003). This does not imply a sharp break from concerns for the need to produce food for mass consumption, but in part addresses the greater segmentation of the food market, and hence the growth of organic foods, food with a clear geographical or artisanal provenance, and an emphasis on ‘local’ production. This has led to the suggestion that the term ‘multifunctional’ agriculture is a better descriptor than post-productivism (Wilson, 2007).

Fielke (Chapter 19) examines the characteristics of multifunctionality, and specifically its role in maintaining local diversity in the face of globalisation. Multifunctionalism recognises that there are both commodity and non-commodity outcomes to farming activity, and hence that activity incorporates explicit social and environmental impacts which are not treated as ‘externalities’ that are simply the responsibility of the rest of society. This was recognised by the EU in its Agenda 2000 and subsequent reforms of the CAP. Fielke refers to this as ‘top-down’ policy that economically values the multifunctionality of agricultural land use, extending beyond agri-environmental programmes that promote ‘environmentally friendly’ farming. However, criticisms of the policies contend that essentially farming in the EU remains productivist, with environmental and social benefits being less than fully integral to farming activity. Fielke

draws contrasts between the EU and Australia, where there have not only been limited producer supports for farmers in recent decades, but also a more limited tradition of finding compensation for the social and environmental disbenefits of farming. Within the dominant export-orientated productivist agricultural sector, however, there are some AFNs representing 'grassroots' multifunctionalism, especially organic production and the emergence of farmers' markets. Fielke discusses some of the factors encouraging these developments and explores the differences between the 'bottom-up' paradigm in Australia and the 'top-down' state-supported multifunctionality in the EU.

Bardsley (Chapter 20) notes how globalisation has produced contrasting and contradictory outcomes when viewed at the local scale. On the one hand it has entailed the availability of a diversity of globally sourced foods from a multiplicity of production systems worldwide, but on the other hand it is eroding diversity by promoting uniformity of production at the expense of agrobiodiversity and a loss of local specificity in production systems. He notes the presence of various forms of resistance to these globalising trends both in developed and developing countries, where maintenance of local diversity is supported by the complex interaction of state policy, conservation programmes, marketing initiatives and cooperative action. He argues that maintenance of agrobiodiversity is a significant component of future global food security, and to this end some of the assumptions of the dominant liberal-productivist paradigm need to be challenged. In part this reflects a need to continue learning lessons from the early phases of the Green Revolution when, despite some major gains, risks were also apparent and notable disbenefits were incurred from the over-reliance on new technology, unproven under certain physical conditions. Greater adaptability to risk can be saved by maintaining diverse agro-ecosystems, as illustrated by Bardsley using examples from Thailand and Switzerland.

He discusses initiatives that have sought to retain landrace crop varieties, such as traditional rice varieties in the Isaan region of Thailand or traditional cereals (e.g., rye, spelt, emmer and einkorn) in the canton of Graubünden in Switzerland. He identifies government support as a crucial factor in encouraging greater agrobiodiversity, along with support from other players such as NGOs, supermarkets and local marketing cooperatives. From these case studies he considers a policy agenda to support agricultural diversity, including initiatives such as cultural recognition, regional and organic production accreditation, and direct environmental payments for agrobiodiversity. He discusses both in-situ programmes and ex-situ conservation initiatives, but notes that loss of agrobiodiversity is still occurring, partly because scientific values are prioritised over farming communities' own knowledge (Raymond et al., 2010), and greater value needs to be given to immediate use values that can be recognised explicitly to support farmers to recreate diversity.

Ilbery and Maye (Chapter 21) provide a European perspective on the changing dynamics of alternative food networks (AFNs). They view AFNs as part of the new relations developing between the state and the private sector, and between the market and civil society. These relations can be traced directly to the impacts of deregulation, privatisation and reduced state involvement. Increasingly it can be argued this is producing a contrast between an agri-industrial paradigm, dominated by industrialisation and globalisation of the agri-food production chain, and an integrated, territorial agri-food paradigm, characterised by AFNs and food production based on specific qualities and

distinctive features of an area or region (Goodman and Goodman, 2009). The chapter elaborates the theoretical debate about AFNs, reflecting different academic approaches in political economy, rural sociology/development and network theory, and discusses the emergence of key related concepts. Amongst these are short food supply chains, with a small number of nodes between the producer and final consumer; concentration theory, whereby economic relationships are 'culturalised' reflecting the emergence of particular conventions relating to quality food products; and social embeddedness, whereby economic behaviour is embedded in and mediated by a complex web of social relations. They caution, though, that simple interpretations of AFNs as representing positive values of social justice, equality, sustainability and ethics are misleading. Indeed, many producers involved in AFNs may also be part of more conventional networks.

In focusing on Europe, Ilbery and Maye look at how AFNs and 'relocalisation' of food systems have exploited product, place and process to emphasise differentiation of particular foods. For example, there have been EU-wide attempts to establish the link between product and place through quality food labels, and hence the protected designation of origin (PDO) and protected geographical indication (PGI) quality labels to protect producers from those in other locations attempting to copy their product, whilst promoting products with a recognisable geographical origin (Parrott et al., 2002; Gutierrez, 2005). The chapter examines the geography of PDOs/PGIs whilst also considering the retail end of AFNs, for example, farmers' markets and box schemes (Renting et al., 2003; Brown and Miller, 2008). Finally, the role of AFNs in the broader context of food security is considered with respect to AFNs in the UK. Whilst it is acknowledged that in outright quantitative terms they will not make significant contributions, their major impact is considered to be at a micro rather than a macro scale, affecting particular communities, households and individuals. However, there are also wider impacts relating to the social and cultural acceptability of certain types of food and education about food (linked to health issues, social inclusion and social justice). It is in these areas that there remains a need for much research to be done on the role and impacts of AFNs.

Blay-Palmer and Knezevic (Chapter 22) examine the growth of alternative food economies (AFEs) and specifically their contribution to sustainable development. Drawing on ideas contained within complex adaptive systems theory they use examples from Ontario, Canada, to consider how bottom-up participatory schemes can be scaled up and scaled out (replicated). They note the diversity of the initiatives in the goals and motivations of AFEs, and report on particularly promising schemes, including several spanning more than a decade of activity. They are cautiously optimistic about the potential for scaling up from local initiatives, both developed by the provincial government and civil society organisations. The Ontarian provincial food system has become increasingly diverse and prolific, with evidence of the diversity and complexity needed for future development of robust and resilient food systems. Ongoing provincial government involvement is providing seedcorn funding for new local food initiatives. However, the long-term sustainability of some of the individual projects is less certain, highlighting a major concern over many of the world's agri-environmental and 'local' food projects, namely what happens when the period for which targeted funding has been allocated comes to an end. In particular, the authors express a concern about the extent to which large TNCs are able to co-opt local agendas to produce food that does not adhere to sustainable production methods. Nevertheless they recognise the potential to expand

cooperation, improve food economies, and give more serious attention to environmental sustainability.

Finally, Scholten (Chapter 23) tackles the issue of the dual economy, the legacy from European colonisation in many parts of the developing world, using the example of dairy production to illustrate how smallholder agriculture in parts of India has been transformed first by the impacts of the Green Revolution and then by globalisation. He argues that the White Revolution, the growth of fresh milk production in India by smallholder producers, parallels the Green Revolution in that it has involved a major increase in output, but differs because it has not been reliant on the mechanisation, irrigation and chemicals that characterised the Green Revolution. In contrast, the White Revolution was founded on a low-input/low-output model, but like its green counterpart, with a particular investment catalyst, namely Operation Flood, which commenced in the 1970s. Essentially this is a cooperative production scheme, initially involving 1.5 million farm families, with overseas aid (especially from the EU and World Bank), and contributing to growth of well-defined 'milksheds' for India's major cities (Dalal and Pathak, 2007). Funding for the project ended in 1996, but the cooperative model has been extended in some provinces, notably Gujarat and Karnataka, and the White Revolution remains a model for other UN-FAO dairy industry development programmes.

CONCLUDING REMARKS

This Handbook discusses various facets of the globalisation of agriculture, which can be broadly summarised under four key themes: (1) the physical basis underpinning world agriculture and the ongoing impacts of globalised agriculture on the physical environment; (2) the policy regimes aiding or restricting the advance of globalisation; (3) the key role of TNCs in developing globalisation; and (4) various challenges facing the globalisation of agriculture. Within the ongoing debates about the impacts and potential of globalisation there are two key issues that stand out and need further attention as they represent the immediate context in which the globalisation of agriculture will develop in the next decade: food security and climate change.

The World Food Summit of 1996 defined food security as existing 'when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life' (WHO, 2014, paragraph 1). An additional component relates to cultural aspects of consumption, as people's cultural preferences can compromise health through people eating unhealthy diets despite having good access to plentiful supplies of nutritious food. Thus, in general, food security rests on food availability, access to food, and food use. Clearly food security is a complex issue. It is an ever-present concern throughout human history and development, but its global political connotations have increased in recent years, in part because of the different views associated with globalisation. One argument contends that globalisation is ensuring there is greater distribution of food around the world, but a counterargument says that globalisation is increasing disparities, enhancing uneven development and failing to overcome endemic problems of hunger and malnutrition in some parts of the developing world (Brown, 2012; Naylor, 2014).

Growing political concern can be seen regarding national food securities, in which national stances with regard to both domestic agriculture and trade in food are critical.

Some countries contend that the push to enhance globalisation through trade liberalisation threatens their domestic food production and hence national food security. This has led to some developing countries requesting that current negotiations on agricultural agreements allow them to re-evaluate and raise tariffs on key products to protect national food security and employment (Schanbacher, 2010; Rosegrant et al., 2014). Other countries (notably China) are developing policies to help support increased domestic food production whilst also establishing additional production offshore (Kugelman and Levenstein, 2012). Yet the latter may contribute to reduced access to food in countries where foreign concerns are increasingly controlling the means of production while at the same time developing a pattern of trade that sits outside a globalised free market. The impacts that such changing national policies may have on food security in a globalised context are only poorly understood and require more detailed investigations.

Rising energy demands and the expansion of biofuel production are considered as posing another considerable threat to national food securities, as they reduce availability of farmland for food production and may drive up food prices, while doing relatively little to reduce greenhouse gas emissions (Scharlemann and Laurance, 2008). So-called second-generation biofuels, which can be produced from non-food crops like prairie grasses or trees grown on marginal lands, may have less impact on food production, but there may continue to be tensions between food production and energy production. The potential outcomes of this collision between food security and energy security are complex and are likely to once again place rich and poor nations on opposite sides of the argument.

Rising concerns over food security are closely linked to the emergence of forecasts that global warming may have major negative consequences for food output. In particular, declining global per capita agricultural production linked to climate change may have serious consequences in parts of the developing world, especially for cereal production. Many developing countries rely primarily on local agricultural production to meet food needs, so if that production is disrupted by climate change or other factors then hunger and starvation can ensue. Globalisation can only transform this picture if it contributes to raising yields in those parts of the world most susceptible to further food shortages associated with climate change-induced yield reductions from staple crops. It is most likely to do this via contributing to improved distribution of seeds and fertilisers, which can then raise yields (Funk and Brown, 2009). However, the extent to which such programmes will be able to avoid repeating the mistakes made during previous rounds of the Green Revolution remains debatable.

Debates on the impacts of global climate change and their links to globalisation processes frequently portray the latter as contributors to human-induced global warming through increases in generation of greenhouse gases. Hence the ongoing worldwide concerns about climate change are inextricably linked to debates about the nature of globalisation. For the latter, this has principally concerned the drive towards industrialisation and mass consumption in developing countries. China has been the best example of a transformation inspired in part by change that has permitted hugely increased participation in global processes, and it is generally the impacts of transport, the ecological footprint of trade with the rest of the world, and environmental destruction that have attracted the most attention. However, climate change may impact negatively on

agricultural output worldwide and so pose a significant threat to the ability of agriculture to meet the growing demands for more food from a rising world population.

Greater connectedness associated with globalisation means that extreme weather in one part of the world may have wide-ranging global consequences. For example, extensive drought and above-average temperatures in the major cereal-growing belt in Russia in 2010 led to fires that destroyed one-third of the country's wheat output that year. The subsequent ban on Russian wheat exports for national food security reasons raised prices on the international market, which exacerbated food shortages in several countries reliant on this market (McMichael, 2013). Yet, while such extreme weather events may become more frequent as a result of climate change, the chief threat to food production from climate change lies in the increased pressures likely to arise from increased land degradation and water shortages.

One of the issues regarding potential impacts of climate change is that they are uncertain and contradictory (Nelson et al., 2009). For any particular crop, the effects of increasing temperatures will depend on the optimal temperature for growth and reproduction of the crop. Warming may help improve crop performance, and hence output, but if warming exceeds a crop's optimum temperature, yields could decline (United States Environmental Protection Agency, 2014). Higher CO₂ levels could increase yields, especially for wheat and soybeans, but other crops, such as maize, would show smaller positive responses. However, other factors may counteract these potential yield increases – for example, if temperature exceeds a crop's optimal level or if sufficient water and nutrients are unavailable, increases in yield may be reduced or reversed. Many weeds, pests and fungi thrive under warmer temperatures, wetter climates and increased CO₂ levels. Together these problems alongside greater frequency of floods and droughts could reduce output, but with highly differential impacts worldwide, increasing the propensity for large disparities in food availability.

Understanding the combination of threats and opportunities associated with climate change worldwide, and how these will interact with globalisation processes to impact on global food security, poses an unprecedented challenge to future generations. Increasing our understanding of these complex relationships remains a key priority and requires ongoing research and critical debates to inform future policies aimed at addressing food insecurity, global hunger and uneven development. This Handbook seeks to provide a state-of-the-art summary of current debates and a starting point for subsequent discussions and investigations into the relationships between globalisation, agri-food systems and food security issues.

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